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The Swiss Tropical and Public Health Institute (Swiss TPH) Overview

The Swiss TPH

The Swiss Tropical and Public Health Institute was founded in 1943 as a public organisation. It is supported through core grants by the Swiss Federal Government and the Canton of Basel-Stadt (total 18%). The remaining part of the funding (82%) is from competitively acquired project funds and the earnings of the Service Departments.

The mandate of the Swiss TPH is:

To contribute to the improvement of the health of populations internationally and nationally through excellence in research, services and teaching and training.

Board of Governors
10 members from the Canton Basel, the Swiss Federation, universities and the private sector. Chairman: Felix Gutzwiller, Vice-Chairman: Jörg H. Schwarzenbach

Directorate
Director: Marcel Tanner, Deputy Directors/Department Heads: Nino Künzli, Nicolaus Lorenz, Department Heads: Christian Burri, Christoph Hatz, Gerd Pluschke, Administrative Director: Stefan Mörgeli

Administration
Stefan Mörgeli

Teaching and Training, Knowledge Management, eLearning, Library
Axel Hoffmann

Swiss Centre for International Health
Head: Nicolaus Lorenz
Deputy Head: Claudia Kessler

Medicines Research
Head: Christian Burri

Pharmaceutical Medicine
Christian Burri

Regulatory Affairs
Karen Maigetter, a.i.

Security/Biosafety
Communication/PR

Epidemiology and Public Health
Head: Nino Künzli
Deputy Head: Mitchell G. Weiss

Biostatistics and Computational Sciences
Tom Smith

Chronic Disease Epidemiology
Nicole Probst-Hensch

Ecosystem Health Sciences
Jürg Utzinger

Environmental Epidemiology and Risk Assessment
Martin Röösli

Environmental Exposure Sciences
Sally Liu

Gender and Health
Elisabeth Zemp Stutz

Health Interventions
Christian Lengeler

Health Social Sciences
Mitchell G. Weiss

Health Systems
Don de Savigny

Human and Animal Health
Jakob Zinsstag

Medical Parasitology and Infection Biology
Head: Gerd Pluschke
Deputy Head: Reto Brun

Molecular Parasitology and Epidemiology
Hans-Peter Beck

Molecular Diagnostics
Ingrid Felger

Gene Regulation
Till Voss

Helminth Drug Development
Jennifer Keiser

Molecular Immunology
Gerd Pluschke

Parasite Chemotherapy
Reto Brun

Tuberculosis Research
Sebastien Gagneux

Swiss Centre for International Health
Head: Nicolaus Lorenz
Deputy Head: Claudia Kessler

Health Systems and Economics
Manfred Störmter

Health Technology and Telemedicine
Martin Raab

Sexual and Reproductive Health
Claudia Kessler

Systems Performance and Monitoring
Kaspar Wyss

Gene Regulation
Till Voss

Health Interventions
Christian Lengeler

Medical Consultations
Johannes Blum

Travel Clinic
Christoph Hatz

Medical Practice Foehre
Johannes Blum

Vector Control Centre
Pie Müller

Diagnostic Centre
Head: Hanspeter Marti

National Reference Centre for Diagnostic Immunology
Stefanie Kramme

National Reference Centre for Diagnostic Parasitology
Hanspeter Marti
Project countries and research and service projects in partnerships including multiple short- and longterm collaborative arrangements in research, services and teaching and training
Foreword

It is always a great pleasure to introduce the Biennial Report to our staff members, collaborators, governing body, colleagues, friends and the interested general public in Switzerland and abroad.

When presenting our biennial report, we not only report about key developments, but at the same time we wish to thank you all for your support and interest. We sincerely hope reading about our developments stimulates further interest in and support of our activities. The collaborators of Swiss TPH are always ready to provide more detailed information about specific projects and achievements and can be contacted directly or through our website (www.swisstph.ch).

Developments and highlights

The biennium was marked by a major step in our institutional development. The Swiss Tropical Institute (STI) changed its name to Swiss Tropical and Public Health Institute (Swiss TPH) beginning in 2010. We now sail under a new logo, but have not forgotten our roots or our former logo, the Tsetse fly. Our mandate is unchanged: to contribute to the improvement of the health of populations internationally, nationally and locally through excellence in research, services and teaching and training.

Since its foundation in 1943, the STI has been known both in Switzerland and worldwide for the quality of its teaching, research and services, and its commitment to work for better health nationally and internationally. Since June 2009, in connection with the appointment of the new Chair of Social and Preventive Medicine and Public Health of the University of Basel, Professor Nino Künzli, and the addition of a new associate professor position for public health, Professor Nicole Probst-Hensch, the Institute for Social and Preventive Medicine (ISPM), with more than 50 members, has been integrated into the former STI.

The integration of the ISPM was a harmonious process thanks to the extremely collaborative and positive attitudes of all staff members of both institutions. The integration process did not imply major structural changes as well reflected in the organogram (see the box on p. 2). Most of the integration took place in the Department of Epidemiology and Public Health, where four new units were established. Professor Nino Künzli took over the leadership of this department from Professor Mitchell Weiss, who – after 14 years of successful leadership for which we are all greatly indebted to him – continues as deputy head of the department. The ISPM is well known nationally and internationally for its research in environmental epidemiology, women’s health and in chronic disease epidemiology. In March 2010 the ISPM moved into the renovated premises of the former STI.

Under the new name and umbrella of Swiss TPH, close to 600 men and women from more than 40 nations collaborate in Basel and in more than 20 countries around the globe under a shared vision to understand diseases and their distribution, to launch appropriate health interventions, to strengthen health systems, and to contribute to alleviate poverty.

The Swiss TPH – like its predecessor, the STI, continues to be an associated institute of the University of Basel, with extensive teaching commitments in the faculties of Medicine, Natural Sciences and Arts, including many postgraduate courses. The association with the University of Basel is formalised in a contract. Our new logo also incorporates the logo of the University of Basel to reflect our close collaboration and mutual support. The Institute also plays a leading role in the Swiss national programme of advanced education in Public Health, and in an international network of institutions of higher education by offering programmes in the fields of international and global health.

A second major highlight is the comprehensive renovation of the building at Socinstrasse 55a, leading to over 1,700 m² of new space for offices and laboratories. In addition, the remaining laboratories were renovated and the working space was optimised in all our buildings. A significant part of the new construction is the BSL-3 facility which allows us to advance the research on mycobacteria (tuberculosis, Buruli ulcer) and brucellosis as well as other microorganisms that require laboratories with the second highest level of biosecurity. It is in connection with these investments that we attracted another Swiss National Science Foundation assistant professor, Sébastien Gagneux, who will pursue his laboratory and field-based tuberculosis research at Swiss TPH. These comprehensive renovations and investments into the BSL-3 facility and Swiss TPH laboratories were undertaken thanks to an investment grant from the Canton of Basel as part of the local government’s contribution to the core funding of Swiss TPH.

In 2009, the former Pharmaceutical Medicine Unit of the Swiss Centre for International health, led by PD Christian Burri, was upgraded to a full department that is now called Medicines Research. This development strengthens our role in validating new tools (diagnostics, drugs, vaccines)
against neglected tropical diseases and diseases of poverty according to accredited international standards. Work in this department is complemented by operational research and institutional (as well as individual capacity) building by our partners in the South.

At the level of the directorate, I am most fortunate to be assisted by two highly experienced deputy directors, Dr. Nicolaus Lorenz and Professor Nino Künzli. I should like to mention the harmonious transition at the level of our administration. After nearly 30 years of unflagging, dedicated and most competent leadership, the administrative director, Ueli Wasser transitioned his role to Stefan Mörgeli and retired. Stefan Mörgeli was administrator of the Swiss Tropical Institute Field Laboratory in Ifakara Tanzania in the early 1990s, and he returned to the institute after a distinguished career as administrator and manager of hospitals, CEO and finance consultant in the private sector. We wish him the very best and deeply thank Ueli Wasser for his enormous contributions to the growth of our institute. We are very happy that Ueli Wasser, besides enjoying the well-merited retirement, continues to assist us as administrator of the Rudolf Geigy Foundation and the Jubilee Foundation which are both related to the Swiss TPH (see also page 11).

The report further highlights that, in addition to its well-known focus on diseases of poverty and neglected tropical diseases, the Swiss TPH has become equally active and recognised (particularly through the integration process) in the area of chronic diseases, ecosystem health and environmental epidemiology. Moreover, the institute is now involved in strengthening health systems, including understanding the social, cultural and economic contexts that govern health and social systems. This has become a major strength and a strong focus in research, training and service provision. In this context, we are also very proud that through the Swiss Centre for International Health we act as partner in many other Global Health Initiatives, lead/participate in several EU FP7 programmes and continue our consultancies for bi- and multilateral organisations as outlined in all following sections. These important achievements were made possible by the fruitful combination of research on disease and health systems with our service support and consultancy services for health systems.

Teaching and training (see section 25) remain a cornerstone of our activities, and we cover all levels, ranging from general introductory courses for the informed public to special courses (more than 230 weekly hours of teaching per year) and to running or contributing to the tropEd network with its diploma course and institutional (as well as individual capacity) building by our partners in the South.

Members of the Board of Governors (Kuratorium 2008–2010)

Professor Dr. Felix Gutzwiller, Chair
Institute for Social and Preventive Medicine, Zurich, Switzerland

Mr. Jörg H. Schwarzenbach, Vice-Chair
Aquila Investment Ltd., Basel, Switzerland

Prof Dr. Michel Carton
Deputy Director, IHEID, Geneva, Switzerland
(until June 2010)

Mrs. Anne-Christine Clottu Vogel
Chair, IUED Board (until June 2009)

Prof. Dr. Sabina De Geest
Head, Institute of Nursing Science, Basel, Switzerland

PD Dr Monika Griot-Wenk
Crucell Switzerland AG, Switzerland

Prof. Dr. Jacques Louis
Pasteur Institute, Paris, France

Prof. Dr. Peter Meier-Abt
Vice Rector Research, University of Basel, Switzerland

Mr. Joakim Rüegger
Head, Higher Education, Cantonal Department of Education, Basel, Switzerland

Prof. Dr. Didier Trono
Dean, Life Sciences, Swiss Federal Institute of Technology, Lausanne, Switzerland

Prof. Dr. Werner Zimmerli
Head, Internal Medicine/Infectiology, Cantonal Hospital, Liestal, Switzerland

Prof. Dr. Marcel Tanner
Director, Swiss TPH, ex officio

Mr. Ulrich Wasser
Administrative Director, Swiss TPH, Secretary to the Board, ex officio (until December 2009)

Mr. Stefan Mörgeli
Administrative Director, Swiss TPH, Secretary to the Board, ex officio

be what it is today without its deep roots in the long-term partnerships and the strong commitment to capacity building, training and academic exchanges. The teaching faculty of Swiss TPH providing these services to the University of Basel, besides commitments in many national and international universities, comprises now 27 staff members and includes two chairs (Epidemiology and Medical Parasitology, Faculty of Science, Social and Preventive Medicine, Faculty of Medicine), two associate professors (Epidemiology, Faculty of Science and Faculty of Medicine), 11 titular professors (7 Faculty of Science, 4 Faculty of Medicine) and 5 assistant professors (“Förderprofessur” of the Swiss National Science Foundation or SSPH+).

Swiss TPH is now firmly established as an institute for international and public health with an attractive portfolio driven by academic excellence and national as well as international standards of high quality, accredited services and consultancies for the local, national and interna-
Strategic Plan of Swiss TPH, 2010–2016
the essentials

1. Vision of Swiss TPH
Our vision is to achieve significant improvements of human health and well-being through a better understanding of disease- and health systems and acting on this knowledge

2. Mandate of Swiss TPH
Our mandate is to contribute to the improvement of the health of populations internationally, nationally and locally through excellence in research, services, teaching and training.

3. Strategic Goals of Swiss TPH
   1. Contribute to the understanding of the disease biology and develop tools and strategies for diagnostics, prevention and cure
   2. Create global leadership in integrated health systems research, strengthening and training
   3. Create national and international leadership in the epidemiology and control of communicable and non-communicable diseases in their social, cultural, environmental and systems contexts
   4. Provide expertise on healthy societies and equitable access to health
   5. Serve as a resource centre to provide expertise for national and international agencies
   6. Generate and provide pre-travel advice, infection diseases diagnoses (National Reference Laboratory) and post-travel cure to travellers and long-term expatriates
   7. Create and provide excellence as a competence centre for eHealth that innovates and applies information and communication technologies
   8. Act and develop as a learning organisation with a knowledge-sharing culture and defined processes of internal and external knowledge flows.

4. Key Areas of Activities
   1. Basic research in infection biology
   2. Molecular and genetic epidemiology
   3. Research and development for vaccines, drugs and diagnostics; including the respective clinical-trial expertise
   4. Chronic diseases
   5. Environmental epidemiology
   6. Travel and tropical medicine
   7. Health systems analysis and strengthening
   8. Health and environmental impact assessment
   9. Human and animal diseases in the biological, ecological and social context
   10. Society, culture and health
   11. Sexual and reproductive health and gender
   12. Biobanks, databases and data repositories
   13. eHealth
   14. Modelling and biostatistics Bringing benefits of research and services into teaching, training and policy making
   15. Translating research findings and scientific reputation into advisory, controlling and implementation services at national and international level.

For details on objectives and expected outputs of the key areas of activities please refer to www.swisstph.ch

tional levels. Thanks to the integration process, we could further bundle the critical mass in all key areas. Looking at the global challenges of health and health development in a globalised world, high quality and effective contribution to international health is only possible if one is well rooted in the national public health context and vice versa. It is with this recognition and spirit that we now pursue our mandate and have developed our strategic plan for the period 2010 to 2016.

The development of the strategic plan 2010–2016 under the umbrella of our mandate was another highlight of the biennium and a most stimulating exercise for the whole institute. All project, unit and departmental leaders were involved in the process. The strategic plan firmly builds on the departmental strategies and entails eight overarching strategic goals (see the box on the left). Successfully meeting our strategic goals requires commitment to three key areas: (i) Develop iterative research and development processes for populations and their health, social and environmental systems, by working across the health sciences spectrum from molecule to policy with interdisciplinary approaches to health and well-being, (ii) Undertake projects/programmes in partnerships that are undertaken with the spirit of mutual learning for change and respect equity principles and the global human right for access to health and (iii) Form strategic alliances with national and international centres of excellence that are based on clearly defined roles and responsibilities.

Therefore, our guiding principle is to work in interdisciplinary partnership to respond to local, national and international public health priorities, seeking solutions through needs for innovation (discovery through promotion and testing of hypotheses), validation (evidence providing what works) and application (strengthening individual and public health actions, systems and policies). We generate new evidence, validate it in different health system settings and directly translate evidence into policy and public health action by combining excellence in science and training of an academic institution with the standards of corporate organisations in consulting, backstopping and contract research organisation. We place particular emphasis on: (i) Expanding our already large network of national and international collaboration; (ii) Strengthening our long-term associations, such as the one with the University of Basel; (iii) Deepening strategic alliances (e.g. with the Institute of Global Health of EPFL); and (iv) Continuing and strengthening the long-term partnerships established over decades where Swiss TPH has also been founder member and/or leading house, such as the Ifakara Health Institute (Tanzania) or the Centre Suisse de Recherches Scientifiques, (Côte d’Ivoire). These long-term partnerships also entail the creation of ten NGOs in ten countries where Swiss TPH has been active in collaborative programmes over the past two decades.

Our strategic goals will be achieved through the outputs of 16 interrelated key areas of activities that are defined with a mid-term perspective and based on the currently active priority programmes/projects (see the box on the left). It is well understood that these areas may change after tasks...
are completed and/or new areas are created following the dynamics of an active institution, new opportunities or strategic choices. We are all very committed to translate our strategic plan into research, teaching/training and direct public health action.

The finances of Swiss TPH still require the highest attention, as our core funding is currently at a level of 18%. This is not satisfying, as there are hardly any funds for strategic investments when opportunities or challenges come up. Nor are there adequate funds to assure the continuous renovations and replacements of equipment. Over 80% of our funds have to be acquired competitively every year (see page 12). Based on the strategic plan, we submitted the midterm development plan to our local and national governments and hope that we can reach a core funding in the range of 20–25% from 2012 onwards. The consolidation of core funding remains a challenge and is crucially important for the successful implementation of our strategic plan and, hence, the pursuit of our mandate.

Outlook

Given these developments (that are more detailed in all following sections), Swiss TPH can confidently tackle the future and feels ready to face the challenges of international and public health. However, we must not only follow our strategic plans, but we also have to remain vigilant to the rapidly changing priorities and needs. We need to maintain the spirit of innovative, thinking pioneers. Above all, however, we need to keep our enthusiasm and the joy of discovery, sharing and translating evidence into public health practice. It is enthusiasm and joy, not concern and worries, that will carry us into the future and will foster partnership and collaboration.

None of the work described in this report would have been possible without the fruitful partnerships and collaborations with national and international institutions and the generous, unconditional support granted by the many donors mentioned throughout the report. We are deeply indebted to all of them.

The harmonic development of the Swiss TPH is only possible with the most competent guidance and advice provided by the Board of Governors (see box on page 5) and the international External Review Team (see box on top). We are extremely grateful for their critical comments and their forward-looking, far-sighted recommendations.

My deep and sincere thanks go to Janine Love who carefully edited this report and to Joachim Pelikan and Markus Weber who planned, illustrated and again well co-ordinated the production of the report.

My warm and highest appreciation goes to all Swiss TPH staff members – scientific, technical and administrative staff and students – and all our collaborating institutions – locally, nationally and internationally. Their wonderful, unfailing commitment, countless new ideas and hard work made possible the achievements described here.

I wish you a stimulating read and look forward to your comments and suggestions as well as the development of possible new collaborations.

Marcel Tanner
Director

Members of the External Review Team serving 2008–2010

Prof. Dr. Carlos M. Morel, FIOCRUZ, Rio de Janeiro, Brazil (Chair)
Prof. Dr. Peter Alplanalp, University of Applied Sciences Northwestern Switzerland, Olten, Switzerland
Prof. Dr. Pascale Allotey, Brunel University, United Kingdom
Prof. Dr. Michael Alpers, Curtin University, Perth, Australia
Prof. Dr. Fred Binka, Dean School of Public Health, University of Ghana, Legon, Ghana
Dr. Uli Certa, Roche Ltd, Basel, Switzerland
Prof. Dr. Gianfranco Domenighetti, University of Ticino, Lugano, Switzerland
Dr. Walter Fischli, Actelion Pharmaceuticals Ltd, Allschwil, Switzerland
Dr. Marie Paul Kieny, WHO, Geneva, Switzerland
Prof. Dr. Thomas Löscher, Abt. Infektions- und Tropenmedizin, Klinikum der Universität München, München, Germany
Dr. Halima Mwenesi, Centre for Health Policy and Capacity Development, Washington D.C., USA
Dr. Vinand Nantulya, FIND, Geneva, Switzerland
Prof. Dr. Rino Rappuoli, Global Head Vaccines Research, Novartis Vaccines, Siena, Italy
Dr. Beate Ritz, University of California (UCLA), School of Public Health, Los Angeles, CA, USA
Prof. Dr. Jonathan M. Samet, Department of Preventive Medicine, Keck School of Medicine, Institute for Global Health, University of Southern California, Los Angeles, CA, USA
Prof. Dr. Martin Schumacher, Institut für Medizinische Biometrie und Medizinische Informatik, Abt. Medizinische Biometrie und Statistik, Universitätsklinikum Freiburg, Freiburg, Germany
Dr. Tessa Tan Torres, WHO, Geneva, Switzerland
Prof. Dr. Carol Vlassoff, University of Ottawa, Canada & Quepos, Costa Rica

What guided us – the harmonious integration of the Institute of Social and Preventive Medicine of the University of Basel into the Swiss Tropical Institute to form the Swiss Tropical and Public Health Institute symbolized by the art of a proud villager from Ipai village, Tana Island, Vanuatu. Two parts of one leaf interwoven to form a harmonic and balanced entity. Photo: M. Tanner, 2009
Marcel Tanner: The Swiss Tropical Institute (STI) was founded in 1943. The main driving force and founder was Professor Rudolf Geigy, who also became the first director. Recognising the need to establish a research, training and resource centre for tropical medicine, local and national governments supported the creation of the institute in the middle of World War II.

Professor Geigy was a man with great vision and he recognised very early the need to combine sound interdisciplinary research (in this case on tropical diseases and mainly on host-pathogen relationships) within the context of the social and cultural conditions of an endemic area, with training and service provisions. He felt that this approach would generate new evidence as well as contribute to health development. Since then, this goal has become our mandate. Particular emphasis was placed on the iterative process between field and laboratory research and on research partnerships with the South, mainly in terms of the two field stations he created: The Swiss Tropical Institute Field Laboratory at Ifakara, Tanzania (now: Ifakara Health Institute) and the Centre Suisse de Recherches Scientifiques in Abidjan/Adiopodoumé, Côte d’Ivoire. His successors, Professors Thierry A. Freyvogel and Antoine A. Degrémont built on these beginnings by strengthening the medical and diagnostic service components, stimulating the creation of the department of public health and epidemiology and embarking in major health development programmes beyond basic biomedical research on parasitology and infection biology.

Building on these foundations, I have had the privilege of developing STI towards a fully fledged institute of international health covering innovation, validation and public-health application through excellence in research, teaching/training and service provision. We have clearly maintained tropical medicine as a singular focus, but we have also added a strong health systems and policy component at the level of research and services. In addition, research and control of the diseases of poverty (malaria, tuberculosis and HIV) as well as neglected tropical diseases helminth infections (schistosomiasis and food-borne trematodes) at the laboratory and population level were developed to broaden international recognition. We have begun to focus on the problems of chronic diseases along side with the processes of epidemiological transitions in many countries, particularly in relation to urbanisation in Africa and Asia. Innovative approaches led to, among other developments, (i) the leading role of STI in malaria research and control/elimination, (ii) the centre for biological screening of drugs against neglected tropical diseases, (iii) the validation of the “one health” concept (combination of human and veterinary medicine for health service provision and research-cum-action on zoonoses), (iv) the establishment of social sciences around gender-sensitive vulnerability and resilience concepts for health development, (v) approaches towards systems thinking as a concrete way forward to health development, (vi) the creation of pharmaceutical medicine functioning like a Contract Research Organisation as a new Department of Medicines research and, last but not least, (vii) the development of the department Swiss Centre for International Health as a major resource and service platform for health systems and health development.

Over the years, our partnerships have been expanded by assisting the transition from field sites and centres towards the creation of national centres of excellence in Africa and Asia. Teaching/training has become an integral part of our research and service provision, and every year we work with some 80 PhD and 40 MSc students from more than 20 different nations with the spirit of mutual learning for change. Thus, the STI has deep roots and has covered a long road, but the mandate to contribute to the improvement of the health of populations internationally, nationally and locally through excellence in research, services and teaching and training remains today and will for the decades to come.

Nino Künzli: The ISPM has its root in a small unit of the School Health Services of Basel-Stadt, led by Professor Ritzel in the 1970s and 80s where research was based on Basel school children. In 1978, Professor Ursula Ackermann-Liebrich – at that time a young physician with a thorough training in epidemiology and public health – was appointed as the only assistant of the unit. In 1986 she became the head of a unit that soon became independent of the School Health Services, yet still was part of the county public health
agency. Under her lead, the unit steadily increased through competitive research funds, marking a new area of growth in research, teaching and training in the field of social and preventive medicine. With Charlotte Braun-Fahrlander joining in the 80s, the unit was able to develop the field of environmental epidemiology, laying the groundwork for a highly successful research agenda investigating the health effects of ambient air pollution and other environmental factors on public health.

In 1992 – almost 30 years after the University of Zurich – University Basel founded the Institute of Social and Preventive Medicine (ISPM). Professor Ackermann-Liebrich became the first chair of public health and the first female professor at the medical faculty in Basel, and fostering research careers for women has been an inherent element of her leadership. While core funding by the university remained very low, the scientific success of ISPM became very strong and solid, developing international collaborations and acquiring grants in environmental epidemiology and women and health. These funds increased the ISPM budget four to five fold. Large projects such as SCARPOL in children and the SAPALDIA cohort study in adults – running now for 20 years – became essential tools to investigate the impact of environmental factors on chronic conditions.

ISPM became a platform of career development for many young public health scientists. I, for instance, had the pleasure to go through the ISPM Basel training both at the very beginning of my environmental epidemiology career and later on as junior investigator. Others, who are now leading scientists at Swiss TPH, also shaped the early development of ISPM, namely Professor Elisabeth Zemp, PD Dr. Schindler, Professor Nicole Probst-Hensch and Professor Martin Rössli. The latter two and myself all decided to return to Basel in 2009 under the promising perspective of the strengthened public health “hot spot”. After Ursula Ackermann’s move to Zurich as the director of the Swiss School of Public Health in October 2005, Professor Charlotte Braun-Fahrländer took the responsibility for the Institute and for the public health curricula at the medical school until my appointment in May 2009. Her leadership prepared the small but highly successful ISPM very well for its new frontiers.

Nino Künzli, what do you think of the integration process?

Nino Künzli: Health is determined by an array of factors, ranging from genetic underpinnings to age, gender, lifestyles and health care as well as environmental, cultural, economic and social factors. To protect, strengthen or improve people’s health and wellbeing we need to understand the role and interplay of all these factors – a key objective of public health research.

Based on such scientific evidence, strategies must be developed and applied. With such a broad task, it is very clear that public health is a multidisciplinary field, requiring expertise and skills from very different sciences and disciplines. As a consequence, to be successful in public health, an academic public health institution needs a “critical mass” of expertise. While it is hard to define what the minimal critical mass is, the core funding of ISPM Basel has never reached that level. Bringing ISPM and STI together offers highly attractive interdisciplinary opportunities to strengthen public health in Basel as well as nationally and internationally. The scientific expertise, skills, and interests of the two institutes are perfectly complementary. This will enhance new collaborative opportunities in relevant public health areas neither institute would have been able to launch alone. Of course, one may argue that one could simply collaborate between independent institutions. While this is true, and while ISPM and STI indeed collaborated for years in several ways, working “under the same roof”, sharing common resources, services and infrastructures, and developing unified strategies is clearly more efficient than running two academic public health institutions in one city. Thus, at times when the University Basel informed me (while I was still working abroad) about the integration plans, I applauded the vision because this is a clear win-win for public health, for Basel and the university, as well as for Switzerland.

Marcel Tanner, where have you seen opportunities for integration?

Marcel Tanner: The integration of the Institute of Social and Preventive Medicine (ISPM) into STI to form Swiss TPH was not born in the currently prevailing spirit of “mergers and acquisitions”, but represents a coherent move towards bringing critical mass and innovative thinking under one umbrella. Furthermore, combining international health and public health expertise at the level of research, teaching/training and direct service provision allows us to be active at the local, national and international levels through sharing and comparing across different health and social systems. Surely this is a most fruitful exercise that not only creates new research questions but also offers new solutions for public health action. The integration process makes Swiss TPH truly an institute of international public health with activities in partnership in virtually all continents. Moreover, ISPM brought along strong and well recognised expertise and experience in environmental and chronic diseases epidemiology as well as in women’s and reproductive health. Hence, it complemented well the expertise and experience of STI. Given the deep roots of STI in East Africa, the Swahili proverb “umoja ni nguvu” (“together we are strong”) answers this question to the point.
Interview

Where do both of you see risks of such an integration process?

Marcel Tanner: Integration processes always bear the risk of failing if not enough attention is paid to the fact that different institutional cultures – grown over decades – come together. Our integration process was planned for a long time. Since we used a step-wise approach (planning, joint thinking, integration but no physical moving together and finally moving together), all team members were well prepared and had respect for each other’s expertise, experience and where they came from. Of course, the integration process continues in terms of bringing together concrete tasks and goals.

Integration could entail further risks in terms of duplications of activities in similar job profiles, projects and tasks. Fortunately, this was not at all the case for us. Our integration was aimed at bringing complementary expertise, skills and experience together to form a critical mass in international public health. None of the projects or staff members became redundant. Integration primarily occurred at the level of the department of epidemiology and public health, where we still need to gradually form fewer, bigger and more coherent units to effectively tackle the basic methodological issues in biostatistics and epidemiology in health social sciences as well as all environmental health, eco- and health systems approaches. Clearly, this integration does not represent any threat or risk if we continue the process under the common umbrella of our mandate and with the spirit of mutual respect.

Nino Künzli: While it is not easy to define “critical mass”, growth and change comes also with challenging and often emotional experiences related to identity, roles, orientation, commitments, responsibilities, space, work load and organisation. It is clear that such fundamental changes bring a broad range of questions which need time to be properly addressed, thus, this type of change inevitably brings a period of uncertainties. Facing uncertainties requires a mindset of patience, tolerance and flexibility. Both ISPM and STI were highly functional, well organised and successful in their activities and, indeed, they were much appreciated working environments. Thus, the fear that an integration may ultimately bring “negative consequences” needed to be addressed. Our vision and challenge is to find a new identity that reflects a merger of the positive sides of both former identities. It is important to allow for sufficient time to adopt changes and let people adapt. In fact, as leaders, we also must accept the need for “trial and error” periods were old or new models are tested for a while to see what really works on the bigger scale, in the new environment. This is particularly the case in my own Department of Epidemiology and Public Health which – literally “over night” – almost doubled in size and structure. To be successful with the integration process is of course very important as the above mentioned strategic win-win materialises only if the “win” is experienced among the team at large. I am very pleased with the smooth process we have had so far and the many achievements of the new “Swiss TPH family”.

What are your key plans and hopes for the future of Swiss TPH?

Nino Künzli: I hope that a few years from now we, the university and all of our partners, funding bodies and the public will agree that Swiss TPH has become more than the sum of its former institutions. This means that we shall not only remain successful, competitive and internationally respected in the fields of current success, but that we will embark on innovative activities at the interface of all of our disciplines to contribute to health locally, nationally and on the international scale in all that we do.

Marcel Tanner: The future clearly lies within the jointly established strategic plan that contains our vision, the mandate, strategic goals and key areas of activities as elaborated earlier (see, foreword on page 6). The success lies in coherently implementing our strategic plan by a rigorous and enthusiastic pursuit of its main directions without losing the curiosity and sensitivity for innovative and pioneering thinking. While doing so, we shall also remember Einstein’s advice “One should not pursue goals that are easily achieved. One must develop an instinct for what one can just barely achieve through one’s greatest efforts” (Albert Einstein to his former student Walter Dällenbach, May 1915).

Thank you so much for this interview.

Interview and Photos: J. Pelikan
The Jubilee Foundation

The Jubilee Foundation was established in 1993 to mark the 50th anniversary of the foundation of the institute. Its aim is to promote innovative research at the Swiss TPH. In addition to considering innovative project ideas within the Swiss TPH’s strategies, the foundation emphasises three main areas: research and control of malaria, urbanisation and urban health, and health and the environment. The Swiss TPH Directorate will be happy to provide further information.

The R. Geigy Foundation

This foundation was established by the first director of the Swiss Tropical Institute (STI), Prof. Rudolf Geigy. The aim of the foundation is to support priority activities of the STI, now Swiss TPH, in the field of research and training and to provide specific core support when required. One of the primary aims of the original foundation was to support young scientists doing field work and to help scientists to publish their results. Grants are also made for the acquisition of special pieces of equipment and can include core support, such as investments in parts of Swiss TPH buildings that belong to the foundation. Support from the R. Geigy Foundation (RGS) for research is indicated under “Funding” in the individual sections of this report.

Every second year, the foundation awards a prize for excellence in research and/or research-cum-action/public health application to a scientist or a public health practitioner. The fifth R. Geigy Award went to Dr. Alphonse Um Boock from Cameroon to honour his fine contributions to improving health systems and to understanding and controlling neglected diseases in Africa. We are convinced that Prof. Geigy would join us in our congratulations, as Dr. Alphonse Um Boock’s career path and achievements represent what Prof. Geigy’s visions entailed since he first visited Africa.

Laudatio Dr. Alphonse Um Boock

It is our great pleasure to award the fifth R. Geigy Award to Dr. Alphonse Um Boock.

Who
• For decades dedicated his professional life as a medical doctor to neglected health systems and neglected diseases in Africa.
• Not only followed with great competence the situation of poor people at the individual clinical level, but also tried to understand the problems of poverty at the population level and with a public health perspective.
• During many years and under difficult conditions led the structural and functional rehabilitation of the urban and peri-urban area of Douala, Cameroon, based on primary health care principles, which in turn generated new national and international standards for urban health systems under resource constraints.
• With great skills coordinated and stimulated scientific work and direct public health action for the better understanding and control of leprosy and Buruli ulcer in Cameroon and the region.
• Shared his experience and expertise in numerous teaching events as well as with WHO and many national and international organizations which strengthened the global commitment for the control of neglected diseases.
• Remains committed to health development, particularly for the poorer segments of African populations.
### Annual aggregated accounts

<table>
<thead>
<tr>
<th></th>
<th>2009 (in 1,000 CHF)</th>
<th>2008 (in 1,000 CHF)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Income Statement</strong></td>
<td></td>
<td></td>
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<tr>
<td>Income</td>
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<tr>
<td>Self managed income</td>
<td>41,168</td>
<td>35,727</td>
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<td>Contribution of the</td>
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<tr>
<td>Swiss national govern</td>
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<td>3,020</td>
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<tr>
<td>Contribution of the</td>
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<tr>
<td>Basel local government*</td>
<td>7,554</td>
<td>3,445</td>
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<td><strong>Total income</strong></td>
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<td>Expenditure</td>
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<td>Staff expenditure</td>
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<td>Material expenditure</td>
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<td>Investments</td>
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<td><strong>Total expenditure</strong></td>
<td>51,510</td>
<td>42,041</td>
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<td><strong>Balance sheet</strong></td>
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<tr>
<td>Assets</td>
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<tr>
<td>Liquid funds</td>
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<td>3,728</td>
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<td>Prepaid expenses</td>
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<td>Fixed assets</td>
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<td>5,300</td>
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<td><strong>Total Assets</strong></td>
<td>24,744</td>
<td>24,219</td>
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<td>Liabilities</td>
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<td>Creditors</td>
<td>2,730</td>
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<td>Provision for VAT</td>
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<tr>
<td><strong>Total Liabilities</strong></td>
<td>24,744</td>
<td>24,219</td>
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</tbody>
</table>

*incl. investment contribution

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### Income statement

<table>
<thead>
<tr>
<th>Research:</th>
<th>2009 (in 1,000 CHF)</th>
<th>2008 (in 1,000 CHF)</th>
<th>Balance in 1,000 CHF</th>
</tr>
</thead>
<tbody>
<tr>
<td>in Medical Parasitology and Infection Biology</td>
<td>6,957</td>
<td>6,243</td>
<td>714</td>
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<tr>
<td>in Public Health and Epidemiology</td>
<td>11,369</td>
<td>11,376</td>
<td>-7</td>
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<tr>
<td><strong>Total research</strong></td>
<td>18,326</td>
<td>17,619</td>
<td>707</td>
</tr>
<tr>
<td>Teaching and Training</td>
<td></td>
<td></td>
<td>-1,636</td>
</tr>
<tr>
<td>10%</td>
<td>3,329</td>
<td>4,965</td>
<td>-1,636</td>
</tr>
<tr>
<td>Service Centres:</td>
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</tr>
<tr>
<td>Clinical and Diagnostic Services</td>
<td>4,674</td>
<td>4,069</td>
<td>-89</td>
</tr>
<tr>
<td>Medicines Research</td>
<td>3,141</td>
<td>3,230</td>
<td>-89</td>
</tr>
<tr>
<td>Swiss Centre for Internat. Health</td>
<td>17,608</td>
<td>17,083</td>
<td>525</td>
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<tr>
<td><strong>Total services</strong></td>
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<td>24,382</td>
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<tr>
<td>6%</td>
<td>3,017</td>
<td>3,017</td>
<td>0</td>
</tr>
<tr>
<td>Infrastructure</td>
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<tr>
<td>3%</td>
<td>1,527</td>
<td>1,527</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
<td>100%</td>
<td>112</td>
</tr>
</tbody>
</table>

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### Funding 2009

- **STI Foundations**: 5%
- **National Government**: 8%
- **Local Government**: 8%
- **Local Government Investments**: 6%
- **Medical & Diagnostic services**: 9%
- **Teaching**: 2%
- **SCIH and Mandates**: 35%
- **Medicines Research**: 6%
- **Other external Funds**: 20%
The administration of the Swiss TPH is the backbone of the Institute and provides internal services through four units: (i) Finances, (ii) Human Resources, (iii) Infrastructure and (iv) Informatics. In 2010, 30 staff members, which equates to 27.6 full-time employee (FTE), fulfil a broad range of assignments.

At the collaborator level, the year 2009 was marked by five retirements and the change in the position of the administrative director. When Ulrich Wasser retired at the end of 2009, he handed over his function to Stefan Mörgeli who has been working at the Swiss TPH since November 2008 (see page 132).

**Finances**

In 2009, the budget for the Swiss TPH expanded beyond 50 Mio. CHF. More than 80% of income was acquired competitively through research grants, medical and consultancy services and courses. Managing the finances of more than 400 projects that are funded by different sources is challenging. To comply with Swiss laws, we established an internal control system over financial reporting. The new integrated framework comprises risk assessment, the definition of the control environment, control activities as well as information and communication and monitoring procedures.

Following the recommendations of an external audit company, we aggregated separate project accounts into the Institute’s balance sheet and income statement for more transparency. As a result, the International Financial Reporting Standard for Small and Medium-sized Entities (IFRS® for SMEs) has been implemented within the 2010 reporting period. The cost accounting system has been adapted to satisfy the needs of these new procedures.

**Human Resources**

As of June 2010, Swiss TPH had 582 collaborators, with 57% female. The “341” figure entered on the payroll table for the Institute corresponds to 304 FTEs (71 have local contracts abroad and the rest are students who occupy a working place at Swiss TPH). In order to handle an increasing workload, human resources was strengthened with the promotion of Silvan Bärtschi as head of human resources and the employment of additional staff.
In 2009, an employee survey was conducted which showed an enjoyable, high satisfaction rate.

A 2009 employee survey found that the majority of employees had a positive opinion about working at the Swiss TPH.

In response to the results, the directorate took selective measures to especially improve the fringe benefits for all staff members.

**Infrastructure**

In the Infrastructure unit, Paul Haas was promoted to head of Technical Service, and the unit was able to employ an additional staff member to respond to the increasing number of transport and maintenance assignments. The Infrastructure unit supported the renovation of the building Socinstrasse 55a as well as the laboratories and offices in the other buildings. It successfully met all of its deadlines.

Renovation. Photos: R. Duerr

Colleagues of the former ISPM move to the institute.
Informatics

The main focus of Informatics is to build and maintain a stable IT basis for the mission of the Institute, its employees and their tasks.

Team

The Institute is constantly growing in size, including the integration of the former Institute of Preventive Medicine (ISPM) and additional tasks and responsibilities related to the eHealth strategy (see frame). In response, Informatics expanded to a team of nine people and now consists of three sub groups: client infrastructure (including classical helpdesk), server infrastructure and IT coordination/project management. Moving to newly renovated offices improved working conditions and allowed for a better face-to-face access to the user helpdesk.

Main projects in the reporting period

- Integration of the employees and the existing infrastructure of ISPM.
- Installation of the network infrastructure in the new buildings and complete replacement of the existing network backbone.
- Establishing tools for internal and external information dissemination: Wiki, Document Management System and the TIPPs database system (transparent information on people, projects and publications).
- Providing IT infrastructure for several national and multi-national scientific projects.
- Installation of an automated server monitoring system.
- Move to XEN-based virtualised servers to optimise capacity utilisation and simplify disaster recovery scenarios.

eHealth task force

The significance of Information and Communication Technologies (ICT) as a means to improve the performance of health systems and population health is increasingly recognised. Consequently, in 2009 the Swiss TPH developed and endorsed a strategy to continuously build on its eHealth capacities. Already internationally well positioned with its eHealth programme, the Swiss TPH systematically interlinks Research, Teaching and Training. The variety of our areas of expertise and large number of health projects worldwide offer an ideal platform to integrate and validate eHealth solutions.

eHealth encompasses a large variety of specialisations and application areas thematically differentiated within the Swiss TPH. To harness the full potential of ICT for the field of health, the Swiss TPH created the eHealth Task Force as an organisational structure. The Task Force coordinates the systematic strengthening of eHealth related innovation, services and capacities across the institute. Additional personnel were hired in 2010 for three units of the Swiss TPH (Biostatistics and Computational Sciences, Health Technology and Telemedicine, Informatics) to increase the performance for software development and health informatics related projects.
Epidemiology and Public Health

The impact of the recent integration of the Institute of Social and Preventive Medicine (ISPM) in Basel into the former Swiss Tropical Institute is most clearly visible in the transformation and development of the Department of Epidemiology and Public Health (EPH) of the new Swiss TPH. The reconfiguration of this research department enhances the depth of epidemiological expertise, the scope of global and regional health interests, and the activities that contribute to the full spectrum of the Institute’s priorities for complementary innovation, validation and application.

Elements of the structure of the two former institutes and the synergy of their interaction are embodied in our enhanced agenda and are all clearly discernible. For instance, environmental health, disease modelling, health systems and broad-based and specific interventions remain pillars of the new departmental agenda. Our work on health systems remains committed to needed rethinking in long-standing debates on how to relate disease control and the broader interests of global health. The focus on malaria and infectious diseases has expanded beyond these areas of acknowledged expertise to develop new interests and activities concerned with chronic diseases. The unique contribution we have been making to the one-health concept and our attention to ecosystem health complements internationally recognised expertise in the agenda for air pollution, electromagnetic fields, and other environmental health studies of the former ISPM.

Attention to social context and population behaviour now enhances the traditional health and disease system focus of the former STI. Consideration of social contexts, population behaviour, gender and the role of culture integrates with interests of the health social sciences and questions of gender and women’s health, maintaining strength and motivating new activities to advance our priorities. The environmental health activities of the former ISPM sustain global networks in Europe and North America, which complement deeply rooted networks in Africa and Asia of the former STI. Achievements over the last biennium are described in the accounts of the 10 units that follow. Each of these also indicate prospects for the next two years and beyond that are attentive to the potential that recent developments hold for realising the vision of the Swiss TPH.

To fulfil our commitment to improve public health, EPH researchers are much engaged in teaching and training, serving as experts and advisors in national and international agencies and committees.

Biostatistics and Computational Sciences

The Biostatistics and Computational Sciences (BCS) Unit engages in collaborative epidemiological research and develops and applies new methods in biostatistics and epidemiology. Our main projects are on simulation modelling of malaria epidemiology, methods for statistical modelling of space-time patterns of diseases and environmental exposures, and respiratory and cardiovascular health in Switzerland, Europe, and abroad. The unit offers data services within Swiss TPH and externally. This includes software development and consultation on study design, data management, statistical analysis, biomathematics and bioinformatics. We teach statistics and epidemiology to medical undergraduates, MSc and PhD students, and in external courses, including the postgraduate program for University Professionals in Insurance Medicine, the Swiss Master of Public Health Program and the European Course in Tropical Epidemiology.

Simulation of malaria epidemiology and control

The fight against malaria has new impetus since the call for eradication in 2007. There are now more, but still limited, resources for research, development and combating malaria, which is increasing demand for improved decision support tools, in particular dynamic models. Our project addresses this with a platform programmed in C++ to compare, fit and evaluate stochastic simulations of Plasmodium falciparum malaria (http://code.google.com/p/openmalaria/).

We use this platform to inform the target product profiles for novel interventions like vaccines, addressing questions such as minimal efficacy and duration of effects needed for malaria vaccines, and also to optimise deployment of established interventions and integrated strategies. While field trials of interventions consider effects over 1–2 years at most, we can simulate longer term dynamics induced by immunity or human demography, predicting effects on transmission, illness, hospitalisation, death or economic impact.

As malaria occurs in a variety of ecological settings, interventions are often not universally applicable. For instance, indoor residual spraying works only with indoor-resting mosquitoes, and insecticide treated mosquito nets only with nocturnal vectors. The best combinations of interventions, delivery approaches and health systems vary, as do trade-offs between high coverage and costs or feasibility of deployment. Indiscriminate deployment may lead to evolution of resistance or insensitivity to interventions. To support analysis of these elements, we are assembling databases of health system descriptions, intervention costing and vector bionomics across the world.

Uncertainties inherent in simulations of complex systems are addressed using probabilistic sensitivity analyses, fitting multiple different models, and basing predictions on model ensembles instead of single simulations. This requires super-computing, both for statistical fitting (which must simultaneously reproduce a wide range of outcomes across different settings), and for exploring predictions. We obtain this computing power over the Internet from spare capacity on the computers of volunteers (http://www.malariacontrol.net/).
BCS, developing web-based job-submission and analysis systems to increase Internet access to simulations and actively promotes the models to wider communities of malariologists, planners and policy specialists.

**Biostatistical Research and Applications**

Spatiotemporal modelling is a focal research area of the Swiss TPH. Our main methodological work in this area is development of data-driven statistical methods and applications to assess determinants of the space-time distribution of epidemiological outcomes. Statistical issues addressed include large non-stationary geostatistical datasets, multivariate data, sparse data with diagnostic error, temporal non-Gaussian data and incorporation of seasonality. We employ Bayesian variogram models fitted by standard or Reversible Jump Markov chain Monte Carlo (MCMC) simulation and develop model validation tools. These methods are applied to epidemiological outcomes such as patterns of risk, transmission of infectious disease and vector species compositions, allowing us to make spatially explicit estimates of disease burden and projections of disease dynamics.

Applications include a range of scientific topics relevant to various focal areas of Swiss TPH research such as:

**Mortality:** We assess risk factors and spatio-temporal patterns of child mortality in countries with incomplete birth and death registries. We analyse national census, Demographic and Health Surveys and Demographic Surveillance System mortality data in collaboration with Witwatersrand University in South Africa. The MTIMBA project is estimating relationships between child mortality and malaria transmission at INDEPTH sites. We also use a range of statistical approaches to investigate the spatial and temporal correlations of air pollution and death.

**Cancer:** We collaborate with cancer registries on mapping tobacco-related cancer mortality and morbidity in Switzerland to estimate geographical patterns and trends of the disease at different regional scales and to obtain a proxy of space-time patterns of smoking behaviour. This research develops conditional autoregressive, age-period-cohort and back-calculation approaches and is funded by Oncosuisse. It will inform implementation and evaluation of the National Tobacco Program 2008–2012, of the Federal Office of Public Health.

**Neglected tropical diseases (NTD):** We estimate space-time patterns of schistosomiasis, soil-transmitted helminths, Chagas, leishmaniasis, lymphatic filariasis and leprosy and related co-infections. Models accounting for data sparsity, variation in survey populations, diagnostic techniques, and levels of data aggregation are used in the analyses. As part of the CONTRAST-EU project, coordinated by Copenhagen University, we initiated an open-access database (www.globalntddatabase.org) of historical data, which now includes surveys of more than 9000 locations. This research is conducted jointly with the Ecosystem Health Sciences unit. It is supported by PAHO, UBS Optimus foundation and Brazilian-Swiss Joint Research Program in collaboration with Bahia (Brazil) and Louisiana State (US) Universities.

**Malaria:** We analyse data from recent malaria indicator surveys (MIS) or historical databases. Employing the Zambia, Angola, Tanzania, Liberia and Senegal MIS data we (i) assessed intervention effects adjusted for climate and environment and (ii) predicted the malaria burden at various spatial scales. Historical parasite prevalence data are heterogeneous in age and seasons surveyed. We align the data...
by combining geostatistical and mathematical models. Applying non-stationary models, we obtained transmission estimates at the country and regional levels in Africa. We also updated and made open access the Mapping Malaria Risk in Africa (MARA) database (www.mara-database.org). This research is conducted within the framework of a Swiss-South Joint Research program in collaboration with MRC Durban in South Africa.

Other research on malaria includes studies modelling immunity and infection dynamics of *Plasmodium vivax*. We are using molecular typing of *P. vivax* in longitudinal studies in Papua New Guinea to quantify liver-stage infection, merozoite release, infection clearance, pathogenesis and infectivity to mosquitoes.

BCS is also strongly involved in the Swiss Cohort Study on Air Pollution and Health in Adults (SAPALDIA) cohort project and several related international cohorts (see section 3). Activities include preparation of data collection tools, management and cleaning of newly collected data, statistical analyses and methods development and support of external scientists. We use advanced methods of longitudinal data analyses tailored to the specific problems of estimating long- and short-term effects of air pollution and other risk factors on health, and of assessing gene-environment interactions.

**Bioinformatics**

High-throughput methods increasingly make it possible to analyse complete genomes of both parasites and their hosts, and also their transcriptomes and proteomes. The BCS unit provides expertise in the specialised computational methods needed to handle the amount and complexity of these data, and supporting groups in the MPI department. Projects with a bioinformatic lead included the analysis of different transcription factors (TFs), which control the expression of genes through sequence-specific interactions with genomic DNA. Current projects include the investigation of DNA methylation in genomes of Neisseria meningitidis.

**Scientific computing**

Scientific computing increasingly underlies institute activities, ranging from data collection to generating web-applications. The BCS unit has specialists in software design, programming, web-application development, database design and administration, data management and high-performance computing. These specialists provide support to malaria modelling, SAPALDIA and other cohorts, eHealth applications and other projects.

**Outlook**

The important role of Swiss TPH in the recent development of the global Malaria Eradication Research Agenda is likely to lead to further malaria modelling activities, which will remain the unit’s main project. Spatio-temporal modelling remains a focal research line contributing to monitoring and evaluation of malaria and NTDs and further applications in cancer and environmental spatial epidemiology. We are also expanding and diversifying software development and bioinformatics activities and working to satisfy the growing demand for mathematical, computing, bioinformatics and statistics support.

**Statistics and data management support service**

BCS provides methodological support to other units, and has long-standing research collaborations with several clinical partners. Data services are offered to the rest of Swiss TPH, and within Basel University, in particular the University Hospital (including medical students writing their theses). Clients (either external or within Swiss TPH) with needs for data management or statistics support apply for services at http://www.swisstph.ch/resources/statistical-support.html. Early involvement of our team fosters sound study design and data-management plans that are key to successful research.


**Students:** M. Bretscher, A. Brooks, V. Crowell, F. Giardina, D. Gosoniu, B. Huho, V. Jürgens, S. Kasasa, A. Lutambi,
Non-communicable age-related diseases (NCDs) – the focus of the newly funded CDE unit – have been an acknowledged public health priority in Western societies for many years. WHO now assigns high priority to their prevention globally. NCDs such as heart disease, cancer, stroke and chronic lower respiratory diseases are also the leading causes of death in many non-industrialised countries.

Increased life expectancy, living in an urban environment and the Westernization of lifestyle contribute to the global increase in NCD morbidity and mortality. The most important behavioural and environmental NCD risk factors that can be modified at the individual or environmental level include tobacco smoking, unhealthy diets, physical inactivity and indoor as well as outdoor air pollution. Yet, the causes of NCDs are complex. They vary between individuals and societies, have often only weak effects at the individual level and may become manifest at very late stages. Thus, NCD risk factors are difficult to identify. Combining molecular, genetic, environmental and socio-cultural epidemiology has the potential to improve our understanding of chronic diseases. Accordingly, the CDE unit’s research focus includes both exogenous and endogenous disease correlates.

Cohorts and Biobanks – the Heart of Chronic Disease Epidemiology

Cohort studies are an essential instrument for understanding the development and progression of chronic diseases and their causes. Scientists in CDE have longstanding experience in establishing and maintaining large cohorts. Since 1990 the SAPALDIA epidemiology centre, has taken a leading role in this most important Swiss cohort study. Diagnosis registries are essential for exhaustive case finding in the context of cohorts as well as for chronic disease monitoring. Accordingly, the unit is active in the promotion of cancer and other diagnoses registries.

For clinical medicine and public health to benefit from the recent advances in various “-omics” disciplines, cohorts of Ceara, Brazil; University of Cheikh Anta Diop and National Malaria Control Program, Senegal; University of Copenhagen; University of Zambia; Virginia Bioinformatics Institute (VBI), USA; Witwatersrand University, S. Africa

Funding: Bill & Melinda Gates Foundation, Seattle, USA (B&MGF); European Union Framework Programme FP7; Oncosuisse; Pan American Health Organization (PAHO); Program for Appropriate Technologies in Health (PATH); Swiss Brazilian Joint Research Program (SBJRP); Swiss National Science Foundation (SNSF); Swiss South African Joint Research Program (SSJRP); Stipendienkommission Basel-Stadt; Union Bank of Switzerland (UBS)
Epidemiology and Public Health

SECTION 3

function of the heart will be investigated within SAPALDIA and the teams of REGICOR (Barcelona & Girona) and the ESCAPE consortium (www.escapeproject.org). Within ESCAPE, CDE leads the respiratory health research collaboration (SAPALDIA, European respiratory health survey ECRHS; German SALIA Study; French EGEA study on the genetics of asthma; French EPIC-study [E3N]; U.K. 1946 birth cohort) and the atherosclerosis investigations (REGICOR – Spain; IMPROVE (Stockholm); German KORA and Heinz-Nixdorf Recall studies).

The public health impact of air pollution is substantial. CDE continues to adapt the methods of the health-impact assessment to the increasing evidence of air pollution causing both acute and chronic effects on a range of pathologies. With partners throughout Europe (APHEKOM project) and at the University of Southern California, CDE provides a better understanding of the current impact of air pollution on public health and the potential benefits of stringent clean air and climate change policies.

Molecular and Genetic Epidemiology of Chronic Non-Communicable Diseases

Unlike in the case of monogenetic disorders, genetic tests for age-related and complex diseases today are of little or no value on an individual basis. Genetic and other biological

SAPALDIA: the Swiss Chronic Disease Cohort & Biobank

SAPALDIA, the Swiss Cohort Study on Air Pollution and Lung and Heart Diseases in Adults, is an ongoing multi-centre study initiated in 1991 in eight geographic areas representing the range of environmental, meteorological and socio-demographic conditions in Switzerland. At EPH, it represents a cross-unit effort and brings together staff from Biostatistics and Computational Sciences, Chronic Disease Epidemiology, Environmental Epidemiology and Risk Assessment, Environmental Exposure and Gender and Health.

Close to 10,000 randomly selected adults were interviewed and examined in 1991 and again invited in 2002 and 2010. SAPALDIA assessed the 1) distribution and time course of major respiratory health problems and allergies, 2) distribution of heart rate variability, 3) association of these health indicators with the participants long-term exposure to air pollution, other noxious inhalants, lifestyle and molecular factors, with a special focus on potential interactions between these factors. Through novel techniques, SAPALDIA combined measurements and spatial modelling techniques to map distributions of pollutants across Switzerland to individually assign exposure to each subject’s residence. As air quality improved since 1991, SAPALDIA has shown that reductions in exposure resulted in the attenuation of lung function loss, in lower rates of respiratory symptoms, and fewer new cases of asthma.

With the third assessment of the cohort in 2010, SAPALDIA will be able to focus on the development of chronic diseases and their link to preclinical respiratory and cardiovascular conditions in the ageing cohort. SAPALDIA will study long-term effects of air pollutants and noise on cardiovascular health and autonomic function. In addition, the measurement of carotid intima media thickness will enhance our understanding of the environmental causes of atherosclerosis.

Over the past years, one of the largest population-based biobanks consisting of various blood aliquots and DNA samples was established within the SAPALDIA cohort. It will allow us to identify common risk patterns and molecular pathways underlying several chronic diseases and provide efficient targets for prevention. The broad range of exposures and health parameters in combination with the biobank have turned SAPALDIA into a unique source for chronic disease epidemiology and a backbone for research at Swiss TPH. SAPALDIA is part of many large European research consortia for air pollution, cardio-respiratory disease and genetic epidemiology, including ESCAPE and GABRIEL.

The SAPALDIA Biobank consists of various blood and DNA aliquots.
markers are, however, essential for improving our understanding of disease classification and susceptibility as well as biological mechanisms and causality in risk-factor/disease associations. The unit is collaborating with several international research consortia to identify biomarkers and novel genes for respiratory (asthma, COPD, lung function) and cardiovascular (heart rate variability, renal function) health outcomes as well as for cancer progression. The unit is a member of the SpiroMeta, GABRIEL and CKDGen Consortia that identified novel genetic determinants of lung function, asthma and renal function, respectively. SAPALDIA was the first study to report that variants in cancer-related cell-cycle genes determine how much people's lung function benefits from improvements in air quality. The unit, especially with the SAPALDIA Biobank at hand, is now in an excellent position to investigate the interaction of novel disease genes with environmental and lifestyle factors.

The Future of Chronic Disease Epidemiology

The new Swiss TPH offers an internationally unique setting for studying non-communicable diseases in various individual, societal, environmental and climatic contexts. By expanding our cohort activities to countries of the South and the East such as in the context of ongoing surveys, new opportunities arise. It will be possible to broaden the range of environmental exposures, to study diseases in the context of different genetic backgrounds and of various behavioural activities and environmental exposures. It will be important to understand the combined impact of communicable and non-communicable diseases in non-industrialised countries as well as the parallel impact of non-communicable diseases such as cancer on both humans and animals.

A central aspect of research in the unit will be the health impact assessment of exogenous and endogenous risk factors to support targeted public-health action and to guarantee continuous readjustment of our activities to the biggest needs.


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Ecosystem Health Sciences

Introduction

The Ecosystem Health Sciences (EHS) unit’s emphasis is on neglected tropical diseases (NTDs). EHS examines how human health and wellbeing are related to behavioural, cultural, demographic, ecological, environmental and socio-economic factors, and how anthropogenic processes govern health and wellbeing. EHS pursues a broadly applicable ecosystem health approach and employs a variety of research streams, from the bench to the field, from molecular to geospatial, from basic to operational. It includes metabolic profiling to enhance our understanding of host-parasite interactions, epidemiology and integrated control of NTDs, and advancing tools and methodologies for health impact assessment, mitigation and adaptation strategies. A strong network of partnerships provides the backbone for linking innovative laboratory investigations with community-based intervention studies. EHS bridges different scientific fields in an interdisciplinary manner, so both human and ecosystem health are put under investigation, pro-
tected and promoted. The unit also pursues work within its mandate as a WHO Collaborating Centre for Research and Capacity-Building in Environmental and Tropical Public Health.

EHS is closely interwoven with other units at the Department of Epidemiology and Public Health (EPH) and other departments of Swiss TPH. The collaboration with the BCS unit (section 2) facilitates the development and validation of spatially-explicit risk mapping and prediction of NTDs. Joint activities (section 15; section 24 DIAGNOSTIC) are built around the discovery and development of new anthelmintic drugs and diagnostic tools, including proof-of-concept trials (e.g. mefloquine against Schistosoma spp.) and broad-scale validation of diagnostic assays (e.g. FLOTAC for helminth diagnosis).

**Metabolic profiling**

EHS’ collaboration with Imperial College London continues to flourish with Dr. Jasmina Saric obtaining a Wellcome Trust fellowship to develop a mass spectrometry platform for metabolic profiling of NTDs. We pursued the direct metabolic consequences of parasite-induced inflammation and the impact of trematodes on brain biochemistry. We have shown that Th1- and Th2-mediated immune responses elicit different metabolic signatures in their hosts and this immuno-metabolic cross-talk may be of mechanistic significance. The most exciting discovery is that the two trematodes Fasciola hepatica and Schistosoma mansoni both cause unique effects on the neurochemical profile in their rodent hosts, which may shed new light on cognitive impairment associated with chronic helminthic infection (Figure 1). The main outcomes of our metabolic profiling work to date highlight the diagnostic potential of the technology and its role in elucidating pathological mechanisms due to parasitic worm infections. We have also started a metabolic profiling study in the newly established Taabo health demographic and surveillance system (Taabo HDSS) in Côte d'Ivoire in order to better understand the natural history and aetiology of anaemia in vulnerable groups: infants aged 6–24 months, school-aged children and young women.

**Epidemiology and control of NTDs**

**Drug trials against soil-transmitted helminthiases**

The efficacy and safety of anthelmintic drugs have been assessed against common soil-transmitted helminth infections in two randomised controlled trials. In Zanzibar, Tanzania, standard single doses of albendazole (400 mg) and mebendazole (500 mg) were compared with combination therapy (either drug plus ivermectin) against Trichuris trichiura. In Yunnan province, China, a single dose of albendazole or mebendazole was compared with triple doses against hookworm and other helminths [Figure 2]. Several hundred people were enrolled in each trial with multiple stool examinations performed prior to and 3–5 weeks after treatment. Single-dose treatments only showed low cure rates (CRs) against T. trichiura (10–40%). Combination therapy or triple-dose albendazole and mebendazole showed higher CRs (38–71%). Moreover, mebendazole outperformed albendazole in both single- and triple-dose administration against T. trichiura. Single- and triple-dose albendazole cleared hookworm infections more efficiently than mebendazole (CR: 69–92% versus 31–59%). Ascaris lumbricoides infections were successfully cured even with single-dose albendazole and mebendazole (CR: 78–100%). Our results underscore that new and more efficacious drugs are required, particularly against T. trichiura.

![Figure 1: Six important discriminatory spectral regions representing the main metabolic changes in the brain tissue of rats experimentally infected with Fasciola hepatica. The spectral regions are individually correlated with the entire signal information of the liver spectra, which revealed strong interaction between the metabolic changes within both compartments. Mechanistically, it could be shown that the metabolic changes in the most severely affected organ (i.e. liver) impose a systemic effect within the whole organism, affecting even remote biological compartment such as the brain (key: AIP, adenosine; BCAA, branched chain amino acids; GPC, glycerophosphocholine; ino, inosine; phe, phenyalanine; suc, succinate; tyr, tyrosine).](image)
Food-borne trematodiasis and schistosomiasis in Lao PDR

Clinical and epidemiological research and control interventions are pursued in Lao PDR against food-borne trematodiasis and schistosomiasis. We found that a high parasitic load with *Opisthorchis viverrini* is significantly associated with an increased risk for intra-hepatic bile-duct dilatations (incidence risk ratio [IRR] = 7.5) and common bile-duct dilatations (IRR = 2.4). The risk of liver morbidity was particularly high among people co-infected with *O. viverrini* and *Schistosoma mekongi*. Compared to non-infected individuals, the odds ratio (OR) of liver fibrosis was 29, whereas an *O. viverrini* single infection resulted in an OR of 18.

We used *O. viverrini* prevalence data assembled in more than 50 villages of Champasack province and employed Bayesian-based geospatial analyses to establish the first risk map of opisthorchiasis in this part of Lao PDR [Figure 3]. Prevalence rates > 80% were found in villages in close proximity to the Mekong River. The consumption of raw fish was the key risk factors for an infection in multivariable spatial statistical analyses. Our findings on the current distribution and morbidity due to *O. viverrini* and *S. mekongi* infections in Lao PDR call for concerted efforts to reduce the public-health burden of these NTDs.

Preventive chemotherapy is the current mainstay for the control of helminthiases. Given the high prevalence rates of *O. viverrini* and soil-transmitted helminth infections, annual community-based distribution of praziquantel in combination with albendazole or mebendazole is advocated by WHO. A main cost item of this strategy is drug distribution. We determine the costs of a community-directed preventive chemotherapy programme in which village health workers (under the supervision of dispensary staff) performed the interventions. Determinants to comply with drug treatment are investigated using qualitative research.
Although the drug intervention is highly welcome, adverse events of praziquantel have a major impact on compliance. Preventive chemotherapy is now complemented with community-led total sanitation (CLTS) in order to assess the impact of this novel sanitation approach on the transmission of schistosomiasis and opisthorchiasis. This initiative joins a multi-country research agenda to comprehensively evaluate the impact of CLTS against NTDs.

**Strongyloidiasis in Cambodia**

In 2009, we launched a new research project on strongyloidiasis in Cambodia to assess the validity of various field-based diagnostic techniques and to identify risk factors for infection and resulting morbidity. Cross-sectional epidemiological surveys carried out in four secondary schools in the vicinity of Phnom Penh and a larger study in 60 villages in Preah Vihear province revealed that *Strongyloides stercoralis* is rampant in the latter setting: one of four school-aged children and every second adult are infected. We are currently determining the clinical impact of *S. stercoralis* infections and, if deemed important, intend to design and monitor targeted interventions.

**Health impact assessment**

Our previous framework of health impact assessment (HIA) built around environmental health areas has been further developed and an innovative risk profiling matrix is currently being validated in several gold-mining projects in Africa [Figure 4].

Since early 2009, EHS has been involved in a project looking at the impact of climate change on water and health in four secondary cities of West Africa that are located in close proximity to rivers or man-made lakes: Korhogo in Côte d’Ivoire, Kaédi in Mauritania, Ziguinchor in Senegal and Kara in Togo. The project pursues an ecosystem health approach and, as proposed by the Intergovernmental Panel on Climate Change (IPCC), determines risk profiles in the three domains of hazard, vulnerability and adaptive capacity, focusing on poor neighbourhoods exposed to extreme events such as flooding [Figure 5]. A database has been assembled on climate change, water resources and health. Of note, in the town of Ziguinchor, the annual precipitation decreased from 1,478 mm in 1951 to 744 mm 50 years later. The average maximum temperature increased from 32.3°C in the period 1951–1980 to 34.6°C between 1981 and 2008.

![Figure 5: Flooding event in the town of Kaédi, Mauritania in August 2008 (photograph taken by Hampaté Bâ).](image-url)
These climatic data, derived from existing time series analyses, provide a benchmark for future predictions that will be triangulated with ongoing data collection and in-depth analyses of schistosomiasis and malaria patterns as both diseases are intimately connected with water resources development and management.

Outlook

We will consolidate and strengthen the unit’s position in the field of NTDs, particularly with regard to integrated and sustainable approaches for their control. Moreover, tools and methods for HIA will be further developed and the impact of climate change on health and wellbeing in secondary towns of West Africa determined. Within EPH, further close collaborations are foreseen with other units.

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Environmental Epidemiology and Risk Assessment

Each individual is continuously interacting with the environment and this affects health in a positive or negative way. Researchers of the Environmental Epidemiology and Health Risk Unit investigate health effects of a wide range of environmental exposures. Our success is based on interdisciplinary approaches and collaborations across groups within Swiss TPH, nationally and internationally.

Environment and Health

**Electromagnetic fields (EMF)**

Electromagnetic fields are ubiquitously distributed in our environment, either from use of electricity, causing extremely low-frequency EMF, or from use of wireless communication devices, causing radio frequency (RF) EMF. Potential health effects are of concern for both types of EMF, and our unit maintains a scientific literature database in which all recent human and epidemiological studies dealing with EMF are summarised and evaluated (see www.elmar.unibas.ch).

QUALIFEX was one of the first studies that used recently developed personal exposure meters to measure RF-EMF exposure from wireless communication applications in a population sample living in the area of Basel. Average contributions to total RF-EMF exposure are depicted in Figure 1. The acquired insights about the exposure distribution in the everyday environment were used to assess the association between EMF exposure and health related quality of life in a cohort of about 1,400 individuals. This was worldwide the first cohort of this kind. We did not find evidence that RF-EMF exposure in daily life caused symptoms such as sleep disturbances or headaches.

![Figure 1: Average contribution of various RF-EMF sources to the personal RF-EMF exposure in a population sample of 131 individuals living in the Basel area (from Mohler et al. UFP, 2009).](image-url)

<table>
<thead>
<tr>
<th>Source</th>
<th>Contribution</th>
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<tbody>
<tr>
<td>FM radio broadcast:</td>
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<tr>
<td>TV broadcast:</td>
<td>5%</td>
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<tr>
<td>Tetrapol:</td>
<td>5%</td>
</tr>
<tr>
<td>Mobile phone handset:</td>
<td>4%</td>
</tr>
<tr>
<td>Mobile phone base station:</td>
<td>3%</td>
</tr>
<tr>
<td>Cordless phone:</td>
<td>22%</td>
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<tr>
<td>Wireless LAN:</td>
<td>39%</td>
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We used the data from the Swiss National Cohort to investigate whether proximity of the residency to high-voltage power lines is associated with an increased risk for neurodegenerative disease. We found some evidence that living within 50m of a high-voltage power line increases the risk to develop Alzheimer’s disease. We have also measured extremely low frequency EMF in apartment buildings with built-in transformer stations. We found that in such apartments, considerable exposure gradients exist with high EMF in apartments adjacent to a transformer room. Thus, such homes may be interesting for a future study investigating the health effects of extremely low frequency EMF.

**Environmental tobacco exposure (ETS)**

ETS is a well known health risk, but health damages and health costs due to ETS exposure in public places have not been quantified for Switzerland to date. We estimated that, in Switzerland, ETS exposure in public places caused about 70'000 hospital days and 3,000 years of life lost in 2006. This results in health costs of 420 Million CHF. Banning smoking from public places is an efficient measure to avoid these threats if regulations are science-based. A study in 95 Swiss hospitality venues revealed that fine particle levels (PM$_{2.5}$) were considerably increased in the non-smoking area if smoking was allowed anywhere in the same location (Figure 2).

**Air pollution and noise**

Air pollution and noise exposure belong inevitably to urban life and is a major research focus at Swiss TPH in various units. In the environmental epidemiology unit, we could demonstrate that even prenatal exposure to air pollution affects the lung development of newborns. Enhanced levels of aircraft noise (>60 dB) was observed to increase the risk for myocardial infarction in Switzerland.

**Microbial environment and childhood asthma and allergy**

Childhood asthma and allergy rates have been on the increase over the last decades in many countries. These diseases are due to a combination of environmental and genetic factors. We were one of the first research groups to describe that farming environments substantially protect against asthma and respiratory allergies. Early childhood contact with stable and barns, and the consumption of non-

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**Figure 2:** Distribution of PM$_{2.5}$ concentration in Swiss restaurant and bars for different smoking situations (from Huss et al. Indoor Air, 2010).
pasteurised farm milk are the essential protective factors in
these environments. The mechanisms mediating these ef-
fects such as the maturation of immune responses, and the
generic and epigenetic factors interacting with the environ-
mental exposures are currently investigated in two large Eu-
ropean projects: the GABRIEL study of school-aged children
and the EFRAIM birth cohort in rural areas. We are respon-
sible for the field-work of the Swiss arm of both studies and
are strongly involved in the analyses of the data with a spe-
cial focus on the role of farm milk. The knowledge about
protective exposures early in life can hopefully be turned
into the development of preventive strategies.

**Environmental determinants of childhood physical activity**

There is growing concern about the increase in overweight
children and its relation to a series of health outcomes such
as asthma, cardiovascular risk or diabetes. Physical inac-
tivity is one facet of the potentially underlying causes. Very
limited data exists on physical activity levels measured with
sufficient precision in representative samples of children.
We have collected objective measurements of physical ac-
tivity (accelerometer), and we developed a parents’ com-
pleted physical activity diary.

We could show that in more urbanised areas, main street
density was inversely associated with children’s time play-
ning outdoors, and that parental concern about traffic safety
was associated with less playing outdoors (independent of the
objective environmental conditions).

“Human powered” commuting to school is an important
part of children’s’ daily physical activity. In Switzerland,
still more than 70% of children walk or bike to school, but
we found the proportion of children biking to school has
significantly decreased since 1994 and motorised transpor-
tation has increased.

Objective predictors, such as major crossings and distance.
were the main deciding factors for active commuting to
school. Parental safety concerns and lifestyle factors, such
as the number of cars, and cultural factors, such as belong-
ing to the French-speaking population, were important de-
terminants of the frequency of car use.

**Outlook**

We will further investigate the impact of the environment
on health as large populations are affected, and even small
individual risks may result in a substantial number of af-
fected individuals. Current studies in our unit include the
evaluation of early environmental determinants of child-
hood asthma and allergy, the analyses of protective prop-
erties of farm milk consumption and the development of a
monitoring program to evaluate childhood physical activ-
ity. In addition, studies dealing with brain tumour risk in
adolescents when using a mobile phone, the association
between childhood leukaemia and residential radon expo-
sure, noise exposure and quality of life and the impact of
new smoking regulations on the health of bar and restaur-
ant workers are ongoing. With these studies, we expect to
further enhance our insights about the influences of the en-
vironment on health.

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Fund; World Health Organization (WHO)
The environmental exposure sciences (EES) unit is focused on the accurate measurement and modelling of health relevant air pollutants to assess the health impacts of exposure to air pollution. Working closely with other units on the effects of air pollution, our measurement-based estimates of personal exposure to urban air pollutants from various sources provide key information for air pollution health studies such as SAPALDIA and others. Our unit’s international experience and collaborations in air pollution research in Europe and the US have contributed to the current appreciation that different components of air pollution vary, to greater or lesser degrees, within the same city. This knowledge has lead to an expansion of research methods and approaches to better characterise the spatial distribution and the sources of pollutants (e.g., industry, traffic, diesel vehicles, long-range transport, residential heating) as well as understand indoor/outdoor exposure differences and contributions caused by commuting.

**Mapping Pollution to Assess Exposure**

Historically, individual exposure to air pollution was estimated by a few air pollution monitoring stations placed in representative locations. However, recent research has shown that fixed stations cannot capture the finer scale variability of many pollutants and accurately estimate individual exposure. A pollutant’s spatial distribution depends on a complex combination of parameters including its reactivity, source location, size and ambient conditions. EES develops new approaches of measurement in tandem with novel modelling techniques to better assess spatial distribution and individual exposure.

One of the models that our group focuses on is the **Land Use Regression (LUR)** model. These models are built upon the relationship of the air pollution concentrations measured at different locations to corresponding geographical characteristics such as distance to streets, traffic and population density, land use and elevation. Such models are used to estimate air pollution concentrations at locations where no measurements were made. This approach has been used in three key projects: SAPALDIA (Swiss Cohort Study on Air pollution and Lung and Heart Diseases in Adults, see section 3); ESCAPE (European Study of Cohorts for Air Pollution Effects); and MfM-U (Monitoring flankierende Massnahmen – Umwelt). LUR models have revealed that various health problems occur more frequently along heavily trafficked roads.

In the ESCAPE project, a European-wide study in 50+ cities and 34 cohorts, EES leads measurements in 8 areas in and around Switzerland including Heidelberg, Varese, Verona, Pavia and Vorarlberg. Air pollution measurements are made seasonally following a European standard protocol for NOx, NOx, PM10, and PM2.5 (particulate matter less than 2.5 & 10μm respectively). LUR-based estimates of pollution will be assigned to thousands of participants of each participating European cohort study, including SAPALDIA. In the MfM-U project, we are assessing the influence of highway traffic exposure on respiratory symptoms in children with asthma. In this study, we also use LUR models to estimate outdoor concentrations at children’s homes and compare them to their health measurements. Additionally, to determine pollutant sources that have the most impact on these children’s health, we use “receptor modelling” methods on our PM10 composition data.

Another approach to estimating the spatial distribution of pollution is **dynamic modelling of pollutant dispersion**. We have used a Swiss-specific PolluMap model that combines emission inventory information with meteorological data to estimate residential exposure to PM10, PM2.5, and NO2 over all of Switzerland. Currently, we have been applying and evaluating the state-of-the-art numerical Weather Research Forecasting model with a chemistry module that can predict the concentrations of 60 chemical species using more than 160 chemical reactions. The model will run on supercomputers in Barcelona and Basel, providing 1–2 km resolution pollutant maps over Switzerland.

**Personal Exposure During Commute**

Commute time and mode are of interest because urban transport micro-environments likely contain high concentrations of harmful air pollutants and are considered to be a significant contributor to air pollution exposure. A commuting model for the Basel region is being developed to simulate the air pollution exposure from different modes of transportation (driving, riding public transport, bicycling and walking). This model will allow us to characterise the commute exposure burden of urban residents within the TA-PAS (Transportation, Air Pollution and Physical Activities) project. Furthermore, understanding commuting air pollution exposure will facilitate the evaluation of urban policies addressing public health, environmental quality and the quality of urban living.

**Traffic: Pollution and Noise**

Traffic is not only a key source of air pollution but also of noise. EES engages in the exposure assessment of noise in the TRITABS project (Projet Tri-national de Trafique, Air, Bruit et Santé) to better disentangle the various health effects of traffic. Noise maps and traffic-related air pollution data from Basel, Grenoble and Girona will be integrated with cardiovascular health data and jointly analysed (also see section 3, SAPALDIA).

**Outlook**

EES’s goal is to establish a leading environmental exposure science centre that encompasses disciplines across the various units and departments of Swiss TPH and the University of Basel. We will continue to advance measurement techniques, modelling methods and develop new approaches to improve exposure assessment. Furthermore, we are ac-
tively involved in the development and testing of the next generation of instruments and methods for characterising environmental pollutants such as wireless remote sensing systems (Sensorscope, EPFL) and portable ultra-fine particle instruments (MiniDiSC, FHNW). We will expand our collaborations within Swiss TPH to Africa and other Southern countries in the “INDEPTH Network” pilot project on biomass smoke exposure interventions.

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Funding: Coca Cola Foundation; European Union Framework Programme FP7; Federal Office for the Environment (BAFU), Swiss cantonal air authorities, Swiss National Science Foundation (SNF)
Gender is a crucial factor in shaping health, health behaviour, and access to health care. Research from our unit contributes to improving health interventions by considering gender as a determinant of health. The unit has developed expertise in gender and health research over the last 15 years and is involved in medical and Public Health training. Our key research areas include sexual and reproductive health, the interrelatedness of maternal and child health, sex- and gender-related factors in the aetiology of chronic diseases and gender-related health reporting. The unit also offers research services for gender analyses of a broad range of health outcomes.

**Sexual and Reproductive Health and Maternal and Child Health**

In Gynaecology, working approaches have undergone major changes in the last decades and have increasingly focused on patient-orientation and quality of care. We obtained SNSF funding to investigate the impact of different working approaches on patients’ attitudes, health behaviour, health conditions and satisfaction with care in nine gynaecological care settings in the Basel region. This study began in 2010.

We also provided yearly reports for the Swiss Midwifery Association about the services of all freelancing midwives in Switzerland. The reports summarise data collected by approximately 700 midwives on more than 40,000 women, displaying details of prenatal visits, birth characteristics and postpartum consultations.

Since 1999, we have also been involved in the monitoring of the Baby-Friendly Hospital Initiative in Switzerland to promote breastfeeding. Each year, we evaluate four monitoring steps: breastfeeding initiation after birth, exclusive breastfeeding during postpartum stay at hospital, uninterrupted rooming-in and avoidance of pacifiers or artificial teats.

New mothers often are challenged by tiredness and infant crying, yet postnatal care lacks effective strategies to alleviate these conditions. A mixed method study of our unit identified maternal depression, immigration status, inadequate support from health care providers or lack of private networks as main risk factors for early crying problems, whereas having more than one child was protective.

A Marie Heim-Vögtlin grant of the SNSF was obtained by Sonja Merten in 2009 for research on child health and acceptability of health services. An ongoing project (ARTACES) investigates socio-economic and cultural drivers and barriers to HIV/AIDS related services in Zambia for adults and children, combining ethnographic and epidemiological methodology. A particular focus is on the gendered social and intra-family dynamics affecting HIV related decision-making.

**Sex/Gender-Related Factors in the Aetiology of Chronic Diseases**

Gender impacts chronic diseases through many pathways. In the cohort study SAPALDIA (see box page 20), we address the role of reproductive and hormonal factors for respiratory and cardiovascular health. A Marie Heim-Vögtlin grant was obtained by Julia Dratva in 2010 to launch an additional study component about the influence of early life factors on cardiovascular and respiratory health in the offspring. This is the first offspring study in a Swiss cohort.

A literature update on behalf of the Swiss Cancer League summarises risks and benefits of menopausal hormonal therapies regarding cardiovascular and cancer outcomes.
Gender Research: Methodology and Services

The unit’s expertise in gender analyses encompasses work with a gender framework as a social and cultural determinant of health, to rely on gender theories, to adopt interdisciplinary methods, and to conceptualise sex/gender-related factors as a health relevant “exposure factor” in epidemiological research.

On behalf of the Swiss Federal Office of Public Health, the unit analysed data of the Swiss Health Survey 2007 regarding the willingness to donate organs post-mortem, the use of home care (Spitex), and oral health. For the Swiss Health Survey 2007, we initiated the integration of a validated instrument to assess premenstrual syndrome, and analyses yielded a prevalence of 10% in women of reproductive age. We analysed socio-demographic determinants of the syndrome and its interrelation with mental health. Data of the Swiss National Cohort study with linked census and mortality data for the period 1990–2005 were analysed regarding the modifying effect of “gender” on the relation between marital status/living arrangement and mortality.

Furthermore, we contributed to the first European State of Men’s Health Report, led by A. White, Leeds Metropolitan University.

A project on deviant traffic drivers investigates the risk of relapses. The data consists of drivers who were referred to a forensic psychiatric assessment in the Basel region from 2000–2009. Most of the subjects were men.

Data of a study conducted by the Department of Otorhinolaryngology at the University Hospital Basel have been analysed with regard to gender-related patterns of use of hearing aids in Switzerland. The collaboration continued with a literature review on epidemiological information on age-related hearing loss in men and women in Europe (Assessment of Hearing in the Elderly/Aging and Degeneration, AHEAD, FP7).

Since 2008, the Gender and Health unit has been involved in the evaluation of an ongoing gender-specific smoking prevention project targeting young women, conducted by the Lung Association of Basel/Basel-Land.

Outlook

We collaborate closely with the chronic disease unit and have started collaboration with other Swiss TPH units, such as the Sexual and Reproductive Health unit and the Health Social Sciences unit. New prospects are appearing through projects addressing the role of gender regarding access to health care and help seeking, for example in relation to immunisation. The numerous links with research groups within the University of Basel will be further strengthened to increase the significance of gender research in medicine. It is also planned to develop and integrate a gender track within the medical curriculum, in collaboration with several European Universities.


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Collaboration: Academy of Insurance Medicine, University of Basel; Centre for Gender Studies, University of Basel; Dept. for Otorhinolaryngology, University Hospital Zurich; European Community Respiratory Health Study Gender Working Group; Haukeland University Hospital, Bergen/Norway; Institute of Gender in Medicine GIM, Berlin; Institute for Legal Medicine, University Basel; Institute of Social Medicine, Vienna/Austria; Leeds Metropolitan University; Lung League Basel-City and Baselland; Officer Women’s Health Vienna/Austria; School of Population Health, University of Melbourne/Australia; Sozialwiss. Frauenforschungs institut Freiburg i.Br./Germany; Swiss Federal Office of Public Health; University of Nijmegen/Netherlands; University of Zambia; University Women’s Clinic of the University Basel

Funding: Gabriele Charitable Trust; Lung League Basel (LLBB); Swiss Federal Office of Public Health; Swiss Cancer League; Swiss Foundation for the Promotion of Breast feeding; Swiss Midwifery Association; Swiss National Science Foundation (SNSF)

Health Interventions

The development of new health interventions, especially in the field of malaria, is one of the long-standing and most successful traditions at the Swiss TPH. Our unit works on all aspects of applied research against malaria, from the testing of new vaccines to the national implementation of proven control tools. A special highlight during the past two years has been the successful completion of Phase 2 testing of the RTS,S malaria vaccine. The large Intermittent Preventive Treatment in infants (IPTi) consortium, in which our institute was very active, has been successfully completed, and high-level publications are being produced. The generation of new evidence on current vector control measures has been further pursued, as well as the introduction of better diagnostic approaches and the improvement of access to malaria treatment.

Another special highlight of the year 2009 has been the large media action «Jeder Rappen zählt» – “Each cent is counting”) which featured prominently the theme of malaria in Swiss mass media for a whole week in December (picture).
**Rapid Malaria Diagnosis and Aetiologies of Fever in Dar es Salaam (IMALDIA)**

The systematic introduction of rapid diagnostic tests (RDTs) for malaria was carried out in the frame of the IMALDIA project in 9 health facilities in Dar es Salaam and 6 health facilities in the Kilombero Valley. Over 500,000 RDTs were used in 3 years and artemether/lumefantrine (ALu) consumption was reduced by 68% (graph). The close link with the national and local health authorities resulted in a successful implementation, which was instrumental in shaping the national policy for RDTs. In addition, the Tanzanian experience was substantially used as evidence base for the new 2010 WHO malaria treatment policy.

**Improved Tools for Case Management (PeDiAtrick)**

Deployment of diagnostic tests for malaria should go hand-in-hand with training on the management of the “negative syndrome” – detecting other causes of fever when the malaria test is negative. The PeDiAtrick project aims to improve the quality of health care for children through the use of electronic decision support systems (mobile phones) to promote evidence-based medicine and rational use of...
drugs (antimalarials and antibiotics) (picture). It builds on the IMCI flowchart and on findings from the IMALDIA etiology study, which identified predictors of bacterial infections and severe disease.

**Access to Effective Malaria Treatment in Tanzania and its Impact (ACCESS and ALIVE Projects)**

The ACCESS strategy to understand and improve access to prompt and effective malaria treatment is based on a set of integrated interventions, including (1) social marketing for improved care-seeking at community level, (2) strengthening the quality of case-management in health facilities, and (3) strengthening the commercial drug retail sector. The interventions are accompanied by a comprehensive set of monitoring and evaluation activities embedded in a demographic surveillance system (DSS). Most parameters of access to effective malaria treatment improved during the project period (figure). The sister project, ALIVE, assessed the impact of artemether/lumefantrine (ALu) introduction as first-line treatment on malaria transmission and child mortality. Both outcomes significantly declined during the first three years of ALu implementation and compliance was found to be excellent.

**Malaria Vaccines Trials**

The RTS,S vaccine candidate produced by GlaxoSmithKline (GSK) Biologicals is a recombinant protein that fuses a part of the *P. falciparum* circumsporozoite (CS) protein with the hepatitis B surface antigen. The crucial Phase 2 trial completed by IHI and Swiss TPH in 2008 has shown that co-administration with EPI-vaccines is not affecting safety and immunogenicity of the malaria and EPI vaccines and resulted in substantial and consistent protection in infants. These key trials, undertaken at the IHI-branch of Bagamoyo (Tanzania) and in Manhica (Mozambique), complemented by findings in other African centres, led to the large-scale phase 3 trial among 16,000 infants and small children in 11 centres in 7 African countries. So far, more than half of the children could be enrolled (over 1000 in Bagamoyo). Our institute continues to be involved in this MVI-led multi-centre trial through being co-investigator of the IHI-Bagamoyo centre and also through participating in a large-scale mode-of-action study of RTS,S, applying innovative approaches in immunology and systems biology (see section 16). First phase 3 results are expected in 2011, and registration of RTS,S should be possible in 2013.

**Core Support to the National ITN Cell in Tanzania (NETCELL)**

Since 2002, the Swiss TPH provides core support to the ITN cell located within the National Malaria Control Programme in Tanzania (SDC-supported NETCELL project). Over the

**Estimated effective coverage of fever treatment based on patients' or caretakers' accounts. Legend on x axis:**

- (1) Episode treated,
- (2) Drug administered,
- (3) Antimalarial administered,
- (4) Recommended antimalarial administered,
- (5) Recommended antimalarial on same or next day,
- (6) Recommended antimalarial on same or next day, in correct dose,
- (7) Recommended antimalarial on same or next day, correct dosage, appropriate considering reported symptoms.

**Mass distribution of free long-lasting insecticidal nets in Tanzania.**

*Photo: C. Lengeler*
past two years, the ITN cell has generated more than 150 million dollars in funding for ITN programmes on behalf of the government. A mass distribution of free long-lasting ITNs was initiated in 2009 to protect all children under five years in the country (Picture). In 2010, the campaign will be extended to the rest of the population. As a result, child mortality has dropped by 45% in the country, saving 80,000 deaths each year.

We also completed recently a Cochrane review on one of the two mainstream methods for malaria vector control, indoor residual (house) spraying (IRS). The review clearly demonstrated the lack of high quality evidence for IRS, as well as the total lack of evidence of impact for the combination of IRS and insecticide-treated nets (ITNs).

**Outlook**

Although the focus of the unit is not strictly on malaria, this is likely to remain our main area of interest in the period to come. The area of diagnostics and improved case management will become an even stronger focus of interest, as well as new technological developments in vector control. The development of vaccines will continue with important developments expected in the 2 following years.

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**Funding:** GlaxoSmithKline Biologicals (GSK); Malaria Vaccine Initiative (MVI); Novartis Foundation for Sustainable Development (NFSD); Novartis Pharma; President’s Malaria Initiative (PMI); Staatssekretariat für Bildung und Forschung (SBF); Swiss Agency for Development and Cooperation (SDC); Swiss National Science Foundation (SNF); US Agency for International Development (USAID)

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**Health Social Sciences**

Social science research for health complements other focal interests of the institute in health systems and disease systems. Leadership in the fields of medical anthropology and cultural epidemiology drives an agenda for access to health services, acceptance and demand for disease interventions, clarifying the role of vulnerability and resilience, urban health priorities and mental health. Our work contributes to activities concerned with society, culture and health, which is a designated key area of activity at the Swiss TPH.

Medical anthropology and cultural epidemiology are featured in the core curriculum and advanced courses, and our research involves close collaboration with other units, especially Gender and Health.

**Access to Interventions and Health Services**

To enhance access, we have formulated a health access livelihood framework, rooted in principles of medical anthropology, for malaria control in the ACCESS project in Tanzania (see page 33, Health Interventions Unit). This research is improving the organisation of health services in Tanzania by relating interests of health services and health-seeking in a context of livelihood insecurity. Suggested interventions focus on women’s ability to use household and community assets to improve access to health services. Social considerations at the level of individuals, groups and communities are linking malaria control to microcredit and income-generation schemes. Other research on access and use of health services considers
perceived risk, help seeking and treatment for Buruli ulcer in Ghana.

Efficacy of medicines and vaccines demonstrated in clinical trials is not necessarily sufficient for programme effectiveness. Social contexts of interventions and population behaviour must also be considered. Our research considers whether people are willing and able to use proposed interventions. Cultural ideas about a disease, a vaccine to prevent it, and motives behind a health system’s recommendation may all play an important role. Working with WHO and partners, we have designed studies in Zanzibar, Kenya and DR Congo to examine the level and determinants of acceptance and demand for vaccines to prevent cholera. Lessons learned from experience in our African studies are guiding development of a new study of community acceptance of vaccines for measles and H1N1 influenza in Switzerland, undertaken in collaboration with the Gender and Health Unit.

A new multi-centred study, Access to Medicines in Africa and South Asia (AMASA), is concerned with the production, supply and use of selected drugs for tuberculosis, malaria, depression, reproductive health and HIV/AIDS. The study investigates the interplay of health priorities, regulatory policy and population access and use of these medicines in India, Uganda and South Africa. The Swiss TPH is one of three European institutions, each paired with an Indian or African partner. Internal collaboration within our institute involves participation of colleagues for knowledge management (in Teaching and Training) and pharmaceutical regulatory policy (in Medicines Research).

Social Vulnerability and Resilience

Responding to challenges of diseases of poverty, a transversal project—Social Vulnerability and Resilience—of the NCCR North-South (ref section) showed how African farmers mobilise cultural and social capital at the household level to respond to malaria despite clear deficiencies in health services. A framework of multi-layered social resilience was developed to guide research and build capacity to generate capital for farmers. Findings show that people not only cope and adjust to adverse conditions as social and societal actors, they also proactively create opportunities to improve competence and pathways to overcome or mitigate health problems. New projects on reproductive resilience investigate the interplay of cure, care and social development at key points of the life cycle from birth to infancy, childhood, adolescence, motherhood and old age. Internal collaboration involves links with the Reproductive Health Unit in the Swiss Centre for International Health (SCIH).

Urban Health, Mobility and Migration

Urban health studies consider interconnectedness in a rapidly urbanising world that is marked by increasing density, diversity and the complexity of dynamic institutions and organisations. Case studies in Tanzanian cities examined waste- and water-related disease. Research in Abidjan and other West African cities showed that mitigation of en-
Environmental and sexual health risks requires economic, social and cultural capital generated within family, community and administrative networks to improve access to urban services. Case studies of the elderly in Tanzania found extensive rural-urban mobility for food security and access to specialised healthcare. In Germany and Switzerland, our research explains how migrants mobilise resources of transnational networks to enhance resilience in the face of migration-related and reproductive health risks.

**Regional Interests and Outlook**

Regional interests in Africa and India remain priorities strengthened by collaborations and programme support. We play a leading role in the Centre of Competence on Africa at the University of Basel, providing expertise on public health, social life and resilience to an urban research network that has the potential to expand collaboration across regions. Mental health research continues on suicide, cultural psychiatry, community mental health and the stigma of epilepsy. In India, our collaboration has developed in an Indo-Swiss Joint Research Programme of the Swiss Federal Institute of Technology, Lausanne, involving curriculum development, social science studies of leprosy and hypertension and development of clinical trials of traditional medicines. These and our other global partnerships remain enduring priorities, and the opportunities for collaboration in our new institute have further strengthened ongoing and new initiatives in Switzerland and Europe.

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**Collaboration:** Centre for Development and Environment (CDE), Centre Suisse de Recherches Scientifiques en Côte d’Ivoire (CRS); Centro de Investigación para el Desarrollo, Universidad Mayor de San Andrés, La Paz, Bolivia; Development Study Group, Geographisches Institut der Universität Zürich; Dept of Sociology, University of Dar es Salaam, Tanzania; Ifakara Health Institute (IHI), Tanzania; Initiative for Vaccine Research and Global Task Force on Cholera Control, World Health Organization (WHO); Institut für Geographie, Friedrich-Alexander-Universität, Erlangen-Nürnberg; Institute of Social Anthropology, University of Basel; Institut Universitaire d’études du développement (IUED); Foundation for Medical Research (FMR), Mumbai, and Foundation for Research in Community Health (FRCH), Pune, India; Jordan University of Science and Technology (JUST Jordan); KEM Hospital and Seth GS Medical College, Mumbai; Maharashtra Institute of Mental Health (MIMH), Pune, India; Maseno University, Kisumu, Kenya; Ministry of Health and Social Welfare, Zanzibar; National Institute of Epidemiology (NIE), Chennai, India; Natural Resources Institute, Noguchi Memorial Institute for Medical Research, Legon, Ghana; Novartis Foundation for Sustainable Development (NFSD); Sandec, EAWAG, Dübendorf; School of Public Health, University of Ghana; South Bank University, London; Sustainable Development Policy Institute, Islamabad, Pakistan; University of Berne; University of Greenwich at Medway, England; Università Psychiatriche Kliniken, Basel; University of Ottawa School of Public Health, Canada; University of the Witwatersrand, School of Public Health, Johannesburg, South Africa

**Funding:** Commission for Research Partnerships with Developing Countries (KFPE); Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne; European Union Framework Programme FP7; Freiwillige Akademische Gesellschaft (FAG); Humer Foundation; Indo-Swiss Joint Research Programme; Novartis Foundation for Sustainable Development (NFSD); NCCR North-South; Rudolf Geigy Foundation (RGF); Swiss Agency for Development and Cooperation (SDC); Swiss National Science Foundation (SNSF); World Health Organization (WHO)
Global health today is extraordinarily dynamic and characterised by unprecedented opportunities made possible by increasing resources, new players, novel strategies and innovative technologies. This results in the potential for significant strengthening of health and health systems.

Although health indicators are improving in the right direction, these dynamics heighten the potential for fragmentation, unnecessary complexity and avoidable inefficiencies that slow progress. Certainly effective coverage and impact of health investments are improving, but more slowly than expected while health disparities are increasing. It is progressively more appreciated that this is largely due to weaknesses in health systems. For the stewards of health systems in low and middle income countries, the challenge of managing this opportunity with its emergent complexity has never been greater.

The Health Systems Unit extends the strong tradition of Swiss TPH in innovating, developing and validating health interventions into a new thrust aimed at system-level interventions intended to lift health systems to higher levels of performance capable of delivering such interventions with effective and equitable (universal) coverage. The Health System Unit’s projects are built around extensive internal and external networks and partnerships of the Swiss TPH, harnessing skills in health-policy analysis, health economics, health systems analysis and dynamic modelling.

**Systems Thinking**

The Health Systems Unit is pioneering the use of systems science to understand complex system behaviours, synergies and weaknesses to better intervene at the “system level”. This calls for applied trans-disciplinary research from a “systems thinking” perspective. This approach allows system managers and designers to get “under-the-hood” of the system to more effectively and synergistically manipulate levers in: governance; financing; human resources; informatics; technologies; and service delivery. In this biennium, the Unit has led a major global contribution introducing “Systems Thinking for Health Systems Strengthening” together with the WHO AHPSR. The approach brings stronger conceptual underpinnings through which funders, researchers and stewards of health systems can constructively extend health systems development. We are expanding this approach into malaria elimination efforts in the Western Pacific, essential drug supply-chain management in Africa and into curriculum development for health systems analysis in Schools of Public Health in Africa.

**Systems Effectiveness**

Effectiveness of any strategy in real-world health systems is always lower than the efficacy predicted by controlled studies. Weaknesses in health systems are the primary cause of this decay. A vast amount of research funding is expended
for marginal increases in efficacy, only to see such increases nullified by health system inefficiencies that could easily be mitigated. These decays are due to issues such as access, affordability, acceptability, compliance and adherence. They are grossly underestimated and the main reason we fail to see sufficient impact of the current wave of commodity funding for health interventions. This is the “systems effectiveness” in delivering health interventions. We are working with the INDEPTH Network in Burkina Faso, Ghana, Mozambique and Tanzania to establish district health systems observatories to develop and apply novel methods to improve systems and equity effectiveness for malaria interventions.

**Systems Governance**

Systems can be quickly elevated to higher levels of performance by judicious intervention targeting two sub-systems: governance and information. These are the least intervened building blocks in health systems. We are developing and evaluating a new framework for analysing governance of health systems in Tanzania and Tajikistan. We are also working in Tanzania and Ghana with innovative approaches for visualising (making transparent) the health system information needed to govern the system in real time (making it more responsive and accountable).

**Systems Effects of Global Health Initiatives**

Global health initiatives (GHIs) are increasingly targeting the strengthening of health systems, with more than three billion USD presently invested in low- and middle-income countries. We are mapping and analysing these investments to understand a GHI’s approach and define health system strengthening in terms of what aspects are being targeted and what methods best assess this strengthening. We are also examining system effects of the largest health intervention investment of GHIs, scaling up antiretroviral therapy for HIV/AIDS. This is the most complex intervention ever taken to scale in low-income settings and has profound impacts that exemplify the strengthening and weakening effects of such initiatives. This work is done in partnership with Burkina Faso, Tanzania and Uganda, and several European Institutions.

**Systems Integration**

Modern concepts of health systems do not stop with health providers but extend to home, family and individual practices. Integrating community- and home-based services is one of the weakest aspects of health systems. Applying systems thinking, we are moving beyond a disease-by-disease approach to improve how such strategies are better integrated. We are working with partners in Africa and Latin America on novel approaches that aim at “neglected risks” as opposed to “neglected diseases” to engineer how these responses can be part of, and seamlessly supported by, the overall health system.


Collaboration: Basel Institute of Governance, Basel (BIG); EAWAG, Dübendorf; Ghana Health Service, Accra, Ghana (GHS); Ghana School of Public Health, University of Ghana, Accra (GSPH); Heidelberg University (HU); Ifakara Health Institute, Tanzania (IHI), Tanzania; Iganga DSS, Makerere University, Kampala, Uganda (IGANGA); Instituto de Investigación Nutricional, Lima, Peru (IIN); Instituto de Non-ionizing Radiation (INN); International Network for the Demographic Evaluation of Populations and Their Health in Developing Countries (INDEPTH); Institute of Tropical Medicine, Antwerp; (ITM); Karolinska Institute (KI) Stockholm, Sweden; London School of Hygiene and Tropical Medicine (LSHTM), London, UK; Mailman School of Public Health, Columbia University, New York, USA (MSPH); Nouna Health Research Centre, Nouna, Burkina Faso (NHRC); Project CONCERN International, La Paz; SIKIKA, Dar es Salaam, Tanzania; SODIS Foundation, Cochabamba, Bolivia; Tanzanian Commission for Science and Technology, Dar es Salaam, Tanzania (COSTECH); University of Dar es Salaam Computer Centre, Dar es Salaam, Tanzania (UCC); University of Cape Town, Cape Town, South Africa (UCT); University of Queensland School of Population Health, Brisbane, Australia (UQ); School of Public Health University of California, Berkeley.

Funding: Alliance for Health Policy and Systems Research, WHO, Geneva (AHP SR); AusAID, Canberra, Australia (AusAID); Bill & Melinda Gates Foundation, Seattle, USA (B&MGF); Doris Duke Charitable Foundation, New York, USA (DDCF); European Union Framework Programmes FP6 and FP7; International Network for the Demographic Evaluation of Populations and Their Health in Developing Countries (INDEPTH); National Institutes of Health, Washington DC, USA (NIH); Roll Back Malaria (RBM), WHO Geneva; Starr International Foundation, New York, USA (STARR), Swiss National Science Foundation (SNSF); Union Bank of Switzerland (UBS); Optimus Foundation; University of California, Berkeley, USA; WHO World Bank UNDP Special Programme for Tropical Diseases Research, Geneva, Switzerland (TDR, WHO).

Human and Animal Health

The Human and Animal Health unit aims to contribute to the health of humans and animals by identifying and applying closer cooperation between human and veterinary medicine, known as “one health”. Thematically, we focus primarily on the health of mobile populations and their animals and secondly on the control of zoonoses in developing countries and Switzerland. Many of these activities are in the framework of a thematic node of the National Centre of Competence in Research North-South (NCCR N-S) which is a cross-unit activity. We are involved in large international networks like EU FP-7, connecting research institutions in the North and the South.

“One health” has gained increased attention worldwide by international organisations and governments, but there is still a long way to make full use of its potential. A “one health” tool box has been developed, providing approaches to integrated surveillance of communicable diseases in humans and animals to accelerate the detection of new outbreaks and of the source of infection. Animal-human models of disease transmission for brucellosis and rabies allow for the simulation of interventions also outside the sector of public health. Inextricable complex interactions of human and animal health, societies and eco-systems pave the way towards increasingly dynamic system approaches within an extension of “one health”, coined “health in social-ecological systems” (HSES).

National Centres for Competence North-South (NCCR North-South)

NCCR North-South is a cross-unit activity of Swiss TPH and has entered its third phase, which emphasizes research projects led by early career scientists from the South and the North who operate across thematic nodes and have been initiated in Africa and Asia. Sexual resilience of adolescents is studied in view of a better understanding of choices in reproduction of young people. Work on social service provision for mobile populations includes migrant workers and mobile pastoralists, as these are most vulnerable and remain excluded from social services. This involves also the mapping of inequalities and resilience in West Africa and South East Asia. Integrated approaches to sanitation consider the optimisation of nutrient cycling while minimising public health risk in peri-urban agricultural systems.

Health of Mobile Pastoralists

Work on health services and nutritional status of nomadic pastoralists from the second phase of NCCR North-South has been completed. One approach addressed the lack of knowledge of demographic composition of mobile communities and demonstrated that demographic data can be collected by capture-mark-recapture methods using electronic fingerprint technology. The quality of health service provision perceived by communities determines largely how services are accepted. Nutritional status of Chadian pastoralists and rural sedentary communities is alarmingly poor, and it requires urgent attention for the planning of health care services.

Zoonoses in Developing Countries

Zoonoses control in developing countries is affected by lack of capacity and funding for interventions. Identifying op-
tions for zoonosis control in developing countries requires addressing profitability and cost-effectiveness. We have joined a large Euro-African consortium on integrated control of zoonotic diseases (ICONZ) in which we are in charge of societal cost and burden of disease estimates of rabies, brucellosis, anthrax, bovine tuberculosis, echinococcosis, leishmaniasis and cysticercosis in six African countries.

Rabies in humans persists in Asia and Africa mainly as a preventable disease transmitted by the bites of rabid dogs. Our ongoing studies on urban rabies control in N’Djaména, the capital of Chad showed that up to 70% of dogs have access to vaccinations. Using a mathematical model of dog-human rabies transmission, we can show that 6 years after implementation, rabies control in dogs becomes more cost-effective than human post-exposure prophylaxis (PEP) (Figure 1). The cost-effectiveness of human PEP was estimated at 46 USD/DALY averted, whereas after 6 years the cost-effectiveness of rabies control in humans by dog mass vaccination reached 32 USD/DALY averted. Beyond a time-frame of 7 years, it appears to be more cost-effective to combine parenteral dog vaccination campaigns with human PEP compared to human PEP alone.

In collaboration with an international consortium we found a new clonal complex of Mycobacterium bovis, characterised by a large deletion (Af1), which is dominant in Central and West Africa. First strains of M. bovis have been molecularly characterised in Mali and Algeria and contribute towards a full picture of M. bovis distribution and spread in Africa. Tuberculosis has been investigated in humans and animals in Borana communities (South-Western Ethiopia) where Mycobacterium bovis has been found in humans and cattle but not in goats or camels. The prevalence of M. bovis in rural Ethiopia is low and ranges between 1–3%, however much higher prevalences are found in peri-urban dairy systems. A network for bovine tuberculosis in Africa has been founded and is strongly engaged in the training of mycobacteriology.

A representative study on brucellosis sero-prevalence in humans, cattle, goat and sheep in Kyrgyzstan revealed an overall true seroprevalence of brucellosis from a Bayesian estimate to be 7% in humans, 3% in cattle, 12% in sheep and 15% in goats. Human seroprevalence was significantly associated with small ruminant seroprevalence but not with cattle. Estimates of brucellosis incidence in humans indicated a conservatively estimated under-reporting of three times more clinical brucellosis cases compared to the reported incidence of clinical cases. Diagnostic tests in livestock confirm the usefulness of the Rose Bengal Test, which should be combined with modern confirmatory tests. The study confirms the high seroprevalence of brucellosis in Kyrgyzstan and warrants rapid effective intervention by mass vaccination of sheep, goats and cattle. First strains of B. melitensis have been isolated from sheep and cattle in Kyrgyzstan. Support is given to Brucellosis control in Mongolia through training, field studies and policy dialogue.

The delayed response during the last Rift Valley Fever (RFV) outbreak in Kenya was due to missing evidence-based emergency plans and inadequate coordination between the animal and human health sectors. The health sector could deploy 5 times as many staff than the veterinary sector that had more tasks to fulfil. In a new research collaboration with five institutes from the health and livestock sectors, the information needed by decision makers to choose an appropriate evaluation design is assessed first, then priority control options are identified that are validated in a cross-sectoral economic evaluation to assist in the joint contingency planning in Kenya and the region. The economic model combines benefit-costs analysis with a social accounting matrix to capture sectoral and multiplier effects to Kenya’s economy. Disability adjusted life year (DALY) estimates will be established for the first time for RVF while considering outbreak and inter-epidemic human cases.

Zoonoses in Switzerland

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The epidemic likely faded away by the out-migration of the water birds at the end of the winter. During this time, we also established the risk of contact of wild water birds and domestic poultry, which is very low and not linked to the presence of lakes or large rivers. The contact network of the Swiss poultry system was established by a questionnaire study. It showed that both commercial and non-commercial farms are involved in neighbourhood and remote between-farm contacts relevant to HPAI spread.


Collaboration: Armauer Hansen Research Institute, Addis Ababa, Ethiopia (AHRI); Centre Suisse de Recherches Scientifiques en Côte d’Ivoire (CSRS); Centre de Support en Santé Internationale (CSSI), Chad; Egerton University, Kenya; Eidgenössische Technische Hochschule, Zürich (ETHZ); Bundesamt für Bevölkerungsschutz (Labor Spiez); Imperial College, London (ICL); Institut für Veterinärbakteriologie, Zürich; Institut National de Recherche en Santé Publique, Nouakchott, Mauritania (INRSP); Kyrgyz Veterinary Services; Kyrgyz Veterinary Laboratories; Laboratoire Central Vétérinaire, Bamako Mali (LCV); Laboratoire de Recherches Vétérinaires et Zootéchniques, Chad (LRVZ); Veterinary Public Health Institute (VPH), University of Bern

Funding: Armauer Hansen Research Institute, Addis Ababa, Ethiopia (AHRI); Bundesamt für Bevölkerungsschutz (BABS); European Union Framework Programme FP7; International Development Research Center Canada, EcoZeid project (IDRC); International Food Policy Research Institute (IFPRI); NCCR North-South; Swiss Agency for Development and Cooperation (SDC); Swiss National Science Foundation, Pro*Doc (SNSF); Union Bank of Switzerland (UBS) Optimus Foundation; Wellcome Trust; World Health Organization (WHO)
Medical Parasitology and Infection Biology

**Introduction**

The work of the Molecular Parasitology and Epidemiology group falls into two main categories: (i) research on cell biological aspects of the parasite *Plasmodium falciparum*, and (ii) molecular epidemiological studies using findings from basic research. Within our unit, we try to link bench results to observations made in the field. Our research group works closely with the molecular diagnostics team, with shared staff, laboratories, research projects and publications.

Research on the cell biology of *P. falciparum* focuses on early events after red blood cell invasion and events by which the parasite refurbishes and modifies its host cell. We previously identified crucial genes for transport of the virulence factor PfEMP1, and we are investigating the role of possible interaction partners. We have identified a number of interesting proteins that are exported beyond the parasite’s confines, and we are currently characterising them.

The main focus of our epidemiological research is infection dynamics and diversity of the malaria parasite *P. falciparum*. We monitor drug resistance and analyse the expression of the virulence factor PfEMP1 in the field. For this we develop new tools, which subsequently can also be used for other infectious diseases. We are also conducting molecular-epidemiological studies on HIV and on tuberculosis.

**Molecular Parasitology and Epidemiology**

**Molecular Parasitology of Plasmodium falciparum**

*Early transcribed and exported proteins*

We analysed the function of the histidine-rich transmembrane proteins MAHRP1 and MAHRP2, which are both exported into the host cell cytosol. We generated a knock-out clone of MAHRP1, and we were able to test signals required for export to the cytosol. We want to identify interaction sites required for PfEMP1 transport by using complementation assays. Using tagged MAHRP1, we performed pull-down experiments and immunoprecipitations to identify interaction partners. Several candidate partner proteins are currently under investigation.

We further analysed MAHRP2, which shows a similar structure to MAHRP1 and is also exported to the erythrocyte cytosol. It localises close to Maurer’s clefts but never directly

*Immunofluorescence assays at different time points of the P. falciparum life cycle showing fluorescence labelling of the potential vaccine candidate P27.*
on the clefts. EM microscopy and tomography showed that MAHRP2 is a component of recently described tethers that connect the Maurer’s clefts to the cytoskeleton of the erythrocytes. Using green fluorescence protein tagged protein in life imaging, we observed a subpopulation of tethers moving within the cell. These free tethers could be isolated by ultracentrifugation, visualised by EM and analysed by mass-spectrometry. Through pull-down experiments and immuno-precipitations, we identified additional protein candidates potentially interacting with MAHRP2. Some of these proteins are currently being studied. Because several attempts to knock out MAHRP2 failed, we tagged the gene with the FKBP destabilising domain and obtained a knock-down parasite that shows minimal expression of MAHRP2. The phenotype of this parasite is currently the subject of intense studies.

Further study of these interactions will probably allow us to identify crucial steps for which inhibitors might be found, eliminating the pathology of the parasite in vivo by blocking the process of cytoadherence.

Scientists:  H.-P. Beck (head), A. Gaida, S. Rusch
Technicians:  D. Müller
Students:  O. Dietz, E. Pachlatko

Collaboration:  Bernhardt-Nocht Institute (BNI) Hamburg; Ecole Polytechnique Federale de Lausanne (EPFL); La Trobe University Melbourne; University of Bern; University of Marburg Germany; Walter and Eliza Hall Institute (WEHI)
Funding:  Swiss National Science Foundation (SNSF); Commision of Science and Technology action 587 (COST 587) through the State Secretary for Education and Research (SER)

**Plasmodium falciparum vaccine development**

Using a bioinformatic screen for heptad repeat motifs corresponding to α-helical coiled-coil structures of the *P. falciparum* genome has led to the identification of novel potential vaccine candidates. We have assessed the extent of polymorphism in these putative α-helical coiled-coil domains in culture strains, in natural populations and in the single nucleotide polymorphism data available at PlasmoDB. Because 82% of 166 peptides were conserved, we concluded that the selection of α-helical coiled-coil structural motifs is a valuable approach to identify potential vaccine targets.

The PFF0165c gene product was identified and pre-clinically evaluated. Human antibodies against two regions within this protein were effective in parasite killing in the antibody-dependent cell-mediated inhibition in vitro assay. The continued development (Phase 1) of this vaccine candidate required functional analyses. We showed that this PEXEL-negative protein contains a predicted signal sequence at the N-terminus, and it is exported and localises to Maurer’s clefts in early trophozoite stages (whereas in schizont stages PFF0165c associates with the red blood cell membrane). By expressing GFP-tagged truncated versions of this candidate, we are attempting to identify the sequence requirements responsible for trafficking.

Scientists:  I. Felger (head), C. Flück
Students:  C. Kulangara
Collaboration:  University of Lausanne
Funding:  Swiss National Science Foundation (SNSF); Novartis Foundation

**Molecular Epidemiology**

**var genes and PfEMP1**

The *var* gene repertoire of *P. falciparum* is extremely large, if not unlimited. However, the function of the encoded protein requires a limited conservation. We tested whether *var* genes in infected children with severe or mild malaria show clustering or structuring. In Papua New Guinea (PNG), a restricted subset of *var* genes was found associated with disease. In Tanzania, a smaller subset was found frequently expressed in children with severe disease, while in non-severe patients a large diversity of expressed *var* genes was found. In Gabon, another subset of expressed *var* genes were frequently expressed in severely ill children. From these studies it is emerging that in severe malaria, diversity of *var* gene expression is limited, suggesting that disease-reducing interventions based on PfEMP1 might be feasible.
In order to test whether var genes from severe cases are more frequently expressed, we conducted ELISAs on several recombinantly expressed PfEMP1 domains with sera from children and adults from endemic areas. We found that var gene domains from severe cases were frequently recognised by adults whilst domains from asymptomatic infections were significantly fewer times or hardly recognised.

In addition, we developed a new typing scheme for expressed var genes with sufficient resolution to track the dynamics of switching within a single individual. It provides a simpler tool to study switching dynamics in naturally infected individuals. We also adapted the transformation associated recombination (TAR) technique to generate clones containing specifically only var genes. These clones can be tagged and sequenced using new generation sequencing techniques with subsequent assembly into contigs.

Scientists: H.-P. Beck (head), A. Gaida, W. Qi, M. Rottmann, S. Rusch, C. Schmid
Students: N. Falk, C. Kulangara
Collaboration: Ifakara Health Institute (IHI), Menzies School of Medical Research Darwin, Papua New Guinea Institute of Medical Research (PNG IMR), University of Nottingham, University of Tübingen Germany,
Funding: Swiss National Science Foundation (SNSF)

Genotyping of malaria parasites

It has become standard that antimalarial interventions are accompanied by molecular monitoring of parasite infections. We have designed a genotyping technique that provides a fast and precise tool to study Plasmodium vivax infection dynamics, allowing us to follow individual clones over time. We determined the size polymorphism of 9 genetic markers (5 genes of merozoite surface proteins (msp) and 4 microsatellites) on approximately 100 P. vivax-positive samples from an in vivo drug efficacy study by capillary electrophoresis. Two micro-satellites, MS16 and Pv3-27 showed the greatest diversity in the study area, followed by two fragments of msp1. Even the most diverse markers showed allele frequencies of up to 13%. To increase the discrimination power between similar haplotypes, we combined two molecular markers for unequivocal discrimination of individual P. vivax infections.

Diversity and complexity of the merozoite surface proteins 1 and 2 (msp1 and msp2) of P. falciparum infections were also investigated in different malaria transmission settings using the high-resolution capillary electrophoresis based technique. Measures of between-population-variance in allele frequencies (FST) indicated little genetic differentiation for both marker genes between the two populations from Tanzania and PNG.

These genotyping tools for P. falciparum and P. vivax were applied to blood samples from a longitudinal field survey conducted on 1-to-4.5 year-old children from PNG. The study was conducted over 16 months with 2 monthly follow-up visits at which two blood samples 24 hours apart were collected from each child.

We estimated the detectability of individual parasite clones by repeated sampling and determined its effect on multiplicity of infection (MOI) and force of infection (FOI) for both P. vivax and P. falciparum sympatrically occurring in PNG. For P. falciparum, detectability rate was 0.79 and for P. vivax it was 0.72. Because P. vivax does not sequester, the incomplete detection is most likely due to the generally lower parasite densities. In contrast, the unexpected high detection rate for P. falciparum suggested that most of the P. falciparum clones were not well synchronised. Thus, we postulate that imperfect detectability both in P. falciparum and in P. vivax derived to a major degree from low parasite densities around the detection limit of PCR. Conducting 24h blood sampling had only a marginal impact on measures of MOI and FOI, suggesting that in this age group, the additional efforts and costs of two blood samples are not justified to achieve more precise parasitological measurements.

Scientists: H.-P. Beck (head), I. Felger
Technicians: D. Müller
Students: N. Falk, C. Köpfli, S. Schöpflin
Collaboration: Papua New Guinea Institute of Medical Research (PNG IMR)
Funding: Swiss National Science Foundation (SNSF); Forlen Foundation

Monitoring antimalarial drug resistance

We completed our studies to monitor the distribution of single-nucleotide polymorphisms (SNPs) in parasite genes associated with malaria drug resistance in Tanzania, Cambodia, and PNG. In each country, we studied several sites and determined prevalence and haplotype frequencies of these SNPs. Many SNPs had reached such high prevalence that it was impossible to determine their predictive value for drug resistance. Long-term analyses over 10 years in PNG showed an increase in mutations with increasing drug consumption. In Tanzania, short-term frequent treatment of a large proportion of young children in the population exerted sufficient selection pressure for the parasite to develop resistance rapidly. Interestingly, in none of the studies were SNPs found in the atpase6 gene.
We also determined SNPs in several human cytochrome and N-acetyltransferase genes of patients from PNG, Cambodia and Tanzania, both by microarray technique and direct sequencing to develop a multivariate pharmacogenetic-pharmacokinetic model. Together with immunological measures, we hope to delineate the contribution of each of these factors in the response to antimalarial drugs.

With molecular data available on drug resistance, we determined prevalence of drug resistance-associated mutations in relation to the duration of infection. We showed that, in contrast to the situation with incoming new infections, in chronic infections the prevalence of the haplotype with 7 mutations was reduced while the prevalence of haplotypes with only 5 mutations increased, implying that high numbers of concurrent mutations incur fitness costs and compromise the long-term survival of the parasite. Similar analyses were performed in samples from a longitudinal cohort study in young children from PNG in which the persistence of infecting parasite clones could be determined precisely, despite a background of multiple concurrent co-infecting parasite clones. The data prove that fitness costs of drug resistance can be quantified experimentally using samples from cohort studies. Findings from both studies provide further evidence of an increased elimination rate of drug-resistant parasites from the untreated chronically infected population. The practical consequence is that after withdrawal of a drug, the resistance trait is likely to be lost over time. This holds the promise that “old” drugs might eventually be re-used after years of withdrawal in well-matched combinations therapies.

Scientists: H.-P. Beck (head), I. Felger
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Students: E.M. Hodel, C. Nsanzabana, S. Schöpflin
Collaboration: Ifakara Health Institute (IHI) Tanzania; Menzies School of Public Health; Pasteur Institute Paris and Cambodia; Papua New Guinea Institute of Medical Research (PNG IMR); University of Lausanne (UNIL)
Funding: Swiss National Science Foundation (SNSF, international collaboration); Stanley Thomas Johnson Foundation

Molecular epidemiology of HIV and tuberculosis

Thanks to international initiatives, combination therapy as first- and second-line treatment for HIV/AIDS has become available for resource poor countries. This improved therapy requires key technologies for monitoring therapeutic failure. Besides determination of CD4-count and viral load, identifying treatment failure is urgently needed to save drugs with remaining activity. Since drug resistance can be predicted by the presence of certain SNPs in HIV genes, we aimed at the development of a microarray-based genotyping system of HIV resistance as an alternative to conventional sequencing. This development of a low-density chip for monitoring HIV drug resistance was guided by our previous experience with the malaria drug-resistance chip. We are targeting the common resistance mutations to nucleoside reverse transcriptase inhibitors and non-nucleoside reverse transcriptase inhibitors type drugs that are in therapeutic use in our study cohort in Ifakara, Tanzania.

Similar to the above mentioned HIV cohort in Tanzania, we have started to develop a treatment cohort for Mycobacterium tuberculosis (MtB) in PNG with the objective to determine the rate of drug resistance in the semi-urban area of Madang and the strains and lineages of M. tuberculosis circulating in PNG. In a second study, we are conducting active case detection of TB in 7 sentinel sites across the country. Here also, we want to determine the rate of drug resistance and the strains and lineages circulating. However, the overarching aim of these projects is to improve treatment and diagnosis of these devastating diseases in resource-poor countries by building capacity for these necessary technologies.

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Collaboration: Borstel Research Center Germany; Ifakara Health Institute (IHI) Tanzania; Institute for Medical Microbiology University of Basel; Papua New Guinea Institute of Medical Research (PNG IMR); National University of Singapore (NUS); Queensland Mycobacteriology Lab Brisbane
Funding: Swiss National Science Foundation (SNSF, international collaboration); Stanley Thomas Johnson Foundation

Staff members of the Molecular Parasitology and Epidemiology unit and members of the Molecular Diagnostic unit. Photo: J. Pelikan
The Molecular Diagnostics unit develops new tools for diagnosing parasitic diseases. Tropical diseases are investigated as well as parasites occurring in Switzerland. New diagnostic tests are applied for individual diagnosis in returning travellers and patients referred to the Swiss TPH policlinic, and are also used in population-wide studies in endemic areas.

Molecular typing of parasites by polymerase chain-reaction based methods is used for the two purposes, (i) for providing a sensitivity higher than that achieved by microscopy, and (ii) for discrimination of closely related parasite species that cannot be discriminated by other means.

Recent developments were undertaken in two major directions: The molecular tool box was expanded towards developing more quantitative nucleic-acid based assays. In order to support serological diagnostics of helminths, we devised a peptide discovery approach.

Detection of *Plasmodium* Species Gametocytes by Quantitative Reverse Transcription PCR

New efforts are currently underway targeting malaria elimination through a strategy of sustained control. Post-intervention gametocyte prevalence and density, detected by qRT-PCR, should then be assessed as outcome measurements in intervention programs. In a field study in East Sepik Province in Papua New Guinea, where all four malaria parasite species co-occur, blood was collected in a cross-sectional survey by various different methods to identify the optimal sampling and storage conditions for subsequent RNA-based amplification of the gametocyte-specific genes *Plasmodium falciparum* pfs25 and *P. vivax* pvs25, both genes being expressed in stage 5 gametocytes. As a next step, we plan to investigate the diversity of size polymorphic genes expressed in gametocytes. Transcripts of these genes are amplified by reverse transcription PCR and sized by capillary electrophoresis. This methodology will be applied to investigate multi-clone *P. falciparum* and *P. vivax* infections and to define the ratio of transmitted to total of asexual parasite clones.

This project applies to field conditions and validates new quantitative tools for comprehensive molecular monitoring of asexual and sexual *Plasmodium* stages.

Scientists: I. Felger (head)
Technicians: D. Müller
Collaboration: Papua New Guinea Institute of Medical Research (PNG IMR)

Explorative Selection of Diagnostic Antigens by Peptide Microarray

Production of native antigens for serodiagnosis of helminthic infections is laborious and hampered by batch-to-batch variation. For serodiagnosis of echinococcosis, especially cystic disease, most screening tests rely on crude or purified *Echinococcus granulosus* hydatid cyst fluid. To resolve limitations associated with native antigens in serological tests, the use of standardised and highly pure antigens produced by chemical synthesis offers considerable advantages, provided appropriate diagnostic sensitivity and specificity is achieved.

Making use of the growing collection of genomic and proteomic data, we applied a set of bioinformatic selection criteria to a collection of protein sequences including conceptually translated nucleotide sequence data of two related tapeworms, *Echinococcus multilocularis* and *Echinococcus granulosus*. We designed 45 peptides between 24 and 30 amino acids in length. These peptides were chemically synthesised, spotted on microarrays and screened for reactivity with sera from infected humans. Peptides reacting above the cut-off were validated in enzyme-linked immunosorbent assays (ELISA). The peptide performing best reached 57% sensitivity and 94% specificity. Pooling several peptide antigens improved sensitivity. While a single peptide cannot provide sufficient sensitivity, peptide combinations may lead to valuable diagnostic tests that replace, or at least complement, conventional immunodiagnosis of echinococcosis.

Scientists: I. Felger (head), W. Qi
Technicians: E. Maag
Students: C. List
Collaboration: Bernhardt Nocht Institute (BNI) Hamburg; Institute of Parasitology University of Bern
Funding: Roche Research Foundation; Velux Foundation; Fonds zur Förderung von Lehre und Forschung, Basel; Rudolf Geigy Foundation
Investigating the Immunome of Strongyloides Stercoralis

A proteomic approach is applied to identify heminth antigens suitable for serological diagnosis. We subjected whole antigen extracts from parasite stages seen by the human immune system to size separation and ion-exchange columns to reduce complexity of the extract. This was followed by two dimensional gel electrophoresis and immunoblotting using sera from infected patients and laboratory animals. Antigens giving rise to signals in immunoblots are eluted and characterised by mass spectrometry. This projects aims to identify a series of chemically synthesised peptides that are highly reactive to patients sera and can be used as a confirmation test for S. stercoralis infections.

The same approach is followed for identifying diagnostic peptides from Fasciola hepatica. The goal of all ongoing helminth projects is to discover a fast and successful developmental pathway for robust and highly reproducible diagnostic assays, not only for the three currently investigated parasites, but also for all helminths of clinical interest.

Scientists: I. Felger (head), A. Perchuc

Gene Regulation

Introduction

Our team is interested in several aspects of nuclear biology in the malaria parasite Plasmodium falciparum. Individual projects can be allocated to two major lines of research. First, we try to understand in detail how the parasite regulates the expression of virulence genes. Second, we characterise the protein content of the parasite nucleus by bottom-up proteomics to identify and characterise the function of novel regulatory proteins.

Epigenetic Regulation of Virulence Gene Expression

Identification and functional characterisation of two major regulatory factors

P. falciparum subtelomeric regions contain hundreds of genes that are grouped into distinct gene families such as var, rif, stever and pfmc-ztm. They all code for proteins that are exported into the cytoplasm or onto the surface of infected erythrocytes where they interact with host molecules. The members within each family are highly polymorphic. Through switches in the transcription of individual genes, these proteins facilitate immune evasion through antigenic variation.

The best-studied example is that of the 60 member var gene family encoding P. falciparum erythrocyte membrane protein 1 (PfEMP1). Strikingly, only one var gene is expressed at any one time while all other members are transcriptionally silent, a phenomenon referred to as mutually exclusive transcription. Antigenic variation of PfEMP1 occurs when the actively expressed gene is replaced by a silenced copy. These transcriptional switches do not involve DNA rearrangements but rather occur through epigenetic processes, which are the main conductors of phenotypic variation in eukaryotes.

We characterised P. falciparum heterochromatin protein 1 (PfHP1), the parasite ortholog of one of the most prominent markers of heterochromatin and silencing in eukaryotes. As expected, PfHP1 binds specifically to the repressive histone 3 lysine 9 tri-methylation (H3K9me3) mark in vitro. We showed that PfHP1 constitutes a major component of heterochromatin in peri-nuclear chromosome end clusters (Figure 1). Genome-wide chromatin immuno-precipitation (ChIP-chip) demonstrated the striking association of PfHP1 with virulence gene arrays in sub-telomeric and chromosome-internal islands. These domains include not only var genes but also other gene families coding for exported proteins with suspected roles in host-parasite interactions and antigenic variation. Over-expression of PfHP1 resulted in increased variegated expression of target genes and highlighted the presence of strictly contained heterochromatic domains.

How PfHP1, and other epigenetic factors such as P. falciparum silent information regulator 2 (PSIR2), are recruited specifically to virulence gene arrays remains elusive. We hypothesised that the previously identified interaction between an unknown nuclear protein and the regulatory DNA element SPE2 upstream of sub-telomeric var genes may play a role in this process. Using a large-scale affinity purification approach, we successfully identified PSIP2, a member of the ApiAP2 family of putative transcription factors, as the protein interacting with SPE2. PSIP2 co-localises with PfHP1 at chromosome end clusters at the nuclear periphery (Figure 1). We identified 777 putative binding sites throughout the genome, 94% of which cluster in heterochromatic domains upstream of sub-telomeric var genes and in telomere-associated repeats. ChIP-chip experiments demonstrated that these sites are bound by PSIP2 in vivo. Like PfHP1, PSIP2 appears to be essential for parasite viability.

Figure 1: Co-localisation of PSIP2 and PfHP1 in parasites expressing both proteins as epitope-tagged versions. Proteins were detected by indirect immuno-fluorescence assay using antibodies specifically recognizing the epitope tags (red: PSIP2-HA; green: PfHP1-Ty). DAPI (blue) visualizes the parasite nucleus.

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as repeated attempts to delete the pfsip2 locus failed. Our results provide strong evidence for the first time for the involvement of an ApiAP2 factor in heterochromatin formation and genome integrity. In summary, these findings are highly relevant for our understanding of chromosome end biology and antigenic variation in *P. falciparum* and will be instrumental for a better understanding of this widely used survival strategy in unicellular pathogens.

The Role of Virulence Gene Promoters in Epigenetic Regulation

*var* gene promoters play an important role in all layers of *var* gene regulation, i.e. silencing, activation, mutual exclusion and transcriptional memory. For instance, in contrast to the enrichment of H3K9me3 at silenced *var* loci, the active locus is characterised by a distinct set of histone modifications within the promoter that are linked to transcriptional activity. These and other findings are consistent with the recruitment of regulatory complexes via sequence-specific promoter elements. To identify such interactions, we carried out functional *var* gene promoter mapping studies using a transfection-based approach. Our results suggest that *var* gene silencing, activation and mutual exclusion are mediated by separate regions that are linked in cis. These findings will have important implications for the dissection of the regulatory mechanisms underlying antigenic variation in *P. falciparum*.

Analysis of the proteins encoded by the rif, stevor and pfmc2tm families and elucidation of their potential role in pathogenesis and immune evasion has hardly been addressed to date. We are interested in testing if promoters of these gene families are regulated by mechanisms related to those involved in *var* gene control. We cloned promoters of each family into a *hdhfr-gfp* reporter vector and generated transfected populations. After selection for promoter activation, we harvested total RNA and analysed transcript abundance profiles on a genome-wide DNA microarray. Comparative profiling will allow us to determine if these additional gene families are also expressed by strict mutual exclusion and if crosstalk between the expression of different gene families exists.

**Figure 2:** Localisation of nuclear protein candidates (NPC) in parasites expressing epitope-tagged candidate proteins. Upper panel: NPC3-HA (red) localises to distinct domains within the parasite nucleus (DAPI) but not the cytosol (GAPDH; green). Lower panel: NPC24 (red) co-localises with the ER-resident protein PfBIP (green).

**Gene regulation lab members (lab excursion July 2010)**

From left, clockwise: Johanna Wetzel, Nicole Bertschi, Till Voss, Igor Niederwieser, Sophie Oehring, Christian Flück, Kathrin Witmer, Nicolas Brancucci.
contains several hundred proteins of unknown function. The proteome was analysed for accuracy and retention of true nuclear proteins using a number of independent bio-informatic approaches. At the current stage of analysis, our dataset will allow the prediction of a core asexual nuclear proteome of several hundred proteins with an acceptably low false prediction rate of below 0.5. Furthermore, experimental validation suggests an overall accuracy of greater than 65% with 20 out of 30 selected proteins localising exclusively to the parasite nucleus or endoplasmic reticulum (Figure 2). We anticipate that these data will be used to identify and characterise many hitherto unrecognised nuclear proteins, several without characterised functions in other eukaryotes.

Scientists: T. Voss (head), C. Flück, I. Niederwieser
Students: N. Brancucci, S. Oehring, K. Witmer,
Collaborations: Biozentrum, University of Basel, Switzerland; Bio21 Molecular Science and Biotechnology Institute, University of Melbourne, Australia
Funding: Swiss National Science Foundation (SNSF); Novartis Stiftung für medizinisch-biologische Forschung; Emilia-Guggenheim-Schnurr Stiftung (EGS); Rudolf Geigy Stiftung (RGS)

Helminth Drug Development

Introduction

The Helminth Drug Development Unit (HDD) conducts research projects in drug discovery (drug screening), pre-clinical research (pharmacokinetic studies) and drug development (proof-of-concept studies). The primary focus is on parasitic worm (nematode and trematodes) infections. Hence, the establishment and maintenance of life cycles and the development, validation and application of in vitro and in vivo assays are pursued. Innovative strategies are developed and validated to monitor pharmacodynamics and pharmacokinetics of anthelmintic drugs and treatment strategies. Proof-of-concept field studies are facilitated through long-term partnerships with institutions in Southeast Asia and Africa, in close collaboration with the Ecosystem Health Sciences Unit (see section 4). HDD works also closely with the Parasite Chemotherapy Unit (see section 17) and the Biostatistics and Computational Sciences unit (see section 2). In addition, our unit maintains widespread collaborative research link with various institutions within Switzerland (University Hospital Basel, Department of Pharmaceutical Sciences, University of Basel, University of Bern, CHUV Lausanne) and abroad, such as the University of Nebraska, USA, the University of Naples, Italy, and the Imperial College, London.

Our work range from the laboratory...

To illustrate our research activities, which range from bench to field, we briefly present work carried out on the antischistosomal properties of mefloquine. We had recently shown that the antimalarial drug mefloquine also possesses anti-schistosomal properties in vitro and in the mouse model. In a next step, we carried out a small structure-activity relationship study and investigated the anti-schistosomal activities of the erythro- and threo- isomers and racemates of mefloquine in vitro and in vivo. The role of stereochemistry in the pharmacokinetics, efficacy and toxicity of drugs is receiving considerable attention in the discovery and developments of drugs today. It is noteworthy, that (+) mefloquine might be characterised by a better tolerability profile, and the drug is currently being evaluated in Phase I stage of clinical development for the treatment of malaria. In our study, the in vitro effects of the drugs in the presence and absence of haemin were monitored on juvenile and adult worms by means of scanning electron microscopy and phenotypic evaluation to get a first insight into the mechanism of action of mefloquine on schistosomes. In addition, microcalorimetry was evaluated as a potentially novel tool to evaluate drug effects on schistosomes.

In vitro, the erythro derivatives showed a superior activity when compared to the threo derivatives. Incubation of schistosomula with the erythro derivatives resulted in convulsions, granularity, death and tegumental alterations (see Figure 1 C, D) while schistosomula incubated with the threo derivatives were only affected at high concentrations (see Figure 1 A, B). The differences in the anti-schistosomal activities between the erythro and the threo compounds in vitro were less pronounced when haemin was added to the medium. The microcalorimetric measurements confirmed the results of the phenotypic evaluation, that the erythro derivatives possess prominent activities against Schistosoma mansoni in vitro, which are even further exacerbated in the presence of haemin. Microcalorimetry was able to precisely...
determine the onset of action of the test drugs (Figure 2). In vivo, mefloquine derivatives achieved statistically significant total and female worm burden reductions ranging from 65.4% to 100%. The highest total worm burden reductions of 93.4% and 90.2% were observed following treatment with the erythro and the threo racemate, respectively. In addition to get an insight into the possible mechanism of action of mefloquine affinity chromatography and haem dependency studies are currently being conducted.

...to proof-of-concept field trials

We conducted a randomised, exploratory open-label trial to assess the efficacy and safety of mefloquine, artesunate and mefloquine-artesunate administered according to current malaria treatment regimens against parasitologically confirmed *S. haematobium* infections in schoolchildren aged 8–16 years in Côte d’Ivoire. We included 83 *S. haematobium*-infected schoolchildren in the study. We found that mefloquine-artesunate is efficacious in the treatment of *S. haematobium* infections. Eleven out of 18 children were free of *S. haematobium* eggs in their urine 26 days post-treatment (cure rate: 61% and an egg reduction rate: > 95%). Praziquantel, the current treatment of choice, achieved a cure and egg reduction rate of 88% and > 95%, respectively. Mono-therapies with mefloquine and artesunate in *S. haematobium*-infected children yielded only low cure rates (21% and 25%, respectively). Although the respective egg reduction rates were considerably higher (73.8% and 84.7%), these were significantly lower than egg reduction rates in praziquantel and mefloquine-artesunate recipients. Mefloquine, artesunate, and mefloquine-artesunate completely cured infections with *Plasmodium falciparum*.

Children waiting for clinical examination in the framework of a proof of concept study (Evaluation of the efficacy and safety of mefloquine, artesunate and mefloquine-artesunate in patients infected with *S. haematobium* in Côte d’Ivoire. Photo: J. Keiser
All children treated with mefloquine and most of the children administered mefloquine-artesunate reported adverse events. However, they were either mild or moderate. Abdominal pain was the most frequent adverse event, with a higher incidence in children treated with mefloquine (89%), mefloquine-artesunate (83%), and artesunate (60%) compared to praziquantel recipients (46%). Adverse events were transient and self-limiting, none required referral to a hospital and some were already reported before drug administration. In conclusion, individuals co-infected with *Plasmodium* and *Schistosoma* treated with a mefloquine-artesunate combination against malaria might have a dual benefit: clearance of malaria parasitaemia and reduction of schistosomiasis-related morbidity. Additional and coherent experimental, clinical and epidemiological inquiry is warranted.

**Future plans**

The unit will continue to develop its expertise in helminth biology with an emphasis on drug discovery work. New tools and techniques will be adopted, developed, validated and consolidated. The overall aim is to become a leading centre in helminth biology with an emphasis on drug discovery and development. In addition, the group will identify prospects for continued innovation. Finally, the unit will further develop and strengthen research partnerships within Swiss TPH and across the globe.

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**Figure 2: Microcalorimetric measurements: Heat-flow curves of juvenile *S. mansoni* before and after medium/drug injections.**

(A) Controls (medium injection) showing normal heat flow over a period of 4 days. (B) Schistosomes treated with the (+)– and (–)– erythro enantiomers and the erythro racemate of mefloquine, respectively showing a decrease of metabolic activity within 24 hours. (C) Worms treated with the (+)– and (–)– threo epimers and the threo racemate of mefloquine, respectively. The observed heat flow was similar to that of the controls.

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**Scientists:** J. Keiser (head)

**Technicians:** A. Corfu, M. Vargas

**Students:** U. Duthaler, K. Ingram, C. Kirchhofer, T. Manneck, L. Tritten

**Collaboration:** Bayer Health Care AG; Center of Microscopy University of Basel; Imperial College London; University of Basel, Department of Pharmaceutical Sciences; Theodor Bilharz Institute; Université de Cocody-Abidjan; University Hospital Basel; University of Bern; University of Naples; University of Nebraska Medical Center; Walter Read Army Research Institute

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Medical Parasitology and Infection Biology

Molecular Immunology

Introduction

The Molecular Immunology unit is developing and evaluating new technologies for the design and immunological testing of candidate vaccines, the development of antigen detection systems, the analysis of the genetic and antigenic diversity of pathogens and the contribution of the immune system to the efficacy of therapeutic interventions. This technology base is used for research in a range of disease systems.

1. *P. falciparum* malaria: Development of a Synthetic Subunit Candidate Vaccine

An ideal malaria vaccine would prevent severe disease and reduce transmission by targeting sporozoites, liver stage parasites, blood stage parasites and gametocytes. Such a polyvalent subunit vaccine requires a modular antigen-delivery system to induce strong and persistent protective immune responses. Our approach for the design of a malaria subunit vaccine is to incorporate several malaria protein antigens in the form of synthetic peptidomimetics. These are designed to stably mimic the native structure of conserved surface loops of the corresponding malaria antigens to induce effective immune responses.

Evaluation of Particle-Based Antigen Delivery Systems

Our preclinical and clinical studies in the past ten years in collaboration with Prof. J. Robinson (University of Zurich) and Pevion Biotech Ltd. have shown that Immuno-stimulating Reconstituted Influenza Virosomes (IRIVs) represent a highly suitable antigen delivery system for synthetic peptide antigens. IRIVs are non-replicating virus-like particles, lacking the genetic material of the native virus. They are prepared by detergent removal from a mixture of natural and synthetic phospholipids and influenza virus derived hemagglutinin and neuraminidase glycoproteins. Hemagglutinin confers stability to the virosomal formulation and contributes to the immuno-stimulatory properties of virosomes. A Phase I clinical trial has demonstrated safety and parasite cross-reactive immunogenicity of two prototype IRIV-based malaria vaccine components. These were derived from the circumsporozoite surface protein (CSP) of sporozoites and the apical membrane antigen 1 (AMA1) expressed by both sporozoites and blood-stage parasites. In a Phase IIa trial, the two combined IRIV-formulated peptides showed evidence of vaccine-induced blood-stage efficacy for the first time in a sporozoite challenge study. Recently, a Phase Ib trial at the Bagamoyo Research and Training Centre in Bagamoyo, Tanzania confirmed safety and tolerability of the vaccine formulation as well as its immunogenicity in both healthy semi-immune adults and children. Optimisation and preclinical profiling of additional peptidomimetics is finalised, and these are now available for clinical testing.

In collaboration with the group of Prof. J. Robinson, we are exploring the use of engineered nanoparticles based on the self-assembling properties of synthetic coiled-coil lipopeptides as an antigen delivery platform. Synthetic peptidomimetic can be coupled to the C-terminus of the lipopeptides, resulting in the display of multiple copies of the mimetic over the surface of the nanoparticle. Strong humoral immune responses elicited by the antigen loaded nanoparticles support their use in the design of fully synthetic vaccines.

Identification of New Malaria Vaccine Candidate Antigens

Our search for new vaccine candidate antigens is focused on predicted Glycosylphosphatidylinositol (GPI)-anchored proteins. The generation of monoclonal antibodies specific for these protein antigens is a key step in our investigation.
of cellular localisation, stage-specific expression patterns and vaccine antigen potential of new antigens. Production of antibodies usually depends on purified recombinant protein for both immunisation and hybridoma screening. We have developed a strategy to generate monoclonal antibodies against membrane-associated proteins that completely bypasses any need for purified recombinant antigen. This approach utilises stably transfected mammalian cells expressing recombinant antigens on their cell surface for immunisation of mice. The transfected cells are also used for measuring seroconversion, hybridoma selection and antibody characterisation. This procedure promotes the generation of antibodies capable of binding to the endogenous protein in its native conformation, as we have shown for several predicted GPI-anchored proteins of \textit{P. falciparum}. One of these proteins elicits antibodies that have efficient parasite-inhibitory activity, and broad cross-reactivity of these antibodies qualify the protein as a vaccine candidate antigen.

\textbf{Study of Immune Correlates of Protection Against Malaria after Vaccination with RTS,S/AS01E}

The most advanced malaria vaccine candidate is the RTS,S (developed by Glaxo Smith Kline), which has shown reproducibly moderate efficacy against malaria in Phase I/IIb trials and is currently undergoing a large multi-centre phase III trial across 11 centres in Africa. Although the RTS,S vaccine is promising, the efficacy and duration of protection need to be improved. We are performing an ancillary immunology study to further explore and better understand the immune mechanisms elicited by the RTS,S/AS01E in Bagamoyo, Tanzania. The use of modern immunological methods integrated with high-throughput platforms to understand the diversity of human responses to RTS,S vaccination can help explain the vaccine immunogenicity and to generate signatures of effective immune responses. A variety of analytical tools, including transcriptional and cytokine/chemokine expression profiling, and phenotypic/functional analysis of leukocyte subsets by multiparametric flow cytometry on blood samples derived from 400 children aged 5 to 17 months at time of first vaccination, are being used.

\textbf{Characterisation of \textit{P. falciparum} Glycosylphosphatidylinositol-specific Antibody Responses}

GPI glycolipids are considered a central toxin in malaria. The contribution of GPI-specific humoral immune responses to protection against malaria pathology is not clear, since studies on the correlation between anti-GPI antibody titres and disease severity have yielded contradictory results. In collaboration with the group of Prof. P. Seeberger, we have used a carbohydrate microarray based on synthetic PfGPI glycans to assess levels and fine specificities of anti-GPI antibody responses in healthy and malaria diseased individuals. Anti-GPI antibodies were only rarely found in children under the age of 18 months. Sera from subjects with severe malaria and healthy children contained antibodies that recognised predominantly synthetic Man(3)-GPI and Man(4)-GPIs. In contrast, antibodies in sera of children with mild malaria also showed substantial reactivity with truncated glycans, comprising glucosamine-inositol moieties without mannose or with only one or two mannose residues.
vaccination to consolidate this finding and to further improve vaccination-mediated effects on nymph moulting capacity.

Whole Genome Profiling of Theileria parva Isolates to Support the Infection and Treatment Vaccination Method in East Africa

East Coast fever (ECF) is caused by the apicomplexan parasite *Theileria parva*, which is transmitted to cattle by ticks. The “Muguga cocktail” live vaccine comprises three stocks of the *T. parva* parasite. This parasite cocktail has been derived empirically, and it is the basis of an infection-and-treatment protocol developed to solidly protect cattle against ECF and has been officially registered in May 2010 in Tanzania as the vaccine against ECF. Using a combination of paired-end library and whole-genome shotgun sequencing with the 454 sequencing method, we are currently analysing the entire genomes of the three main components of the “Muguga cocktail”. The aims are identification of i) highly conserved and rapidly evolving genes, ii) genes under positive selection relating to host-pathogen interactions, iii) identification of sequence polymorphisms in the known epitopes targeted by *T. parva* specific cytotoxic T cells, iv) characterization and comparison of genomic localisation of known variable number tandem repeat regions, and v) identification of panels of SNP suitable for epidemiological studies. These studies enable the guided improvement of this live vaccine and define molecular markers to follow the impact on the local *T. parva* strain epidemiology after introduction of the live vaccine cocktail in the field.

Collaborators: R. Bishop, C. Daubenberger, S. Patel
Students: C. Olds
Collaboration: International Livestock Research Institute (ILRI), Kenya; B. Mans, Onderstepoort Veterinary Institute, South Africa; Swiss Federal Institute of Technology (ETH) Zürich
Funding: Research Fellow Partnership Programme for Agriculture; Forestry and Natural Resources funded through SDC

3. Bacterial infections

*Use of Anthrose-Specific Monoclonal Antibodies for the Detection of Bacillus Anthracis Spores*

The similarity of endospore surface antigens between bacteria of the *Bacillus cereus* group has made it difficult to create selective antibody-based detection systems for anthrax. On the surface of *B. anthracis* endospores, a tetrasaccharide containing the unique monosaccharide anthrose has recently been identified. In collaboration with the group of Prof. P. Seeberger, we have produced anti-tetrasaccharide mAbs and anti-anthrose-rhamnose disaccharide mAbs. Both sets of mAbs recognised spores of a broad range of *B. anthracis* strains and showed only limited cross-reactivity with a few *B. cereus* strains. In a highly sensitive and specific Luminox assay based on these mAbs, a detection limit of $10^2$ to $10^3$ spores was obtained. Although not strictly specific for *B. anthracis* spores, this assay represents a useful first-line screening tool for the detection of *B. anthracis* spores.

Staining of *Bacillus anthracis* spores with anthrose-tetrasaccharide specific antibodies. Photo: M. Tamborrini

*Molecular Epidemiology of Bacterial Meningitis in the Meningitis Belt of Sub-Saharan Africa*

The highest burden of meningococcal disease occurs in the “meningitis belt” of sub-Saharan Africa. Within individual areas of this belt, major disease epidemics occur in irregular cycles every 8–12 years. In collaboration with the Navrongo Health Research Centre (NHRC), in 1998 we initiated a still ongoing long-term study of the dynamics of *N. meningitidis* carriage and disease in northern Ghana. Our data demonstrate that clonal waves of colonisation and disease are a characteristic feature of the meningitis belt. In the case of serogroup A meningococci, genoclouds associated with the sequence types (STs) 5, 7 and 2859 have been responsible for the outbreaks of the last two decades. In autumn of 2009, we observed a wave of colonisation with W135 meningococci and the NHRC forwarded a warning to the local health authorities that outbreaks of W135 meningococcal disease may occur in northern Ghana in the meningitis season of 2010. This was indeed the case, demonstrating that the monitoring of colonisation can be an efficient forecasting tool.

In collaboration with A. Sie (Nouna Health Research Centre, Burkina Faso) and T. Junghanss (University Hospital Heidelberg), we have begun a similar longitudinal meningococcal disease and colonisation study in the Nouna health district of Burkina Faso. Here, serogroup A ST2859 meningococci caused outbreaks in 2006 in the northern part of the district. While >10% of the population of an outbreak village carried ST2859, the population in the southern part of the district was predominantly colonised by serogroup Y ST4375 meningococci, which were associated only with sporadic cases of meningitis. Colonisation with these less-virulent Y meningococci apparently interfered with spread of the serogroup A ST2859 bacteria to the southern part of the district. The virulent ST2859 clone is now also replaced in the northern part of the district.

Collaborators: J.-P. Dangy, J. Hauser, G. Pluschke (head), M. Tamborrini
Students: K. Bäumli, M. Bauer, C. Huber, V. Pflieger, B. Rupinski, S. Quaye
4. *Mycobacterium ulcerans* Infection (Buruli ulcer)

Buruli ulcer (BU) caused by *Mycobacterium ulcerans* is considered to be the third most common mycobacterial infection after tuberculosis and leprosy. Children living in rural communities in sub-Saharan Africa are affected the worst. BU is a chronic necrotising skin disease mainly affecting subcutaneous and adipose tissue. The unique pathology of BU is primarily attributed to a plasmid-encoded macrolide toxin, mycolactone, which has cytopathic and apopotic activity.

Since 2008, our research on BU is embedded in the Stop Buruli initiative supported by the UBS Optimus Foundation. Currently this research consortium consists of 8 member institutions from Australia, Belgium, Benin, Cameroon, Ghana, Switzerland and the USA. The consortium is focusing its activities on the following aspects: identification of transmission pathways, development of a simple method for laboratory diagnosis, optimisation of treatment and research into socio-economic and cultural aspects to improve control of Buruli ulcer.

**Transmission and Genetic Diversity of *M. ulcerans***

BU often occurs in focalised areas close to stagnant or slow-moving waters. The mode of transmission is not fully understood, partly because no molecular typing method has sufficiently high resolution for micro-epidemiological analyses. Our comparative genomic hybridisation analysis of *M. ulcerans* clinical isolates of diverse geographic origin identified two distinct lineages: (i) the “classical” lineage representing the most pathogenic genotypes – those that come from Africa, Australia and South-East Asia and (ii) an “ancestral” lineage comprising strains from China and Japan, South America and Mexico. However, *M. ulcerans* isolates from Africa appear genetically largely monomorphic and conventional genetic fingerprinting methods have insufficient resolution for micro-epidemiological studies. We therefore have sequenced the genomes of three *M. ulcerans* strains to systematically profile single nucleotide polymorphisms (SNPs). Comparison with the reference genome of a Ghanaian classical lineage isolate revealed 26,564 SNPs in a Japanese strain representing the ancestral lineage. Only 173 SNPs were found when comparing two Ghanaian isolates with the reference genome. Based on these results, we estimate that the divergence of the *M. ulcerans* Ghanaian strains from the Japanese strain occurred about 500,000 years ago.

We developed a SNP typing method to investigate the spatio-temporal distribution of clinical isolates from the Densu river basin of Ghana. Results showed dominance of one clonal complex and local clustering of some of the variants belonging to this complex. Emerging new haplotypes thus do not readily spread over the entire endemic area, but form focal transmission clusters. These results exclude certain hypotheses about the reservoir and transmission of *M. ulcerans*, such as free floatation of the bacteria in the local river or transmission by highly mobile insects.

**Diagnosis**

Inadequate laboratory resources in the highly disease-endemic areas of Africa often limit possibilities for in-country confirmation of clinical diagnoses. No simple and highly sensitive point-of-care diagnostic method is currently available to reconfirm clinical diagnosis of BU. Serological assays turned out to be useful for monitoring exposure to *M. ulcerans* but not for diagnosing BU. We therefore are working on the development of antigen capture assays using monoclonal antibodies against selected abundant proteins of *M. ulcerans*. Two prototype assay formats are available and will now be tested with clinical specimens for sensitivity and specificity.

**Treatment**

While surgery has traditionally been the only recommended treatment for BU, the WHO published in 2004 provisional guidelines recommending treatment with a combination of rifampicin and streptomycin for 8 weeks. We have observed vigorous local immune responses and the development of ectopic lymphoid tissue in lesions from BU patients treated with antibiotics. Results indicate that the relatively short antibiotic treatment reverses local immunosuppression, and that the curative effect may be sustained by immune defence mechanisms. On the other hand, some patients develop paradoxical reactions during or after chemotherapy. Our histopathological analyses of tissue samples from patients developing such paradoxical reactions have so far provided no evidence for occasional failure of chemotherapy. In particular, in non-ulcerating lesions, massive inflammatory infiltration caused by mycobacterial antigens and immuno-stimulators released during chemotherapy and by necrotic tissue seems to be responsible for the paradoxical reactions. Therefore, limited surgical excisions and wound debridement is likely to remain necessary for some of the patients with severe lesions.
In collaboration with T. Junghanss (University Hospital Heidelberg) and A. UmBoock (Aide aux Lépreux Emmaüs-Suisse, Cameroon), we are monitoring the effect of thermal therapy on BU. *M. ulcerans* grows best at 30–33°C, but not above 37°C. This property makes the application of heat a treatment option. In a proof-of-principle study, bags filled with a phase-change material which are easy to apply and rechargeable in hot water have turned out to be a suitable device for heat application to the skin in rural African settings. Six laboratory-reconfirmed patients with ulcerative BU lesions were included in this study and treated for 4–6 weeks. In patients with smaller ulcers, wounds healed completely without further intervention. Patients with large wounds underwent skin grafting after successful heat treatment. 18 month following completion of treatment, all six patients were relapse-free. Follow-up trials with more patients are ongoing.

**Collaborators:** A. Benard, J.-P. Dangy, J. Hauser, M. Käser, G. Pluschke (head), N. Scherr, W. Qi, Students: A. Dreyer, C. Huber, E. Mensah-Quainoo, K. Röltgen, T. Ruf, D. Schütte

**Collaboration:** Aide aux Lépreux Emmaüs-Suisse, Bureau Régional pour l’Afrique, Yaoundé, Cameroon; F. Hoffmann-La Roche, Basel; Institute for Infectious Diseases, Monash University, Australia; Noguchi Memorial Institute for Medical Research, Accra; University of Bern, Switzerland; University Hospital Heidelberg, Section of Clinical Tropical Medicine

**Funding:** European Union framework program; Medicor Foundation; UBS Optimus Foundation; Volkswagen Foundation

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### Parasite Chemotherapy

#### Introduction

The Parasite Chemotherapy Unit looks back to two exciting years including the consolidation of existing collaborations with international partners and the start of new projects in the area of drug discovery for neglected tropical diseases. In May 2009, Pascal Mäser joined the Unit with his research group coming from the University of Berne. He is an assistant professor (SNF tenure track), and he complements the area of competence with his expertise in drug resistance, parasite genomics and bioinformatics.

The drug discovery work is still based on established collaborations we maintain with TDR/WHO, DNDi, the CPDD, MMV, the NGBS consortium and the local pharmaceutical company, Actelion. In May 2009, a prestigious Grand Challenge Exploration award was granted by the BMGF for the project “Drug-induced differentiation of trypanosomes leads to lysis”. The collaboration with Actelion to develop a new drug for malaria was intensified and a PhD project added to elucidate the mechanism of action of a lead molecule. With Pascal Mäser joining the unit, more basic research will be introduced and more student projects will take place. A central question is what are the mechanisms of drug resistance in protozoans and in helminths. The completely sequenced parasite genomes can offer possibilities for comparative genomics of endoparasites and their hosts to identify molecular mimicry proteins.

After several decades of research on trypanosome transmission by tsetse flies, the tsetse laboratory will be closed by the end of the year 2010. This is a consequence of focussing work on drug discovery and development and on the new projects introduced by Pascal Mäser.

**Drug discovery for New Antiprotozoal Compounds**

**Screening Centre for WHO/TDR**

Swiss TPH is a partner of WHO/TDR’s drug discovery network, which facilitates and supports the discovery of new lead compounds for infectious tropical diseases. Our mandate is the in vitro and in vivo screening of compounds supplied by pharmaceutical companies and academic groups, all partners of the network. With less than 1mg of a compound, the antiparasitic activity against several protozoan parasites and mammalian cell lines can be determined. We use two types of in vitro assay, both in a 96-well plate format: a single concentrations assay (medium-throughput screen, MTS) and the serial drug dilution assay with IC50 determination. We are screening about 10,000 compounds annually in the MTS and over 1,500 in the serial drug dilution assays against four protozoan parasites. Several new hits and leads were identified in the last two years. TDR84116 was identified as hit against sleeping sickness and TDR32750 showed activity against malaria. Both are in a hit-to-lead program in collaboration with other network partners.
partners. Our screening centre is also involved in three lead optimisation programmes with the pharmaceutical companies Pfizer and Merck Serono, and with the University of Cape Town.

**Drugs for Neglected Diseases initiative (DNDi)**

Collaboration with DNDi started in 2005, with a screening mandate and a project-independent contract. During the last two years, exploratory work was done on novel compounds donated to DNDi by various academic and industrial partners to identify novel chemical scaffolds that can become part of the DNDi portfolio. A fruitful collaboration with two US-based companies, Scynexis and Anacor, on oxoboroles led to the identification of a preclinical candidate molecule. We tested selected oxaboroles against a panel of *Trypanosoma brucei* isolates, including sensitive and resistant strains. All compounds showed good in vitro activities. One molecule cured the chronic CNS mouse model which mimics the second stage of sleeping sickness. In the nitroimidazole project, the highlight was the selection of fexinidazole as clinical candidate and the initiation of Phase I clinical trials. Our unit also provided training and technical transfer to the members of the Pan-Asian Network for Neglected Diseases which is coordinated by DNDi. In collaboration with DNDi, the Pan-Asian Network, the London School of Hygiene and Tropical Medicine and the Swiss TPH, a training manual for drug screening in neglected diseases was published.

**Consortium for Parasitic Drug Development (CPDD)**

CPDD was founded in 2000 and is funded by the BMGF to conduct research on diamidines active against trypanosomes and leishmanias. The diamidine pentamidine has been used since the early 1940s for the treatment of sleeping sickness. As it is not orally available and only active in first-stage disease, prodrugs have been synthesised. This strategy was successful leading to the first oral drug (DB289) for sleeping sickness that has entered clinical trials. It revealed good efficacy in patients with first stage *T.b.gambiense* infection. However, development was discontinued due to renal toxicity when DB289 was already in Phase III trials. Now, the main challenge is the development of a new drug for second stage sleeping sickness. All compounds capable to cure the CNS mouse model were derivatives of DB289. One of these prodrugs is DB868. Its parent (CPD0802) revealed unexpected high potency in the CNS mouse model when applied parenterally (which is acceptable for the severe second stage). Preclinical studies are ongoing in a vervet monkey model at the Trypanosomiasis Research Centre in Kenya. While further screening of novel diamidines will

**The Grand Challenge Exploration project aims at triggering differentiation of bloodstream forms to insect forms which would then result in the lysis of the parasites by the innate defense system of the patient.**
stop, discovery will continue with other compound classes (new analogs based on tipifarnib and emetine) in collaboration with the Universities of Georgia, North Carolina and Washington.

**Grand Challenges Explorations (GCE)**

The GCE is a grant program by the BMGF awarding unconventional global health research projects. One such prestigious award was granted to Reto Brun in collaboration with Isabel Roditi, Institute of Cell Biology, University of Bern. The project targets a trypanosome-specific process, the differentiation of bloodstream trypanosomes to procyclic insect forms. Procyclic trypanosomes are serum sensitive and are killed by plasma factors in the mammalian host. We have established and validated a reporter gene assay to detect a differentiation signal and so far have screened 7500 compounds at 2 concentrations (1 and 10 ug/ml) at 37°C. Several hits were already identified, which will be studied further in an in vitro lysis assay and in mice.

**3. Malaria Drug Discovery**

**Medicines for Malaria Venture (MMV)**

Our MMV mandate comprises exploratory work on novel compounds submitted to MMV from various sources, with the goal to identify novel chemical entities showing antimalarial activity in vitro and in rodent models. Our experience during the last decade is that such novel compounds can ultimately become part of the MMV portfolio. The MMV project on synthetic trioxolane compounds of the ozonide (OZ) series serves as a prime example in this regard. OZ439 is a novel synthetic peroxide currently undergoing clinical trials. Relative to the artemisinin derivatives, as well as the “first generation” synthetic ozonide OZ277, OZ439 has significantly improved pharmacokinetic properties and increased potency. A single oral dose of 20 mg/kg OZ439 cures mice infected with *P. berghei*, a result that cannot be reached by chloroquine, mefloquine, OZ277 or the artemisinin derivatives. Phase I clinical trials were performed by MMV from May to October 2009 and showed that OZ439 is well tolerated at all dose levels. So-called “proof of concept” Phase II clinical trials against uncomplicated *Plasmodium falciparum* malaria is planned for the fourth quarter of 2010. During the current reporting period, two other major collaborations with MMV were initiated. The novel compounds involved in these projects come from Synstar, Tokyo (Japan) and the University of Cape Town (South Africa), respectively.

**NGBS Malaria Programme**

The NGBS programme aims to find a one dose cure for *P. falciparum* malaria and an attempt is made to identify effective cures for *P. vivax* infections. New molecules are needed to replace older ones that are increasingly rendered ineffective through drug resistance. The programme has its own pipeline with projects ranging from target identification through lead optimisation and preclinical studies.

A promising example is the “Natural Products” project. In the past, natural products have successfully been used for the development of new anti-infective therapies. This is especially true for antimalarial drugs for which the most successful compound class, the quinolines and the artemisinin-derivatives, were developed upon the identification of the active pharmacophore in plants. To identify new antimalarial drugs, a library of more than 10,000 compounds of the Novartis Natural Products Unit (NPU) in Basel was screened, and the hits were analysed at the SwissTPH. A lead optimisation program was initiated and a promising candidate with good oral activity and a favourable pharmacological profile (NITD609) was identified. The compound is already in preclinical development. In 2009, this program was awarded MMV project of the year. Other projects based on hits from a high throughput screen are also in the lead.
Collaboration with ACTELION Pharmaceuticals

Good progress has been made since 2007 in a collaborative project with Actelion to discover new antimalarial molecules. Originally targeting plasmepsins, hits with unknown mechanism(s) of action are available today. High in vitro potency against *P. falciparum*, combined with a favourable initial safety profile, raises the hopes that a preclinical program for a new antimalarial drug can be initiated in the near future. Additionally, interesting results are coming out of a PhD thesis addressing the elucidation of the mode of action of these novel compounds.

Scientists: R. Brun (head), J. Chollet, M. Rottmann, S. Wittlin

Collaboration: ACTELION Pharmaceuticals Ltd; Biomedical Primate Research Centre (BPRC), Rijswijk; The Netherlands; F. Hoffmann-LaRoche, Basel; Genomics Institute of the Novartis Research Foundation (GNF), San Diego; USA; Medical Centre, Omaha, USA; Medicines for Malaria Venture (MMV) Headquarters, Geneva; Monash University, Victoria, Australia; Novartis Institute for Tropical Diseases (NITD), Singapore; Synstar Ltd, Tokyo, Japan; University of Cape Town, South Africa; University of Nebraska; Novartis Pharma, Basel, Switzerland; Medicines for Malaria Venture (MMV), Geneva, Switzerland

Funding: Medicines for Malaria Venture (MMV), Wellcome Trust; Actelion

4. Drug Resistance and Parasite Genomics

For most parasiticides identified through whole-cell assays, the mode of action is unknown. We are combining molecular genetics and bioinformatics to investigate how drugs selectively kill parasites and how the parasites, in turn, can become drug-resistant. In African trypanosomes, we are focusing on nutrient transporters as determinants of drug susceptibility. Diamidine drugs and melamine-based arsenicals are imported into the trypanosomes through an aminopurine permease (none of the obligate parasitic protozoa synthesize purines de novo). We have identified point mutations in the corresponding gene from drug-resistant *T. brucei* lab mutants which abrogated drug import. Interestingly, the same mutations also occurred in *T. brucei* field isolates and correlated to some degree with drug treatment failures. We are also investigating how purine permeases and other nutrient transporters can be exploited to specifically deliver toxic purine antimetabolites into trypanosomes. In parasitic nematodes, we are focusing on the pharmacological potential of ligand-gated ion channels, particularly acetylcholine receptors. Nematodes possess a family of acetylcholine receptor genes which is absent from mammalian genomes and which, based on mutations found in drug-resistant worms, form anthelmintic drug targets. Now we are predicting nematode drug susceptibility based on phylogenomics of ligand-gated ion channels. In addition, we are exploring the rapidly growing number of completely sequenced parasite genomes for comparative genomics of (i) unrelated endoparasites to analyse convergent trends in the evolution of parasitism, and (ii) endoparasites and their hosts to identify molecular mimicry proteins. The multidisciplinary approach in our lab is supported by a large number of national and international collaborations.

Scientists: P. Mäser, E. Greganova (since September 2010)
Technicians –
Students: C. Perret, P. Ludin

Collaboration: M. Barrett, P. Büttikofer, H. de Koning (University of Glasgow, UK), E. Matovu (Makerere University, Kampala, Uganda), D. Nilsson (Karolinska Institute, Sweden), R. Perozzo (University of Geneva), D. Rentsch (University of Bern), I. Roditi, A. Schneider, T. Seebeck, E. Sigel, N. Uozumi (Tohoku University, Sendai, Japan)

Funding: Swiss National Science Foundation (SNSF), Novartis Animal Health, Roche 10GB Award Program

Eastern Africa Network for Trypanosomiasis (EANETT)

EANETT was founded in 2000 and currently consists of six East African countries (Kenya, Sudan, Tanzania, Uganda, Malawi and Zambia) together with Swiss TPH. The network received financial support from SDC for the first 7 years. During that period, EANETT established management structures, improved communication and initiated collaborative research and technical transfer. Each year an Annual Conference was held for auto-evaluation and as a platform for young scientists to present their research work.

Links and collaborations were established with WHO and other international organisations as well as with research groups in Europe, Japan and the US. Co-opted members

Trypanosomes scavenge adenosine from the host through a transporter which also transports trypanocidal drugs e.g. melarsen or cordycepin. This transporter can be exploited for chemotherapeutic purposes (blue trypanosome). The transporter was found to be absent in drug resistant (red) trypanosomes.
were incorporated to complement the available expertise in the network. In this context EANETT would be an ideal platform for clinical trials and field research. Since financial support by SDC came to an end, the network is struggling to fill the funding gap. The Board of Management and the Advisory Board met in June 2010 to develop strategies to attract new donors to guarantee the continuation of the network.

**Medical Parasitology and Infection Biology**

**SECTION 17/18**

The Tuberculosis Research Unit joined the Department of Medical Parasitology and Infection Biology at Swiss TPH in March 2010. Part of our group members moved from the MRC National Institute for Medical Research (NIMR) in London, and our unit retains a strong collaborative link with NIMR. Our main research topics are the cause and consequences of genetic diversity in *Mycobacterium tuberculosis* (*Mtb*), the bacterium which causes human tuberculosis (TB). Our research consists of two complementary arms. One macro-evolutionary arm focuses on the global diversity of *Mtb*, the evolutionary forces that drive this diversity, and the phenotypic consequences of this diversity. The second, micro-evolutionary arm studies the evolution and ecology of drug resistance in *Mtb*.

**Global Diversity of M. Tuberculosis**

We have previously demonstrated that *Mtb* comprises of six phylogenetically distinct lineages which are associated with different regions of the world (Figure 1A). Currently, we are using large-scale comparative DNA sequencing to study the nature of the genetic differences between these lineages and the evolutionary forces that shape this diversity. Recently, we published the first whole-genome based global phylogeny of *Mtb* (Figure 1B). This phylogeny demonstrates that *Mtb* is more genetically diverse than previously believed, and supports the notion that human TB originated in Africa. Our ongoing work on the global strain diversity of *Mtb* is now focusing on geographic areas and human populations where no or only limited data are available. A particular emphasis will be on sub-Saharan Africa and Asia where we hope to discover novel *Mtb* lineages.

Population genomic analyses of our whole genome data also revealed that, in contrast to most other human pathogens which evade host immune responses by accumulating antigenic variation, T cell antigens in *Mtb* are highly conserved. These findings have important implications for the development of new TB diagnostics and vaccines. Following on this observation, we are now screening for variable regions of the *Mtb* genome which might represent as yet unrecognised human antigens.

We have used DNA sequencing to evaluate the phylogenetic performance of the current genotyping tools used for *Mtb* (i.e. spoligotyping and MIRU-VNTR). We found that...
while these tools are valuable for standard molecular epidemiological applications, they are inadequate for phylogenetic and population genetic analyses of *Mtb*. Hence we are now developing novel single nucleotide polymorphism based genotyping approaches for *Mtb*, which we will implement in collaboration with partners in areas where TB is endemic.

Scientists: S. Gagneux (head), S. Borrell, M. Coscollá
Students: B. Malla, D. Stucki
Collaboration: Fudang University, Shanghai, China; Foundation for Medical Research, Mumbai, India; GENETUP, Kathmandu, Nepal; Institute for Systems Biology, Seattle, USA (ISB); Makerere University, Kampala, Uganda; MRC Laboratories, Banjul, The Gambia; MRC National Institute for Medical Research, London, UK (NIMR); New York University School of Medicine, USA (NYU); Noguchi Memorial Institute for Medical Research, Accra, Ghana; Research Centre Borstel, Germany; The Broad Institute of MIT and Harvard, Cambridge, USA; University of California San Francisco, USA (UCSF); University of Cape Town, South Africa (UCT); Wellcome Trust Sanger Institute, Cambridge, UK

Funding: Amt für Ausbildungsbeiträge Basel-Stadt; Institutes of Health (NIH), Medical Research Council UK (MRC), Royal Society, Swiss National Science Foundation (SNSF)

Figure 1. Global diversity of *Mycobacterium tuberculosis* (*Mtb*).

(A) Main lineages of *Mtb* are associated with different parts of the world.
(B) Whole genome-based phylogeny of *Mtb*.

Figure 2. Relative transmission of drug-resistant *Mtb* compared to drug-susceptible *Mtb*.
Evolution and Ecology of Drug Resistance

One of the most important questions in the epidemiology of drug-resistant TB is whether the global burden of drug resistance is primarily due to the de novo acquisition of resistance during patient treatment or a consequence of transmission of already drug-resistant strains. Traditionally, the thought was that drug resistance in bacteria was universally associated with a reduction in virulence and/or transmissibility. However, when reviewing the current evidence for the transmissibility of drug-resistant Mtb, we found that multidrug-resistant strains of Mtb were everything from 10 times less- to 10 times more transmissible than drug-susceptible strains (Figure 2). The reason for this heterogeneity is partially because the molecular basis of drug resistance in Mtb is complex, and different drug resistance-conferring mutations are associated with different effects on strain fitness. Furthermore, by using a combination of experimental evolution and comparative genome sequencing of clinical strains, we have discovered secondary mutations that might mitigate some of the negative effects of the primary drug resistance-conferring mutations in Mtb. Validation of some of these putative fitness-restoring or compensatory mutations is underway.

Scientists: S. Gagneux (head), S. Borrell
Collaboration: MRC National Institute for Medical Research, London, UK (NIMR); Research Centre Borstel, Germany;

Funding: Medical Research Council UK (MRC); National Institutes of Health (NIH); Swiss National Science Foundation (SNSF)

Members of the TB Research Unit. Photo: N. Gagneux
The Swiss Centre for International Health (SCIH) is a service department of the Swiss TPH. We provide programme management and implementation, consultancy and advisory, teaching and training, and operations research services in developing health systems worldwide. We are engaged globally in short- and long-term projects with a special focus on Africa, Asia, Central and Eastern Europe, and Switzerland. We are also a WHO Collaborating Centre for Health Systems Development.

The mission of the SCIH is to combine scientific knowledge and practical expertise to reduce health inequalities worldwide. We offer comprehensive, interdisciplinary and multi-sectoral services based on the experience of the Swiss TPH and its wider network of associates. Our guiding principle is to work with partners to respond to local needs, thus tailoring our services to the contexts and countries we work in. Four thematic focuses represent our main areas of expertise:

- Health systems and economics
- Sexual and reproductive health
- Health technology and telemedicine
- Systems performance monitoring and evaluation

Each of these areas of expertise has been translated into a thematic unit to concentrate on and further develop competencies. To facilitate a trans-disciplinary working style, a unit may also manage, and often contributes to, the projects of the other units.

**Services: Innovation, Validation, Implementation**

Based on our technical and managerial expertise in health-sector reform and systems development, and our extensive field work experience, the SCIH provides assistance in the implementation of health-systems projects, acts as executing and support agency for health development and offers short and long term consultancies in all aspects of health services management, planning, risk analysis and evaluation. The interdisciplinary approach of the SCIH guarantees optimal interfacing of our wealth of knowledge in disciplines such as engineering, epidemiology, informatics, health economics and reproductive health.

**Project Management and Implementation:** Comprehensive project management encompasses health system planning and development, organisation of technological and human resources, medicines and medical devices, as well as project monitoring, process optimisation and the introduction of information and communication systems.

**Consultancy and Advisory:** Short and long term consultancies for global clients include advisory services such as, feasibility studies, project monitoring and evaluation, strategic planning, needs assessment, workshop organisation and moderation and knowledge management.

**Teaching and Training:** To ensure sustainability of the benefits of our services, teaching and training of technical, medical, managerial and administrative personnel are crucial. Additionally, we supervise doctoral and Master’s students and contribute to international university level courses in fields such as health care and management in tropical countries (HCMTC), rational drug policy and management for diseases of poverty, and perinatal services.

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**Operations Research**: Scientific work is conducted through operational and applied research projects to improve evidence for decision making. Priorities include health service research and intervention, as well as various topics such as the governance of health systems and the effects of scaling-up priority interventions.

**Clients**

Our client portfolio is large, including Swiss and German government, and European Union (EU) development agencies. Global initiatives and other international agencies constitute a large portion of our portfolio. The relationship of the SCIH with partners and clients is governed by a spirit of collaboration and mutual respect. The projects the SCIH supports are developed in line with policies, guidelines and priorities of partner countries in keeping with the principles of the 2005 Paris Declaration of alignment and coordination for aid effectiveness. We maintain a strong working relationship with our global clients and partners as well as various UN and aide organisations, some of which are:

- German Technical Cooperation (GTZ)
- Global Alliance for Vaccines and Immunization (GAVI)
- Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM)
- German Development Bank (KfW)
- Luxembourg Agency for Development Cooperation (Lux-Development)
- Swiss Agency for Development and Cooperation (SDC/DEZA)
- Swiss Federal Office of Public Health (FOPH/BAG)
- Swiss State Secretariat for Economic Affairs (SECO)
- UNAIDS, UNITAID, UNDP
- World Bank (WB)
- World Health Organization (WHO)

**Mission Statement of the SCIH**

The Swiss Centre for International Health (SCIH) contributes to improving health systems and population access to effective health services worldwide. It combines scientific knowledge and practical expertise to reduce health inequalities.

In strengthening health systems, our approach is to offer comprehensive, interdisciplinary and multi-sectoral services, covering project or programme identification, planning, implementation, monitoring and evaluation. Our services are based on evidence developed by the Swiss Tropical and Public Health Institute (Swiss TPH) and its wider network of collaborators. The experiences of our collaborators feed into the teaching provided by the Swiss TPH.

Our guiding principle is to work with partners to respond to local needs, thus tailoring our services to the contexts and countries in which we work. The SCIH combines the state-of-the-art knowledge of a multidisciplinary academic institution with the industry standards of a consulting agency.

The SCIH is a department of the Swiss TPH in Basel, Switzerland, and works on a non-profit basis. Any benefits generated are reinvested in creating knowledge and providing training in the field of international health.

**Our Team**

The various focuses and competencies represented by our team are our capital. Over 130 professional staff members, representing some 35 nationalities, currently work for the SCIH in Basel and abroad. Our public-health specialists span a variety of backgrounds ranging from medicine, epidemiology, health economics and engineering to sociology, social geography, public administration and organisational development, medical anthropology, education, financial auditing, pharmaceutical medicine and pharmacology. The majority of our staff is based in the field, ensuring hands-on local involvement. The SCIH’s capacity and diversity of competencies is further enhanced through frequent collaboration with other professionals within the Swiss TPH. To cover very specific and short-term capacity gaps, we also maintain a wide network of external professional partners.

We are globally active and have representatives based in Burundi, the Democratic Republic of Congo, Egypt, Niger, Romania, Rwanda, Tanzania, Romania, Tajikistan and the Ukraine, in addition to Local Fund Agents in Lao, Benin, Burkina Faso, Cambodia, Cameroon and Nicaragua. Our Basel-based staff travel frequently on assignments, and have first-hand experience of the countries with which they work. In six of these countries, the SCIH has created offices with a non-government organisation (NGO) status, which are independent of a specific project.
Teaching and Training

SCIH staff is involved in teaching and training at various Swiss and international universities and contribute actively to the international discussion on health development. We regularly publish papers in peer reviewed journals and support and supervise students at the University of Basel, as well as of other universities, in their research projects. An annual Swiss TPH Spring Symposium on international health issues is also organised by the SCIH, attracting a high level of international and national speakers and providing a fertile ground for discussion.

The SCIH maintains its leading position as a consulting agency in international health in Switzerland and continues to expand into international markets. To sustain this growth, we orient ourselves with our “Strategy to 2015”, enabling us to further our reputation for providing services in international health based on institutional, technical and scientific expertise. Human resource development as well as regional and decentralised collaboration are key elements of this strategy, as is a quality management system which ensures efficient processes that comply with the highest ethical standards. In addition, SCIH internal knowledge management is constantly evolving to strengthen our knowledge base.

Health Systems and Economics

In view of the limited resources available for providing health care, decisions have to be made in all health systems on how to invest scarce resources to maximise the benefits for the population. Efficient health systems are necessary to provide comprehensive, continuous and integrated health care that effectively addresses the needs of the population and ensures adequate access for all. Analysis of the economic and financing aspects of health systems and health interventions contributes to the development of such sustainable and efficient health systems. Economic analysis informs decision makers on the choice and design of health interventions and the refinement of health policies.

Three thematic areas are covered by the health economics projects of the Swiss TPH: (i) sustainable health systems development, (ii) health care financing, and (iii) economic analysis. Cutting across these themes are pro-poor and equitable health policies, a focus on priority diseases and inter-sectoral issues in health including malaria, HIV/AIDS, vaccine preventable diseases and environmental issues.

Health systems require viable funding to develop and provide quality health services, and should simultaneously strive to achieve appropriate access of the population to needed health services. The analysis of equity implications and policy options for improving access and arriving at fair financing solutions is one of our important working areas. At present, out-of-pocket payments for accessing health care pose a heavy burden for households and individuals. In order to protect people from catastrophic health expen-
The Swiss Centre for International Health (SCIH)

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clients. The WHO, World Bank, GTZ, Danish International Development Agency (DANIDA) and GAVI are among the organisations which have funded health economics activities of the SCIH. The SDC finances implementation projects in the Great Lakes Region (Rwanda, Burundi, South Kivu, and Tanzania) and in Tajikistan, where health economics and financing expertise are essential inputs for the selection and implementation of project activities. Furthermore, health economics expertise is drawn on by the SDC’s back-stopping mandate with the SCIH. An other important funding partner is the Bill & Melinda Gates Foundation (BMGF), which supports the malaria modelling project and the cost effectiveness analysis of intermittent preventive treatment for malaria and anaemia control in infants (IPTi).

Sustainable Health Systems Development

In 2009, health economists of SCIH and specialists of its partner organisation MEH-Consultants (P) Ltd., Kathmandu, conducted a study on the availability and quality of important essential drugs at all levels of the health system in Nepal on behalf of the World Bank and the Ministry of Health and Population. The study was carried out as part of the Governance and Accountability Action Plan of the Government of Nepal. The aim of the survey was to assess whether the quality of essential drugs is satisfactory, to determine causes for deficiencies, and to suggest ways of strengthening the drug management system and address any shortcomings. Quality and availability issues (including efficient utilisation of resources) were analysed in terms of central and district procurements.

The analysis of the procurement process at the central level revealed that quality assurance mechanisms are in place and generally applied, while at the district level they are mostly not in place or not applied. Procurement documents and processes are very weak at the district level. Another finding of the study was that irrational cost estimates of drugs at the district level have led to increases in the costs of local procurement. The analysis revealed that for the NRP 610 million (Nepalese Rupee) spent at district level in 2008/09, central procurement with the same amount would have resulted in purchasing three times the quantity of drugs. Another remarkable finding was that more storage quality problems were found among the district stores than in the stores of the primary level health facilities, most often based on attitudinal aspects, seldom due to the physical attributes and professional training. The findings on drug availability showed that drugs are in general available at all levels, with some shortcomings. This is an important finding in respect to sustaining the new free essential drug policy of the Government of Nepal. Finally, tests of sampled drugs by SGS Life Science Laboratory, Chennai, India verified the good quality of supplied drugs, with minor exceptions.

Technical staff: D. Droeschel, C. Napierala (2008), M. Stoermer
Funding: The World Bank

Evaluation of Tellewoyan Memorial Hospital in Liberia

In 2009, the SDC mandated the SCIH to conduct an assessment of Tellewoyan Memorial Hospital (TMH) in Voinjama, Liberia, after one year of support by the SDC, and to outline options for their future engagement. Both the health policy context of the Government of Liberia as well as the external technical support rendered were evaluated. The internal management of TMH by an international NGO was analysed, and the appropriateness of the services provided was assessed. Options were analysed for the future development of TMH and the SDC’s involvement, including phasing-out SDC support.

Technical staff: D. Droeschel, M. Stoermer
Funding: Swiss Agency for Development and Cooperation, Humanitarian Aid

Quality and Availability of Drugs in the Nepal Public Sector

Close cooperation with our local partners in Nepal. Photo: D. Droeschel

Tellewoyan Memorial Hospital (TMH) in Voinjama, Liberia under reconstruction by SDC, Backstopping and Consulting by SCIH. Photo: Swiss TPH
Sustainable Health Systems Development in the Great Lakes Region

The Swiss TPH was mandated by the SDC to implement primary health care programmes in the Great Lakes region of Central Africa: the Public Health Programme in Karongi and Rutsiro (Rwanda) and the Health Sector Support Programmes in Ngozi (Burundi) and South Kivu (DRC). Covering several countries in the region facilitates the exchange of lessons learned across national borders, which enhances the dissemination effects for best practices. Cross-border professional communication is also an effective instrument to address health problems of migrating populations (e.g. organise vaccination campaigns, epidemiological surveillance) and helps to maintain valuable contacts in a fragile political and security environment, thus helping to promote peace in the region. The Swiss TPH regularly mobilises regional experts through exchange visits for programmes in neighbouring countries, organises regional workshops (adolescent health and youth-friendly services, participation in strategic planning workshops) and creates and maintains a regional learning environment for health interventions on an operational level.

Karongi and Rutsiro Public Health Programme in Rwanda: The Swiss TPH has been supporting district health systems since 2002 with interventions targeting the improvement of physical and financial access to high quality health services through capacity building, financial support, pro-poor interventions, community-based health care financing (mutuelle de santé), and ascertaining the availability of minimum and complementary intervention packages. The programme provides strong and effective management support for district health services. The supported institutions have repeatedly won national prizes for best facility management. Through its integrated systems strengthening approach, this programme has considerably contributed to the downward trend of children-under-five mortality in the country.

Technical staff: X. Bosch-Capblanch, P. Hanlon, B. Sawadogo, J. Schwarz, M. Zahorka
Collaboration: Ministry of Health Rwanda
Funding: Swiss Agency for Development and Cooperation

Ngozi Health Systems Support Programme in Burundi: The programme started in 2006, building on the experience gathered in the Rwanda programme and using similar instruments. Its health systems strengthening approach includes a focus on improving access and service quality for mothers and infants through the strengthening of structural and process quality and reinforcing the administrative capacity of health districts. The percentage of child deliveries by trained health workers increased more than threefold in the Ngozi province since the start of the intervention, and the health districts were among the first to have the capacity to participate in the government decentralisation efforts.

Technical staff: B. Pose, J. Schwarz, M. Zahorka
Collaboration: Ministry of Health Burundi
Funding: Swiss Agency for Development and Cooperation

South Kivu Health Systems Support Programme in DRC: The South Kivu programme is the youngest in the region starting only in 2009 in two health zones of the South Kivu Province. The programme supports the rebuilding of a health system which has been deteriorating through a period of civil wars. The programme took over from earlier humanitarian aid interventions and began improving the structural quality of services through rehabilitation of infrastructure and the provision of medical equipment, ensuring regular and consistent drug supply and strengthening the managerial capacity of the zonal and provincial health administration. In its second phase beginning in 2010, it will further fortify the health system and enable compliance with national norms, improve the drug supply system through the development of a drug revolving fund, improve access to health care particularly for the poor, reinforce community participation to help control vector-based and water-born diseases and increase health services utilisation. A youth component addresses gender issues and provides a forum to sensitise the next generation on sexual and reproductive health through youth-friendly services, school-based life skills education and issues around sexual violence.

Technical staff: B. Pose, J. Schwarz, M. Zahorka
Collaboration: Ministry of Health Burundi
Funding: Swiss Agency for Development and Cooperation

Support to Health Reform and Family Medicine in Tajikistan

The problems of the health sector in Tajikistan are multiple and broad with an over-emphasis on the hospital sector and vertical programmes. Reform efforts of the government of Tajikistan and Ministry of Health (MoH) focus among others on the introduction of family medicine and new financing mechanisms. The Tajik-Swiss Health Reform and Family Medicine Support Project (Sino) supports and complements ongoing reform initiatives in Tajikistan. With support of SDC, the second phase of the project ended in 2009 and has been followed by a third phase which will con-
The Swiss Centre for International Health (SCIH) continues until 2012. Both phases have a budget in the range of US$ 4 million and are implemented by SCIH.

The goal of project Sino is to improve access to primary care in four pilot districts. The main components have focused on supporting the development of family medicine, the related links with community and social development, the strengthening of management and planning process at district level and on transferring and disseminating experiences at a national level. Special attention is being paid to the two cross-cutting themes of gender and governance.

Project Sino plays a key role in testing and establishing community groups that consist of “active individuals” to empower ownership for health within the village communities. Local individuals took a coordinating role between the communities and family medicine services to develop locally sensitive responses and solutions. The project provides implementation support to health financing reforms, such as allocating funds on a per capita basis to decentralised entities, and the introduction and monitoring of the basic benefit package at primary care level. Since 2007, the Ministry of Health (MoH) introduced co-payments for secondary care services not included in the Basic Benefit Package, which helped to promote the utilisation of family medicine services and generate resources for salaries and drugs. Project Sino supported the implementation of these financing reforms and assured the subsequent monitoring of changes. Evidence on equity aspects as well as the economic burden of health services utilisation to households was made available to policy and decision makers through regular reports, policy briefs and during meeting presentations.

Sino has also supported the enhancement of the status of family medicine, which is a new “specialisation” in Tajikistan. It has been instrumental in building adequate local training capacity and supported the re-training of approximately 150 family doctors and 200 family nurses to give them the necessary professional competency skills. As a complementary measure, project Sino designed and tested various approaches to continuous medical education. Peer review groups consisting of 6–10 family doctors were established and convene on a regular basis in four districts to discuss case studies or health problems of relevance to primary care such as hypertension or respiratory diseases among children. The monitoring and assessment of the peer review groups indicated that this form of “Continuous Medical Education and Learning” has been well received by managers and district authorities, and is slowly finding acceptance by national experts.

Health Care Financing

SCIH health economists supported the development and strengthening of social health insurance in Tanzania. These activities were funded by the GTZ, DANIDA and the SDC in cooperation with the Ministry of Health and Social Welfare (MoHSW) Tanzania.

GTZ Strengthening of Fund Flow from the National Health Insurance Fund (NHIF) to Health Services in Tanzania: In 2006, the GTZ implemented a strategy for training health facilities in Tanzania on claiming, reimbursement and utilisation of NHIF funds. Economists of the SCIH were involved in the monitoring and evaluation of these training activities in the regions of Tanga and Mbeya, where health services became able to increase their funding from NHIF. Bottlenecks in the use of such funds were identified and recommendations given for reorganising the financial management procedures.

DANIDA Training on Claiming, Accessing and Utilising Funds from the NHIF in 29 Districts of the Great Lakes Zone: The experience gained from the GTZ supported programme in Tanzania on training health facility staff was further utilised in a training programme for 29 districts in the Lake Zone. The SCIH was mandated by the MoHSW to support in the design and implementation of this DANIDA-funded programme.

Assessment of the SDC Project “Health Insurance for the Rural Population” in Tanzania: Within this project, the SDC rendered support for the development of community health funds (CHFs) in the Mbeya and Dodoma Regions of Tanzania. CHFs provide social health insurance coverage for the rural population, especially those without formal employment. CHFs at the district, as well as national level, support structures in the MoHSW, and the Tanzanian Network of CHFs. The SCIH was mandated by the SDC to evaluate this programme.

Technical staff: M. Stoermer
Collaboration: Ifakara Health Institute, Tanzania
Funding: German Technical Cooperation; Danish International Development Agency; Swiss Agency for Development and Cooperation

Collaboration: Ministry of Health Republic of Tajikistan
Funding: Swiss Agency for Development and Cooperation

Health Promotion for community-based health insurance, acquisition of new members. Photo: Swiss TPH
Economic Analysis

The “Integrated Healthcare Technology Package” (iHTP): A Tool for Resource Planning

The SCIH cooperates with the WHO on the promotion of the “Integrated Healthcare Technology Package” (iHTP) – a tool for supporting countries worldwide in their resource allocation for health services. The software tool is presently being implemented within a WHO – Lux Development programme on strengthening healthcare infrastructure and technology management in six countries in Africa, Asia and Latin America. The SCIH provides technical support for implementing the iHTP tool in Namibia and Senegal, and monitoring and evaluation for the progress made in the remaining countries of El Salvador, Nicaragua, Vietnam and Laos. With its strong costing component, iHTP provides a flexible instrument for resource allocation analysis and planning both at national, district and institutional level. The SCIH is thus able to apply this tool flexibly in different project contexts as need arises. Through the cooperation of the health economists and health technology and telemedicine experts of the SCIH, further comprehensive software solutions for health care planning can be offered.

Technical staff: D. Droeschel, P. Hanlon, M. Stoermer, R. Werlein
Collaboration: World Health Organization
Funding: Luxembourg Agency for Development Cooperation

Economic Evaluation of Intermittent Preventive Treatment for Infants (IPTi) for Malaria

IPTi has been shown to decrease clinical malaria by approximately 30% in the first year of a child’s life and is a promising malaria control strategy for Sub-Saharan Africa that can be delivered alongside the Expanded Programme on Immunisation (EPI). As part of the IPTi consortium, a Cost-Effectiveness Working Group (CEWG) was lead by the SCIH health systems and economics team and provided technical leadership in the evaluation of the cost and cost-effectiveness of IPTi based on five trials: Gabon (Lambaréné), Kenya (Kisumu), Mozambique (Manhica), Papua New Guinea (East Sepik), and Tanzania (Kilimanjaro). A total of five different IPTi drug regimens were assessed. The study concluded that IPTi delivered alongside the EPI is a highly cost-effective intervention against clinical malaria in a range of malaria transmission settings. Where IPTi did not have a statistically significant impact on malaria, generally in low transmission sites, it was not cost effective.

Technical staff: L. Conteh, G. Hutton, F. Manzi (Student), M. Tanner, F. Tediosi
Collaboration: Albert Schweitzer Hospital, Gabon; Barcelona Centre for International Health Research, Spain; Ifakara Health Institute, Tanzania, Kenya Medical Research Institute, Kenya; Kilimanjaro Christian Medical Centre, Tanzania; London School of Hygiene and Tropical Medicine, UK; Manhiça Health Research Centre, Mozambique; National Institute for Medical Research, Tanzania, PNG Institute of Medical Research, Papua New Guinea; United Nations Children’s Fund; University of Tübingen, Germany
Funding: Bill and Melinda Gates Foundation

Health Technology and Telemedicine

Health care services and the utilisation of health relevant information is increasingly driven by technology. The steady influx of new methods, materials and clinical devices into health services shape the way health care is provided. Unprecedented opportunities arise, but health systems are also confronted with an array of new challenges. Service quality and efficiency is directly related to the proper utilisation and management of those technologies. Furthermore, the availability and maintenance of a supportive facility infrastructure must be ensured.

The ever increasing numbers of new technologies (and the lack of preparedness of decision makers to deal with them) often have serious consequences, making it difficult to set priorities, allocate resources and create room for effective programmes. In low-income countries, the use of inappropriate technologies frequently leads to a waste of resources and a weakening of system performance due to drainage of funds from more essential interventions.

In international health, the acute shortage of health workers is recognised as one of the main constraints to improving health services. As evidence shows, the availability of technologies and appropriate infrastructure are important factors in counter-balancing the shortage. Technology increases the effectiveness of the workforce and is important for the motivation of staff.

In the past decade, Information and Communication Technology (ICT) has finally found its way into the health sector. The possibilities to support and develop health services have become virtually unlimited. Due to falling costs
in hardware, mobile phone services and internet access, ICTs are now also within reach for countries with limited resources.

In order to make the right investment decisions, systematic evaluation of the effects of a new technology on health systems performance and benefits for the population is required. Methodologies have been developed to retrieve, analyse and synthesise the available evidence in a way that supports decision making for investments and setting policy. For this concept, the term “Health Technology Assessment” (HTA) was coined.

Technologies are undoubtedly crucial enablers for preventive and curative medical services, but in low-income countries especially, the requirements for these new technologies in terms of recurrent costs, infrastructure needs and knowledge for application and maintenance have been grossly underestimated. As a result, much medical equipment is defective, out of order or cannot be operated because consumable items, replacement and spare parts are missing. Comprehensive technology management capacity is needed to counterbalance these shortcomings and support a long-lasting benefit of the capital investment.

The development and implementation of clinical equipment maintenance systems, the building up of clinical engineering and material management skills and the overall enhancement of technology management capacity are essential for the performance of any health system. These areas of technical assistance are covered in the various Health Technology and Telemedicine projects of the SCIH.

Further challenges lie in the rapid spread of ICTs and their innovative applications, such as telemedicine, eHealth, knowledge management, and in the field of teaching and training. Various UN organisations advocate the availability of ICT services to developing countries in order to “bridge the digital divide”, to enable access to knowledge, and to improve the efficiency and quality of health services. Their slogan is: “Knowledge is the foundation upon which healthier communities are built”.

Systematically, the Swiss TPH pursues the utilisation of ICTs to achieve overarching health goals in our partner countries in the frame of a tailored eHealth strategy. The SCIH closely collaborates with the Institute’s IT team and research departments to conceptualise, roll out and validate eHealth interventions.

European Network for Health Technology Assessment

The ever increasing complexity and cost implications of introducing new technologies in health systems requires suitable assessment methods and specialised institutions to orient decision makers. In view of strengthening and coordinating European health systems, the EU commission has identified HTA as a priority science discipline to improve the management of health systems. To this end, a European Network for HTA (EUnetHTA) was created. One of the EUnetHTA working groups has been mandated to build HTA capacity in countries that have not yet introduced formal HTA programmes. On behalf of the Swiss Network for HTA, the SCIH health technology and telemedicine specialists were mandated to perform assignments as part of the EUnetHTA work and development plan. As a result, we co-authored a handbook for HTA capacity building and an elaboration of indicators.

Technical staff: M. Raab
Collaboration: Swiss Network for Health Technology Assessment
Funding: Swiss Federal Office of Public Health

Effectiveness Analysis for the WHO’s Resource Planning Tool

In the frame of our mandate as a WHO Collaborating Centre, we have a longstanding partnership with the WHO Department for Health Systems Governance and Service Delivery. Together we facilitated a novel planning methodology and software termed “Integrated Health Technology Package, iHTP”. iHTP is a powerful planning, costing and simulation tool that defines all resources needed to perform health interventions based on clinical procedure guidelines. Jointly with the WHO, this methodology had been tested and validated at various field sites. We performed a comprehensive study comprising 15 countries to evaluate the efficiency of iHTP use in all field sites. The results of the study have become a milestone for the further development of iHTP.

Technical staff: M. Raab
Collaboration: World Health Organization, Department for Health Systems Governance and Service Delivery
Funding: Swiss Centre for International Health

East African Telemedicine and eLearning Network (EATEN)

The Swiss TPH, together with the Tanzanian Training Centre for International Health (TTCIH) in Ifakara, joined forces to establish a local centre of competence for the elabora-
tion and dissemination of innovative teaching and training materials. The first eLearning course under this project addresses Maternal and Child Health (MCH) for the education of Assistant Medical Officers. Support is provided for constructing the technical infrastructure and training of technical staff for its operation and maintenance. Additionally, lecturers will be trained on how to apply the new tools in their teaching activities.

Technical staff: M. Blunier
Collaboration: Novartis Foundation for Sustainable Development; Tanzanian Training Centre for International Health
Funding: Novartis Foundation; Tanzanian Training Centre for International Health; Swiss TPH

Modernising Diagnostic Imaging Services in Egypt

Rapid population growth, changing disease patterns and rising expectations from the population are pressuring Egypt’s public health system for reforms. Primary health care has been restructured in the past decade within a large healthcare reform programme. A severe challenge is still posed by sub-standard primary and secondary referral care, where the population is often deprived of valuable, life-saving health services.

Essential diagnostic services are the backbone of hospital care. Beside laboratory services, conventional radiology is the most important essential diagnostic service. Radiological diagnostic services had been neglected throughout Egypt, resulting in incorrect diagnoses and thus, inappropriate patient therapy. The population had lost confidence in governmental services and was forced to seek radiology services in private centres at high prices.

To confront this problem, an agreement on a large-scale initiative was made between the Egyptian Ministry of Health and Population and the Swiss State Secretariat for Economic Affairs (SECO) through a mixed-credit financing scheme. The Swiss TPH was mandated to provide managerial and technical support for the project entitled, Egypt-Swiss Radiology Project (ESRP). During its first phase, 2004–2006, the project aimed at improving first-line diagnostic radiography services across Egypt in 80 hospitals. The second phase of the project, 2007–2011, pursues the same objectives with an emphasis on quality assurance. It also follows as pilot activities in the provision of a wider array of imaging equipment, and more particularly, of digital radiology equipment and the testing of tele-radiology in selected facilities.

Technical staff: M. Raah, A. Ragaey (Egypt), C. Zaugg
Collaboration: Ministry of Health Egypt
Funding: Swiss State Secretariat for Economic Affairs; Ministry of Health Egypt

Upgrading Public Hospitals in Jordan

Following the successful project to upgrade intensive care units, neonatal services and operation theatres in Jordan, a follow-up project focusing on the improvement of central sterile supply departments (CSSDs), laboratory services and ophthalmology was engaged. Though medical services in Jordan are generally quite well developed, effective care in public hospitals is compromised by outdated equipment. Specialised equipment is often not available in government hospitals, forcing patients to search for services at higher costs in private hospitals. Although the project focuses primarily on the upgrade of medical equipment, additional aspects are considered. A complete rehabilitation of the CSSDs financed by the Jordan authorities, and a systematic improvement of sterilisation processes will accompany the delivery and installation of modern sterilising equipment in 16 out of the 28 government hospitals. Effective use of new laboratory and ophthalmic equipment will be supported with intensive expert exchange and training. The Swiss TPH supports the Jordanian MoH in technology planning and the selection of adequate equipment and organises exchange of expertise and trainings.

Technical staff: M. Blunier, B. Werlein
Collaboration: Ministry of Health Jordan; Directorate of Biomedical Engineering; Jordanian hospitals
Funding: Swiss State Secretariat for Economic Affairs; Ministry of Health Jordan

Healthcare Waste Management in Northern Jordan

Infectious health care waste (HCW) is in many countries still a source of health risk for patients, hospital personnel and the general public. This project focuses on improving management of HCW in Northern Jordan, including the handling, storage and proper disposal of waste. The core of the project is the delivery and installation of a modern incinerator to replace an outdated one. In addition, the project will support the development of an adequate business plan for a sustainable operation of the incinerator in the future. General support to establish an effective HCW management at the health facility level – including segregation, internal

Radiology information systems in Egyptian hospital.
Photo: C. Zaugg
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transport, storage and collection of waste – will complete the measures and assure effective handling from the source in hospitals, to final disposal of the ashes after incineration.

Technical staff: M. Blunier, R. Werlein
Collaboration: Ministry of Health Jordan, Directorate of Environmental Health; Jordanian hospitals; Jordan University of Science and Technology
Funding: Swiss State Secretariat for Economic Affairs, Ministry of Health Jordan

Regionalisation of Perinatal Emergency Care in the Republic of Moldova (REPEMOL)

The SDC engaged the Swiss TPH to assist the Moldovan Paediatric Emergency Care Project in opening international competitive bidding for the procurement of medical equipment. The SCIH assisted in revising the entire set of bidding documents and accompanied the bid opening and evaluation.

Technical staff: M. Blunier
Collaboration: Ministry of Health Republic of Moldova, Centre of Health Policy and Services, Romania
Funding: Swiss Agency for Development and Cooperation

Health Technology Management and Promotion of ICT in Moldavian Perinatal Care

As hospitals and clinics in Moldova received large amounts of medical equipment through donations and loan programmes, it became obvious that modern medical equipment requires attention from professional engineering staff and a solid managerial base. To make investment in physical assets long-lasting and safe, development of a new system for health technology management becomes crucial. Within the Moldavian-Swiss perinatology project, the SCIH was mandated to contribute to the design of a comprehensive health technology management system that includes the development of relevant policies, the introduction of computerised inventory systems, a needs-based procurement strategy and medical engineering services. To strengthen the quality of perinatal services enabled by the new equipment, and foster communication and exchange of expertise between health professionals, a telemedicine network has been established between second and third level health institutions. Each clinical ward in the Neonatology and Obstetrics department has been equipped with a telemedicine workplace. Health staff is now using the web-based telemedicine platform iPath to present and consult clinical cases (improving their diagnosis) and organise referrals of pregnant women and neonates.

Technical staff: M. Blunier, A. Martin-Hilber, R. Werlein, C. Zaugg
Collaboration: Ministry of Health Republic of Moldova
Funding: Swiss Agency for Development and Cooperation

eHealth

The Swiss TPH has declared eHealth as one of eight institutional goals indicating the importance Information and Communication Technologies (ICTs) have in today’s health systems. The institute’s eHealth strategy defines three core areas to improve human resource capacities and technical infrastructure: telemedicine, health information systems and eLearning. The objective is to offer expertise in these fields to our internal and external customers, providing support in project assessment, planning and implementation.

Open Source Software: Governments around the world have identified the use of Free/Libre Open Source Software (FLOSS) as a key part of their information technology (IT) strategy. A strong motivation for this is the reduction of public expenditure on IT products, but also the desire for independence, security and better control of resources. FLOSS is particularly suitable for countries with minimal resources, as paying for expensive software licenses can be avoided and technical support can be provided at local labour costs. Within the health sector, FLOSS enables technicians and health professionals to economically create, customise and expand on eHealth applications themselves based on their specific needs. The following examples demonstrate the successful involvement of the SCIH in FLOSS initiatives:

- **OpenMEDIS** (Open Source Medical Device Information System) is a web-based application developed by the...
SCIH to collect and manage data on technical infrastructure in hospitals. The software is currently deployed in the Ukraine and Moldova where openMEDIS has become a national tool. In Egypt, the system was customised and is now used by the MoH to track equipment servicing.

- **MCH Registry** (Mother and Child Health) is an open-source online platform to register pregnant women and identify possible risk factors to indicate a timely referral for the delivery. The software was developed by Ukrainian programmers with the technical assistance of the Swiss TPH.

- **iPath** is a web-based content management and collaboration tool developed at the University of Basel. It is a telemedicine platform which the Swiss TPH promotes and implements in several projects to establish professional networks, enabling health professionals to exchange expertise and discuss clinical cases over long distances.

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**Sexual and Reproductive Health**

Global population dynamics and migration, sustainable development and climate change, the economic crisis and poverty reduction as well as human rights are challenges and questions the world is faced with that are all directly linked to issues of sexual and reproductive health (SRH). The recognition of the burden of morbidity and mortality coupled with changes in the political landscape led to an era of unprecedented opportunities to promote the sexual and reproductive health of people and populations, in line with the relevant Millennium Development Goals.

Today, more than 1.75 billion people on the planet are between 10 and 24 years of age. As globalisation accelerates change and the social structures that protected previous generations of young people are being eroded, adolescents are exposed to heightened risks and pressures. These have lifelong consequences for their healthy development, such as early and unwanted pregnancy, and sexually transmitted infections (STIs) including HIV and AIDS. But young people also represent a positive force in society, and when supported, they can be resilient in absorbing setbacks and overcoming problems. While many programmatic approaches have been developed to meet their needs, reaching youth and facilitating participation remain a challenge.

In view of the pivotal link between population growth and priority issues such as climate change and food security, population dynamics are crucial. The challenge lies in repositioning family planning in a positive way, without falling back into the old population control debate that was associated with coercive practices in the seventies and eighties. Health systems need to be strengthened so they can be accessed by all for comprehensive advice and an integrated continuum of care – from pre-conception, over the course of a pregnancy, to delivery and the post-natal period.

Addressing the alarming rate of maternal mortality is among the top concerns of the international agenda. Effective family planning to prevent unintended pregnancies, preventing and managing the consequences of unsafe abortion, providing safe abortion where legal and ensuring access to high-quality maternal services, including emergency delivery care are key strategies with high potential to impact maternal mortality. Additionally, the continuum of neonatal and infant care is in need of strengthening.

A multi-sectoral HIV and AIDS response also remains high on the international agenda. Building on the progress of antiretroviral therapy, slowing incidence, and better surveillance, etc., two main issues receiving much attention today are the questions of integration of services, and linking HIV to sexual and reproductive health. Strategies for health system strengthening and quality of services are now seen to be pivotal in the quest for a sustained response.

In providing our services, experts of the SCIH follow a rights-based approach to health-policy advice and technical support. We address all thematic fields of SRH within the broader context of health sector reform, strengthen-
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ing health systems and improving the quality of service delivery. We respond to the increasing demand for quality services and assist in the development of prevention and health promotion campaigns involving gender equity and social development. Improving the quality of perinatal care is a major focus in our Eastern European projects, as is the prevention of HIV. We are present in the Ukraine, Moldova, Romania, Tanzania, the Great Lakes and Central Africa regions. The SCIH is a Local Fund Agent for the Global Fund to Fight AIDS, TB and Malaria in 19 countries and takes part in, and leads major evaluations and consultancies in the field of SRH.

A Regional Approach to Improved Perinatal Health

The Swiss TPH has implemented SDC funded perinatal health projects within a Health Sector Reform (HSR) context in the Ukraine, the Republic of Moldova and Romania since 2002, focusing on quality improvement through current medical technology, evidence-based medical guidelines, regionalised care and referral systems, capacity building of staff, information and communication technology (ICT) in health and telemedicine, among others. Having started the HSR process from similar starting points during the early 1990s, the three countries have chosen different implementation strategies. The different approaches and the capacity that have emerged in the three countries have translated into important expertise and resources for regional development in perinatal health. The Swiss TPH continues to build on this capacity by initiating regional professional exchange and collaboration between neighbouring countries.

Collaboration was initiated through the joint participation of representatives of the three neighbouring countries in the symposium “Bridging the Gap in Neonatal Care – The Eastern European Perspective” organised by the Swiss TPH at the 5th World Conference on Paediatric Critical Care in Geneva in 2007. Problems and critical gaps in the provision of perinatal care were discussed among the invited partner countries and the leaders of respective international bodies to identify opportunities through regional and international networking. Subsequently, the Swiss TPH facilitated a series of exchange platforms based on a common understanding of problems and the appreciation of solutions identified by regional colleagues. Some examples are:

- In 2008 the Iasi (Romania) and Chisinau (Republic of Moldova) neonatology referral level hospitals initiated an annual Neonatal Days conference
- The two neighbouring neonatology centres in Iasi and Chisinau now facilitate exchange visits and common projects (like the joint Romanian-Moldovan pocket booklet on neonatology guidelines) as well as invite each other to their professional conferences
- Trainers are exchanged to present country-specific solutions for quality improvement:
  - Moldovan trainers contribute to management training in Kiev for hospital managers on quality assurance instruments (mortality audit, “BABIES” matrix)
  - Romanian perinatology facilities organise training for Moldovan physicians
  - Romanian experts contribute to the expansion of health technology management expertise in the Republic of Moldova
  - Ukrainian expertise is in demand concerning the utilisation of telemedicine as an instrument to improve professional communication

The regional conference on quality assurance in perinatology care organised by the Swiss TPH and its partners in June 2010 in Chisinau provided another opportunity to discuss approaches for quality assurance in perinatology and its instruments, as well as a forum for the three partner countries to discuss future initiatives. The regional expertise is already in high demand even beyond the three neighbouring countries. Romanian experience, together with Swiss TPH expertise, has accompanied the development of the Macedonian Safe Motherhood strategy, including a training component, a quality of care study and several participatory workshops to develop the strategy.

Technical staff: M. Blunier, A. Martin Hilber, J. Schwarz, F. Secula, R. Werlein, M. Zahorka
Collaboration: Ministries of Health Ukraine, Moldova, Romania
Funding: Swiss Agency for Development and Cooperation

PASHA – Promoting Sexual and Reproductive Life Skills in Tanzanian Schools

HIV is a preventable infection. Many other sexual and reproductive health risks are also preventable. Despite this, every day Tanzanians become infected with the virus – many of them adolescents and young people. Too many girls drop out of school because of having engaged in, or having been coerced into, unsafe sex with the consequence of having an unwanted pregnancy. However, this age group also presents

PASHA Peer educators in a Tanzanian school.
Photo: H. Heinrichs, 2009
probably the most important “window of opportunity”. Shaping young people’s attitudes and behaviours early on, towards a healthy and responsible sexuality, promoting equality in gender relations and building self-confidence and life skills of adolescents is a crucial investment into a country’s future and the health of coming generations. These are the aims of Prevention and Awareness in Schools of HIV/AIDS (PASHA), a project of the Ministry of Education and Vocational Training (MoEVT) of Tanzania. It is funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) through the GTZ as part of the Tanzanian German Programme to Support Health (TGPSH). The Swiss Centre for International Health was contracted in 2003 to provide the technical collaboration and support the implementation of this project, which has just entered its third phase (2010–2012).

Initially PASHA worked with all secondary schools in the Tanga Region regardless of their ownership (government or non-government). Since 2007 primary schools have also been included and coverage has extended to the Lindi and Mbeya regions. At the beginning of the third phase PASHA worked with 169 primary and 92 secondary schools and co-operated with 100 schools on the training of school counsellors through the Tanzanian Head of Secondary Schools Association.

The two main strategic pillars of PASHA are to support the Ministry at all levels in developing and implementing peer education and a system of counselling teachers, in line with MoEVT policies and their strategic plan related to HIV and AIDS. PASHA also develops materials and introduces participatory and innovative teaching methods to working with adolescents. Their approach follows the constructivist learning theory and is learner-centred. The main materials for students are the Shangazi Stella materials (peer education) and the life skills booklet (self-learning). The latter includes, but also goes beyond, education on sexual and reproductive health and HIV and AIDS.

A recent external study that assessed PASHA’s effectiveness showed remarkable quantitative outcomes such as improved knowledge on HIV and SRH, lowered gender inequity in career aspirations and reduction of reported pregnancies amongst school girls, and qualitative outcomes such as empowerment of peer educators and changes in school culture. The focus of the third phase will be to scale up the PASHA approach to other regions in partnership with other organisations and support the Ministry with its national roll-out.

Technical staff: X. Bosch-Capblanch, H. Heinrichs (Tanzania), C. Kessler, C. Stucki
Collaboration: Ministry of Education and Vocational Training, Tanzania (R. Mangulu); Tanzanian German Programme to Support Health, Tanzania Heads of Secondary Schools Association, various consultants
Funding: German Federal Ministry for Economic Cooperation and Development through the German Technical Cooperation

**A Regional Approach to HIV/AIDS Prevention in Central Africa**

Prevention and treatment of HIV and AIDS and the fight against stigmatisation of people living with HIV and AIDS remain a high priority on the international health agenda. In the Central African region, this is addressed through “Projet Prévention de lutte contre le VIH/SIDA en Afrique Centrale (PPSAC)”, a programme involving six countries looking to improve the coverage with quality condoms at subsidised prices, increase the knowledge of the population (with particular emphasis on groups with high risk behaviour) and reduce the stigma of people living with or affected by HIV or AIDS.

Activities embedded in the regional approach have been financed for five years by German financial cooperation, the
KfW development bank, in the amount of EUR 23 million for the period 2009 to 2012. The six countries that benefit from this support are Cameroon, Chad, the Central African Republic, the Republic of Congo, Gabon and Equatorial Guinea. The SCIH is responsible for the coordination of activities incorporated into the regional organisation for control of disease, Organisation de Coordination de la Lutte contre les Endémies en Afrique Centrale (OCEAC), located in Yaoundé.

At the national level, activities are implemented by a number of actors, most importantly national social marketing associations (NGOs), who oversee and organise social marketing activities and the selling of condoms. In 2009, an average of 1.3 condoms were sold per inhabitant in Cameroon (around 22 million condoms), 2.0 in the Central African Republic (around 4 million condoms) and 0.4 in Chad (around 4 million condoms), corresponding to 30 million condoms in the region. Compared to 2004, these numbers reflect a substantial increase of condom sales. In Cameroon the market has become increasingly competitive through the appearance of a number of additional condom brands. An analysis on condom selling points conducted in 2009 indicated there are a number of shortcomings with regard to stock levels, product placement and promotion, and that improving these aspects may contribute to the further increase of the number of condoms sold.

Cross-country collaboration between the social marketing associations of the region, governmental HIV control programmes and multi-lateral agencies, such as the United Nations Population Fund (UNFPA) and the United Nations programme on AIDS (UNAIDS), has led to pooled procurement, which resulted in a substantial drop in unit costs of condoms (around 21%) and allowed for harmonisation of condom prices across the three countries, thus substantially reducing cross-border selling.

Social marketing impacts not only the supply, but also the demand for condoms through behaviour change campaigns. An attractive monthly “edutainment” magazine, radio and TV broadcasts on topics related to SRH and HIV, and a system of peer educations are part of the youth activities of social-marketing associations supported by PPSAC. These approaches involve a high degree of youth participation and are increasingly being regionalised. In addition, within its social marketing approach, the programme will further link sexual and reproductive health issues to HIV in future. Close collaboration has been established with networks of people living with HIV and AIDS. They are supported in their daily life and substantial efforts are made to reduce their stigmatisation.

The experience of PPSAC indicates that a regional approach embedded within national HIV control strategies offers various opportunities. This includes economies of scale in commodity procurement that can result in an increase in condom sales. A regional approach to knowledge-sharing also facilitates collaboration and partnership between NGOs, national AIDS programmes, regional institutions and donors, leading to improved efficiency and effectiveness of HIV and AIDS prevention activities.

Addressing the HIV Needs and Vulnerabilities of People in Humanitarian Contexts

Throughout 2009, the Swiss TPH provided technical assistance to UNAIDS to support the DFID-Funded UN system-wide work programme for scaling-up HIV services for populations of humanitarian concern. The needs of an estimated 200 million people in humanitarian situations who were not effectively served by existing HIV and AIDS programmes were addressed. People affected by emergencies and disasters have to contend with a complex constellation of change and insecurity. This may include internal displacement, seeking refuge in other countries, loss of livelihoods, food insecurity, lack of access to basic assets and services, and dependence on others (such as humanitarian workers and uniformed personnel). Within the humanitarian context, respect for human rights may become more fragile, and people increasingly vulnerable to coercion and abuse. As safer sexual practices cannot be negotiated by those who are sexually assaulted, there is an inherent increase in the risk of transmission of HIV and sexually transmitted infections. In humanitarian situations, there may be an accompanying increase in sexual and gender-based violence (SGBV), and women and children may be coerced into transactional sex to meet the very basic needs for themselves and their dependents. It is in such situations where HIV prevention services are most needed, that they are greatly lacking as national and international organisa-
tions mobilise and reconstruct basic services in the aftermath of a disaster. People living with HIV in situations of disaster and conflict have to deal with the loss of their usual care and treatment including disrupted access to antiretroviral and tuberculosis medication and consequent deterioration of their health.

The Swiss TPH led a team to evaluate this programme. It concluded that while there are still a number of obstacles to fully mainstreaming HIV into humanitarian mechanisms, significant progress has been made with regard to HIV service delivery and promotion among internally displaced populations. Successful programme efforts to address HIV and SGBV within Disarmament, Demobilisation and Reintegration (DDR) processes were evident in Liberia and Eastern Sudan, where HIV services to ex-combatants had been integrated into the national DDR curriculum. Activities under the programme were found to contribute to building capacity towards integrative livelihoods, food security and nutritional support, HIV prevention and mitigation and address the underlying causes of SGBV. In this way, the programme encouraged innovation of creative responses and adaptation of existing approaches, models and strategies. In Southern Africa, this contributed to strengthening food security and nutritional support and raised the profile of the importance of social protection in response to SGBV and HIV vulnerabilities of populations of humanitarian concern.

In 2009 and 2010, SCIH experts were mandated by the BAG to provide technical assistance in revising policy guidance for HIV and STI control in Switzerland. We conducted an electronic survey among Swiss stakeholders in the field of HIV and STIs, contributed to stakeholder workshops and developed a report on “International Context Analysis of HIV & STI Strategies and Programmes: The European and International Reference” to help align the Swiss programme. A wide range of experts was consulted on priorities in relation to international aspects of the Swiss programme. We also contributed to developing priorities and drafting the “National HIV and STI Programme 2011–2017” of Switzerland.

The experiences gained in assessing the status of the legal, policy and services related to STI and HIV control at national and regional levels are mutually reinforcing and complimentary as it allows us to share knowledge between partners and projects for mutual benefit.

Technical staff: C. Kessler, A. Martin Hilber, C. Stucki, S. Weiss
Collaboration: Institute of Social and Preventive Medicine of the University of Bern; Institute of Social and Preventive Medicine Lausanne; London School of Hygiene & Tropical Medicine; Brighton and Sussex Medical School, East Sussex, UK; various experts
Funding: Swiss Federal Office of Public Health, European Centre for Disease Prevention and Control through the Institute of Social and Preventive Medicine Bern

Strengthening HIV and other Sexually Transmitted Infection (STI) Control in Europe

In recent years, there has been growing interest in strengthening STI and HIV prevention, control and surveillance in the European region. Strategies employed by countries must be evidence based, effective in the local context and consistent with international human rights and ethical public health standards. The European Centre for Disease prevention and Control (ECDC) and local health authorities such as the Federal Office of Health (BAG) in Switzerland have recently focused their attention on critical policy and interventions needed to make a difference regionally and nationally. Partner notification (PN), for example, was identified as an important strategy for controlling and preventing future STI and HIV transmission. PN involves identifying, informing and treating (when necessary) the sexual partners of people with a sexually transmitted infection, and providing information to prevent future infection. PN has long been considered an essential component of the control of sexually transmitted infections at the population level and good case management at the individual level. Such interventions, however, need to be supported by public health laws and policies.

In 2009, the European Partner Notification (EuroPN) Research Consortium (in which the SCIH is a partner) was contracted to conduct a series of studies in response to the ECDC request for research in “Evaluating the public health benefits of partner notification”. The interdisciplinary approach used focuses on the implications of wider health care policy for the feasibility and effectiveness of various strategies for PN in Europe related to HIV and sexually transmitted infections. The project aimed to create a PN knowledge base and evaluate the public health aspects of PN for STIs in EU member states. Through qualitative and quantitative research methods, it was found that partner notification is a well accepted component of public health approaches for controlling the spread of HIV and other STIs, although there is the relative lack of clear guidelines about how to implement PN strategies. While legal frameworks are supportive of the intervention in most European countries, there is considerable confusion and misunderstanding of the legal, policy and practice of PN in EU countries, highlighting the need for further work at a national level to implement PN.

In 2009 and 2010, SCIH experts were mandated by the BAG to provide technical assistance in revising policy guidance for HIV and STI control in Switzerland. We conducted an electronic survey among Swiss stakeholders in the field of HIV and STIs, contributed to stakeholder workshops and developed a report on “International Context Analysis of HIV & STI Strategies and Programmes: The European and International Reference” to help align the Swiss programme. A wide range of experts was consulted on priorities in relation to international aspects of the Swiss programme. We also contributed to developing priorities and drafting the “National HIV and STI Programme 2011–2017” of Switzerland.

The experiences gained in assessing the status of the legal, policy and services related to STI and HIV control at national and regional levels are mutually reinforcing and complimentary as it allows us to share knowledge between partners and projects for mutual benefit.

Technical staff: K. Molesworth
Collaboration: United Nations Programme on HIV/AIDS
Funding: Department for International Development (UK) through United Nations Programme on HIV/AIDS
In an increasingly complex global health environment, the measurement and improvement of the performance of health providers, programmes and systems is becoming more important. Thereby, the quality of information and accountability play a central role. Accountability has two broad elements: the rendering of an account (provision of information) and the consequent responsibility (sanctions or rewards for the party accountable). Performance monitoring and auditing helps oversee the functioning of health systems, programmes and partnerships, with a primary goal of increasing their quality, effectiveness and accountability.

In recent years Global Health Initiatives (GHIs) have emerged as important mechanisms for channelling donor funds to improve the health of the world’s poor, and consolidate the technical and financial efforts of a variety of stakeholders. Consequently, performance monitoring is seen as a pivotal aspect of GHIs. To service this need, one of the main areas of activity within the SCIH precisely addresses the methodological and practical aspects related to measuring and monitoring health systems and programme performance.

It is readily acknowledged that the way health systems are governed and organised, and how they collect information and manage resources and transform them into services for the population, greatly determines health outcomes. While many indications support clinical decision making, the body of evidence related to policy options for health systems organisation and management is much weaker. Hence, the SCIH aims to capitalise on and disseminate relevant experience on performance improvements of health systems and programmes. This is done through regular policy briefs, articles in peer-reviewed international journals, as well as teaching and addressing all thematic fields of performance monitoring and issues related to GHIs.

The SCIH’s contribution to optimising health-service delivery and priority interventions is based on a broad range of skills and competencies, requiring teamwork across various domains, including public health, monitoring and evaluation (M&E), and financial controlling and resource management, such as drug supply and human resources.

Collaborations cover a wide range of actors, including the Global Fund to Fight HIV/AIDS, Tuberculosis and Malaria, the Financial Mechanism Office of the European Economic Area (EEA FMO), the Global Alliance for Vaccines and Immunization (GAVI), the Global Drug Facility of the Stop TB partnership (GDF), UNITAID, Swiss Agency for Development and Cooperation and the Presidential Malaria Initiative (PMI) funded by the government of the United States. Just as important are the institutions which benefit from these initiatives, such as national HIV/AIDS, malaria or tuberculosis control programmes.

**Appraisal and Monitoring of Health Sector Projects in the European Union**

By signing the EEA Enlargement Agreement, the EEA EFTA States – Iceland, Liechtenstein and Norway – agreed to continue their efforts to enhance cohesion within the EEA and to focus their efforts on the new EU accession countries (Bulgaria, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia). More than EUR 1.14 billion was made available in the period 2005–2009 for selected priority areas in

<table>
<thead>
<tr>
<th>Beneficiary Country</th>
<th>Priority Area</th>
<th>No. of Assignments</th>
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<tbody>
<tr>
<td>Bulgaria</td>
<td>Health and Child Care</td>
<td>26 individual project appraisals</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>Health and Child Care, Cultural Heritage, Environment</td>
<td>36 individual project appraisals</td>
</tr>
<tr>
<td>Estonia</td>
<td>Health and Child Care</td>
<td>7 individual project appraisals</td>
</tr>
<tr>
<td>Greece</td>
<td>Health and Child Care, Cultural Heritage, Environment</td>
<td>28 individual project appraisals</td>
</tr>
<tr>
<td>Latvia</td>
<td>Health and Child Care, Cultural Heritage, Environment</td>
<td>10 individual project appraisals</td>
</tr>
<tr>
<td>Lithuania</td>
<td>Health and Child Care, Cultural Heritage, Environment</td>
<td>30 individual project appraisals</td>
</tr>
<tr>
<td>Hungary</td>
<td>Health and Child Care</td>
<td>29 individual project appraisals</td>
</tr>
<tr>
<td>Poland</td>
<td>Health and Child Care, Cultural Heritage, Environment</td>
<td>147 individual project appraisals</td>
</tr>
<tr>
<td>Portugal</td>
<td>Health and Child Care and Sustainable Development</td>
<td>8 monitoring assignments</td>
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<tr>
<td>Romania</td>
<td>Health and Child Care</td>
<td>1 baseline study</td>
</tr>
<tr>
<td>Slovakia</td>
<td>Health and Child Care</td>
<td>14 individual project appraisal</td>
</tr>
<tr>
<td>Slovenia</td>
<td>Health and Child Care, Cultural Heritage, Environment</td>
<td>14 individual project appraisals</td>
</tr>
<tr>
<td>Spain</td>
<td>Health and Child Care, Cultural Heritage, Environment</td>
<td>2 monitoring assignments</td>
</tr>
</tbody>
</table>
The new EU member states, as well as Greece, Portugal and Spain, comprising among others, academic research, cultural heritage, human resources, sustainable development and health and child care.

The SCIH was appointed as the appraisal and monitoring agent in charge of reviewing proposals submitted to the EEA FMO. The focus of the work was on verifying, examining and assessing the proposals and related information (technical and financial concepts, methods and risks) provided by applicants, as well as on monitoring individual projects during the implementation phase to verify overall project development according to the grant agreement and respective payment claims.

Since 2006, the SCIH appraised more than 388 individual projects (see table below) with an applied-for-funding amount of EUR 190 million in the field of health and child care, including prevention and promotion (e.g. drug abuse, obesity), country-relevant communicable (e.g. HIV/AIDS, TB) and non-communicable diseases (e.g. cancer, respiratory diseases) and related infrastructure development (e.g. modernisation of equipment, facilities and buildings).

To manage the appraisal and monitoring assignments efficiently, the SCIH coordinated a network of international experts based in the beneficiary countries. A detailed review project documentation combined with site visits allowed the SCIH to give the FMO qualitative recommendations on the project proposals.


Collaboration: European Economic Area Agreement Financial Mechanism Office, Applicants from EU countries

Funding Agency: European Economic Area Agreement Financial Mechanism Offices of Norway, Iceland and Liechtenstein

Capacity Assessment Tools for UNITAID

UNITAID’s mission is to contribute to scaling up access to treatment for HIV/AIDS, malaria and tuberculosis, primarily for people in low-income countries, by leveraging price reductions for quality diagnostics and medicines and accelerating the pace at which these are made available. In 2009, UNITAID recognised that it needs to adapt its current processes in order to deal efficiently with an enlarged project portfolio and an increase in the number of partners that it needs to develop tools to expedite the assessment of: the continued capacity of its existing technical partners to manage increased UNITAID funding as well as the capacity of potential new partners.

The SCIH was selected to provide support to UNITAID in developing capacity-assessment tools for the evaluation of existing and new partners implementing UNITAID funded projects.

In a first step, the SCIH team reviewed existing tools and guidelines currently used by UNITAID, as well as examples of existing projects funded by UNITAID, in order to get a better understanding of the context and requirements for this project. In parallel, the project team started to design the general framework for the capacity assessment tools. Brainstorming sessions were organised with SCIH experts involved in using similar tools for other donors (Global Fund, Financial Mechanisms Office administering the Norwegian Cohesion Funds to the European Union and Global Drug Facility desk audit form).

Once the general structure for the tools was determined, the team developed a draft version of the self-assessment and external assessment components of the tools. These draft tools were shared with UNITAID Secretariat in the interim reporting at the end of June 2009. In July 2009, the capacity assessment tools were tested internally by the UNITAID Secretariat. Two portfolio managers from different disease areas reviewed the tools in the view of their existing projects and provided comments. In September/October 2009, the capacity assessment tools were tested on UNITAID’s approved project “EXPAND TB”. This project is the expansion to 11 additional countries of an existing project, aimed at introducing diagnostic tools for MDR-TB. The project is being implemented by a consortium, involving the following organisations: FIND (Foundation for Innovative Diagnostics), GDF (Global Drug Facility) and GLI (Global Laboratory Initiative). All three organisations were involved in piloting the self-assessment tool. As for the piloting of the external assessment, the focus was on verifying that the questions were well formulated (rather than on the actual content of the answers). A real external assessment would have required substantial additional time inputs and was also not the prime focus of the present assignment. Capacity assessment tools were revised to take into account the feedback from UNITAID partners in using the self-assessment component of the tools, as well as findings from the external assessment.

The final deliverables included a UNITAID capacity assessment background document, a user manual, an initial capacity screening tool, a capacity self-assessment tool, a review of self-assessment tool and an external assessment template.

Technical staff: B. Clary, D. Guinot, K. Wyss
Collaboration: UNITAID (I. de Leon, E. Hoff)
Funding Agency: UNITAID

Local Fund Agent for the Global Fund

Since 2004, the SCIH has gradually increased its mandate as Local Fund Agent (LFA) for the Global Fund to Fight AIDS, Tuberculosis and Malaria. Starting with one country, by 2010 it was acting as LFA for 19 countries in various regions of the world (Benin, Bolivia, Burkina Faso, Cambodia, Chad, Costa Rica, Djibouti, Equatorial Guinea, El Salvador, Guatemala, Lao PDR, Mali, Myanmar, Nicaragua, Niger, São Tomé and Príncipe, Senegal, Syria, and the West Bank and Gaza).

According to its mandate, the role of the SCIH is to assess principal recipients’ capacity to implement grants, and to
review proposed budgets, work plans and the performance framework. So far the SCIH has established more than 70 initial assessments of principal recipients such as national disease control programmes, international NGOs and the United Nations Development Programme with regard to institutional and organisational capacities, financial management systems, procurement and supply management, and M&E. Programme-related documents leading to grant signing were reviewed and assessed by the respective experts. The SCIH also assisted in the monitoring and evaluation assessment required for grant allocation and has actively participated, working with evaluation experts in several national M&E self-assessments.

In recent years, the SCIH has gained substantial experience in reviewing and verifying progress reports, disbursement requests and external audit reports through its mandate to follow up 66 Global Fund supported programmes in 18 countries. The financial volume of these five-year programmes ranges from EUR 3 million up to EUR 100 million. Progress reports were reviewed by a team consisting of finance professionals and programmatic experts and included spot checks of the financial and programmatic documentation at the level of the principal recipient and sub-recipients of funds. Quarterly or half-year financial controls included an analysis of transactions on bank statements, book entries of actual expenditures, as well as follow-up of accounts receivable and accounts payable. Expenditures were verified on a spot check basis with a particular focus on significant amounts, conspicuous book entries and posting texts. The SCIH follows the principles of performance-based funding in making financing decisions, such as those outlined by Global Fund principles. The aim is to ensure that investments are made only where grant funding is managed and spent effectively on programmes that have an impact in the fight against HIV/AIDS, malaria and tuberculosis.

The SCIH has also conducted approximately 60 on-site data verifications using the standard tools available from the Global Fund with a view to assessing data quality and reliability. The field visits lasted three to four days and were conducted by a national evaluation expert, and in some cases, in combination with an international programmatic expert. The SCIH expanded its knowledge on how best to give feedback and present observations emerging from the on-site data verification so that they can effectively be taken up by programme implementers and contribute to improving the M&E system of a given programme.


Drug distribution and inventory at a Lao dispensary.
Photo: T. Schuppisser, 2007
Decision Making on Health Systems: From Data to Policy

Governments and the international health community are confronted with an increasingly challenging environment characterised by the multiplication of approaches to development in the health sector (e.g. Global Health Initiatives and Partnerships) and the complexity of health problems which have societal and economic roots and implications. Despite a certain global progress in health outcomes over the last decades, health related Millennium Development Goals (MDG 4, 5 and 6) are far from being achieved in many countries. The international community and public opinion demand, more than ever, that agencies and donor governments demonstrate the results of their actions and account for the disbursed funds. Good quality data is paramount to monitor progress towards the MDG and to assess and verify programme performance in the short run with credibility.

Data Quality Audits

The Global Fund has created a methodology to assess the quality of data that countries report under their grants called Data Quality Audits (DQA). DQAs consist of the verification of data reported to the Global Fund by comparing individual records and aggregated reports at each level of the health system, from a random sample of service delivery points up to the national authority responsible for compiling and reporting data. DQAs produce a verification factor as an indicator of data accuracy.

The SCIH conducts DQAs in collaboration with the EuroHealth Group. In the last two years, several DQAs were conducted in Belarus (tuberculosis), Gambia (malaria), Tajikistan (tuberculosis), Thailand (HIV/AIDS), Yemen (tuberculosis), Uzbekistan (tuberculosis), Central African Republic (HIV/AIDS) and Pakistan (tuberculosis). DQAs, conducted with national counterparts systematically identified data and system issues that otherwise would have remained undetected by the programmes themselves, contributing to the building-up of analytical capacities within recipient countries.

Technical staff: C. Auer, L. Beck, X. Bosch-Capblanch, A. Nicole
Collaboration: EuroHealth Group
Funding: The Global Fund

Epidemiology of the Unvaccinated Child

Despite many efforts, there are still a large proportion of unvaccinated children who have had no access to health services or have not used them. The WHO Strategic Advisory Group of Experts (SAGE) requested a more detailed analysis of children who have not been reached by immunisation services. This study included a statistical component which was commissioned to the SCIH.

The analyses included 241 Demographic and Health Surveys (DHS) and Multi-Indicator Cluster Surveys (MICS) in 95 different countries, encompassing more than one million children. The focus of the analyses was to describe predictors of children not having received a single dose of any routine vaccination. Several predictors were inspected: sex of the child, birth order, level of education of mothers and their partners and wealth index, among others. Globally, approximately 9% of children were unvaccinated (across all surveys and years). A fact sheet with relevant data for each survey was elaborated. These fact sheets were presented to the SAGE and distributed to countries to contribute to inform policy making and alleviate inequities.

As a result of these findings, the WHO commissioned a second study of unvaccinated children with a special focus on gender issues, to inform WHO and GAVI polices on gender and vaccination. This study has a qualitative review and a statistical component. Several gender related predictors were selected (e.g. decision making capacity, spousal relations) and multi-variate analyses of interactions between a selection of variables is being undertaken.

Funding: World Health Organization
Evidence of Health Systems Strengthening

Evidence to support policy-making decisions is growing, but it is still limited for many issues and often not systematically consolidated or properly disseminated. Two projects have been commissioned to the SCIH to address these challenges: the GAVI Knowledge Bank (KB) on vaccination health system level interventions and the production of a handbook to support the development of guidance for policy makers about health system level interventions (WHO).

To better tailor the GAVI KB to the needs of managers and policy makers, an analysis of the targeted countries’ Health Systems Strengthening (HSS) proposals (which were submitted to GAVI) was undertaken and the key areas of intervention were identified. Available evidence on selected topics was retrieved, synthesised and presented in a user-friendly web-based platform (www.harvesting-evidence.org). The website presents three levels of information: take-home key messages, summaries of systematic reviews supporting those messages and data on individual studies included in the systematic reviews. The project has been undertaken in collaboration with Liverpool Associates in Tropical Health, the Liverpool School of Tropical Medicine and the University of Cape Town.

The handbook to develop guidance on health-system interventions is undertaken in collaboration with the Knowledge Centre for Health Services and monitored by a task force of international experts. The main users of the handbook will be WHO staff in their headquarters and regional offices to assist countries in developing strategies to strengthen health systems. This handbook is compliant with the guidelines development procedures created by the WHO. The work is structured around two main areas: the methodological challenges in retrieving, appraising and disseminating evidence on health system level interventions, and policy needs and decision-making processes.

Technical staff: GAVI KB: X. Bosch-Capblanch; WHO HS guidance: X. Bosch-Capblanch, D. De Savigny, K. Wyss
Collaboration: GAVI KB: Liverpool Associates of Tropical Health (M. Kelly, P. Garner); Liverpool School of Tropical Medicine; University of Cape Town (C. Wiysonge); HS guidance: Task Force of International Experts, chaired by Prof. A. Haines
Funding: Global Alliance for Vaccines and Immunization and World Health Organization

GAVI Baseline Study on a Pilot Advance Market Commitment (AMC) for Pneumococcal Vaccines

It can take 10–15 years until an existing or new vaccine is finally introduced in low income countries, despite their burden of disease and the proven effectiveness of immunization. GAVI has played a crucial role in contributing to the reduction of children-under-five mortality by increasing access to existing and new vaccines. To accelerate the introduction of new and underused vaccines into poor countries, a new financing model is currently being piloted to test its impact on morbidity and mortality of pneumonia, the single largest cause of death in children worldwide. The Advance Market Commitment (AMC) is an innovative “pull” approach to public health funding designed to stimulate the development and manufacture of vaccines for low income countries. The pneumococcal vaccine AMC pilot was launched by the Governments of Italy, the United Kingdom, Canada, the Russian Federation, Norway and the Bill and Melinda Gates Foundation, who pledged a total of US$ 1.5 billion to fund the programme. The overarching goal of the AMC pilot is to reduce morbidity and mortality from pneumococcal diseases, preventing an estimated 7 million childhood deaths by 2030. The objectives of the pneumococcal AMC are:

- Accelerate development of vaccines that meet developing country needs
- Bring forward the availability of effective pneumococcal vaccines through scaling up of production capacity
- Accelerate vaccine uptake through predictable vaccine pricing for countries and manufacturers
- Test the AMC concept for potential future applications

The SCIH was commissioned to undertake the AMC baseline study. The goal of this study was to establish the environment prior to the implementation of the AMC with baseline estimates for a selection of indicators related to the objectives of the AMC and to model counterfactual scenarios to ascertain the potential impact of the AMC vis-à-vis traditional financial and procurement strategies. Based on a conceptual M&E framework, indicators and tools for data collection and analysis were developed. The data collected will be used to monitor progress and to assess the impact of the pilot AMC programme. The study addressed both the situation with respect to the pneumococcal vaccine industry and the status of immunisation and health in GAVI programme eligible countries. As the core of the study, a model for quantification and comparison of the

http://www.vaccineamc.org/
http://www.gavialliance.org/about/in_finance/index.php
AMC with two counterfactuals was developed. Counterfactuals will serve to estimate what would happen if no AMC were to be implemented and to measure incremental impact of the AMC initiative on the vaccine market and pneumococcal disease and mortality.


Collaboration: Office of Health Economics, London UK; Open University, London, UK

Funding: Global Alliance for Vaccines and Immunization

**Medical Education Tajikistan**

At the end of the year 2009, the Swiss TPH was awarded a 2.5-year undergraduate medical education project (MEP) in Tajikistan with SDC financial support for a total amount of approximately 1 million Swiss Francs. The preparation of the MEP was based on the key priorities identified in the Tajik Comprehensive Health Strategy document currently designed to assure alignment and harmonisation with broader health-sector developments.

The project aims to reform the undergraduate medical education of doctors and to align, as well as harmonise, the reforms with family medicine strengthening. To achieve this goal, the MEP project focuses on six main areas of interventions consisting of the adaptation of the State Standard for undergraduate medical education, the development of a new curriculum, the strengthening of teaching capacities of staff, the strengthening of the material base for teaching/learning and contributions to the establishment of clinical bases for the medical faculty of Tajik State Medical University (TSMU) in Dushanbe.

During the inception phase of the project lasting from December 2009 to June 2010, the MEP sought to promote a common understanding and agreement among relevant actors, especially in the TSMU, the Ministry of Health and the Ministry of Education, in view of improving the basic undergraduate medical education at the medical faculty of TSMU. The general content, approach, main activities, specific objectives, logical framework and cost allocation were prepared and agreed on through a participatory approach promoting alignment with other health sector initiatives.

These elements translated into a jointly agreed on project document resulting from continuous discussions with the main stakeholders.

To promote ownership of the Tajik local authorities, the MEP implements its activities through existing national structures with the support of international technical assistance, while the main implementer of the project is the TSMU. During the inception phase, a Curriculum Committee (working group) was also established at the TSMU, with TSMU experts as key members in non-clinical and clinical subjects, as well as in curriculum development. This Curriculum Committee also benefited from the support of a legal and a political advisor. The project therefore, draws on local, as well as international expertise to improve skills and knowledge exchange and increase local ownership. During the same period, the terms of references and members’ list of a steering group for the project was developed. A small project office has also been set up in the capital, Dushanbe with three local staff members of the Swiss TPH.

One of the major project activities of the inception phase was the implementation of a baseline assessment conducted by experts in curriculum development from the Faculty of Medicine in International Work of the University of Calgary in Canada, jointly with the project management team and Swiss experts. This study provided more insight and learning about the range of issues that the project will have to focus on during its implementation, such as the relevance of the current curriculum, the appropriateness of the methods for teaching and learning, the availability of teaching and learning resources, and the specific relevance of the curriculum to Tajik health needs. The assessment report made some very useful recommendations related to curriculum development and also pointed out factors not directly related to curriculum development, but which affect the quality of medical education.

If the inception phase is validated by the SDC offices, the MEP would then begin the implementation phase from mid-June 2010 for a period of approximately two more years.

Technical staff: R. Galeazzi, S. Ibbodova, Q. Pham-Tan

Collaboration: Tajik State Medical University; University of Calgary in Canada

Funding: Swiss Agency for Development and Cooperation

**National Micronutrient Status Survey in Tajikistan**

A national micronutrient status survey was jointly carried out in Tajikistan by the Ministry of Health and UNICEF. Technical support for preparation, implementation and analysis of the survey was provided by the SCIH. The survey aimed at assessing the nutrition and micronutrient status of women and children, determining risk factors for deficiencies, and comparing the findings with a previous national micronutrient survey from 2003.

Nationally representative data were collected from women of child-bearing age (15-49 years old) and children between
A total of 4,287 individuals participated in the survey: 2,141 women and 2,146 children. Two-thirds of the examined individuals were living in rural areas. Remittances, official salary, and farming and livestock were the main sources of cash income. Every fourth woman was over-weight or obese, more often women living in urban areas. The frequency of overweight (BMI>25) slightly increased between 2003 and 2009. The proportion of non-anaemic women increased from 59% in 2003 to 76% in 2009. Almost 60% of the examined women and more than half of the children had inadequate levels of urinary iodine, particularly individuals from rural areas. Overall, moderate and severe urinary iodine deficiency decreased in all study areas between 2003 and 2009, probably attributed to efforts made with salt iodisation. The frequency of anaemia and iron-deficiency anaemia among children decreased compared to 2003. Still, almost every third child had anaemia and infants aged below two years were more often affected. Compared to 28% in 2003, 58% of the household’s cooking salt was adequately iodised. Yet, one third of the cooking salt samples showed an insufficient iodine concentration and 14% of the samples no iodine.

Generally, the 2009 results indicate that, with the exception of urinary iodine deficiencies and being overweight, all nutritional status indicators for women have improved since 2003. Similarly, for children below five years of age, all nutritional status indicators showed a positive evolution. Despite these encouraging tendencies, the prevalence of nutritional disorders remains high and serious public health problems prevail in Tajikistan.

Technical staff: T. Aebi, R. Aye, L. Beck, M. Crivelli, S. Knopp, B. Matthys, K. Wyss
Collaboration: United Nations Children Fund Tajikistan (M. Bakhrudinov, S. Kurbanov), Ministry of Health Tajikistan (Dr. S. Rakhmatulloev)
Funding: United Nations Children Fund
The Department of Medicines Research (MedRes) is a new organisational entity of the institute. It was created at the beginning of 2009 from the Pharmaceutical Medicine Unit, which formerly was a unit of the Swiss Centre for International Health. The change reflects the strategic importance of the development and implementation of new interventions against poverty-related diseases, and it allows the institute to broaden its coverage of the discipline and explore further fields of activities. The department consists of two units (Pharmaceutical Medicine Unit and Regulatory Affairs Unit), a staff section (Quality Management & Services) and a cluster of academic, investigator-driven projects that are carried out by the staff of the service units and students. The MedRes department is service-oriented, and it is one of the three profit centres of the institute.

Since 2000, the Pharmaceutical Medicine Unit (Swiss TPH-PMU) has been the contract research organisation of the Swiss TPH. The unit provides professional support in the conduct of clinical trials with a regulatory background. The services range from complete management of clinical trials or development programs to selected contributions regarding design, organisation, conduct, selection of sites and/or monitoring of projects in accordance with the relevant guidelines. The Swiss TPH-PMU specialises in services for poverty-related diseases and in low resource countries. For selected indications, clinical trials are also conducted in Switzerland.

The core team of the Swiss TPH-PMU is routinely reinforced by experts from our institute or other specialised organisations when needed. During the reporting period, the Swiss TPH-PMU contributed to the development of NECT, the new treatment for sleeping sickness, through the management of a Phase III and a Phase IIIb trial in the Democratic Republic of the Congo; a virosome-based malaria vaccine through a Phase Ib trial in Tanzania; two malaria drugs through monitoring of several trials in various countries in Africa, India and Thailand; and a novel vaccine against Shigella infections through the management of a Phase I trial in collaboration with the ISPM Zurich, Switzerland. Tuberculosis was added as a new indication to the disease portfolio, and, as a first project, a Phase II trial on a vaccine is being monitored in Kenya on behalf of the Aeras TB Foundation.

The new Regulatory Affairs Unit has just been founded and will eventually cover several fields of activity. First, it will provide services and training on regulatory topics such as the registration of new drugs and vaccines with international drug authorities and the preparation of selected documentation for drug registration activities. Second, it will contribute to pharmacovigilance projects through the collection and analysis of data for sponsors, organisations and drug-regulatory authorities. In a later step, we expect to provide and support audits in good manufacturing practice and projects in drug quality.

The research cluster comprises the continued efforts in the framework of the alliance for clinical research and clinical epidemiology in the Democratic Republic of the Congo (see www.ARCEAU-RDC.org), which simultaneously marks the strategic inclusion of clinical research on non-communicable diseases in resource-limited countries into our portfolio. Also, several research projects were carried out, mainly by M. Pharm students, who contributed to the better understanding of various clinical aspects of sleeping sickness. A Ph. D. project allowed the significant improvement of the treatment of the East African form of sleeping sickness (see IMPAMEL III) and another one provided insight into the potential development of drug resistances in sleeping sickness treatment through a surveillance system.

NECT and NECT FIELD (Nifurtimox-eflornithine combination therapy for human African trypanosomiasis)

The pivotal Phase III NECT trial was successfully concluded in 2008 and demonstrated that the Nifurtimox-Eflornithine Combination Therapy is as effective and safe but easier to use than standard eflornithine monotherapy. In March 2009, NECT was included in the WHO Essential Medicines List (EML) as treatment for second-stage sleeping sickness. The WHO shipped the first batch of NECT kits with all needed drugs and medical material to the Democratic Republic of the Congo (DRC) and is supporting its introduction as first-line treatment in other endemic countries.

However, to become widely used in the remote rural settings of sleeping sickness treatment facilities, logistical barriers must be overcome. Health care staff must be well instructed and the safety profile under such conditions better known. For these reasons, we are conducting a Phase IIIb
In June 2010, we concluded part of the feasibility assessment of NECT implementation under remote rural conditions of the Democratic Republic of the Congo. Clearly, NECT is appreciated as first line treatment by all staff interviewed. Minimal levels of human resources, thorough staff training and comprehensive instructions/guidelines are absolutely needed. Logistical barriers in the supply chain management must be overcome.

*Clinical study to assess the clinical tolerability, feasibility and effectiveness under field conditions of the combination of nitrofurmitox and eflornithine (NECT) for the treatment of Trypanosoma brucei gambiense human African trypanosomiasis (HAT) in the meningo-encephalitic phase

Scientists: S. Bernhard, C. Burri (head), D. Kalemwa, A. Kuemmerle, G. Pohlig, C. Schmid

Students: P. Baumelt, N. Ludwig

Collaboration: Drugs for Neglected Diseases Initiative (DNDi), Geneva Switzerland; DNDi Kinshasa, Democratic Republic of the Congo; Institute of Tropical Medicine and Hygiene (IHMT) Lisbon, Portugal; Médecins sans Frontières (MSF), Geneva Switzerland and Kinshasa Democratic Republic of the Congo; Programme Nationale de Lutte contre la Trypanosomiase Humaine Africaine, Kinshasa Democratic Republic of the Congo

Funding: Drugs for Neglected Diseases Initiative (DNDi)

**Development of an Orally Administered Drug for Treatment of First-Stage Sleeping Sickness (DB289 – pafuramidine maleate)**

DB289 (pafuramidine maleate) was a drug candidate selected for development of an oral treatment of human African trypanosomiasis (HAT) by the Consortium for Parasitic Drug Development (CPDD) in 2000. Between 2001 and 2009, the Pharmaceutical Medicine Unit (PMU) has contributed to the development programme by conducting the Phase II and Phase III clinical trials in Africa needed for registration of DB289 for sleeping sickness with the US Food and Drug Administration (FDA). In October 2007, a supplementary Phase I safety study was initiated in South Africa.
Eighty healthy volunteers received 100mg of DB289 twice daily for 14 days. The liver and renal toxicity detected in this trial led to the discontinuation of the DB289 program in February 2008.

The final analysis of the DB289 trial data and the preparation of the clinical study reports gave an opportunity to reflect on the DB289 program. Extraordinary efforts are necessary to conduct clinical trials in sleeping sickness. To the enrolment of the 416 participants in the Phase II and III clinical trials, more than 275,000 people needed to be screened. Another major achievement and factor for good trial quality was the outstanding rate of participation in the 24 month follow-up for the Phase III study which was up to 97%. One prerequisite which should be taken for granted is continuous funding for the full program to ensure completion of the objective (either registration or rapid discontinuation if drug does not meet efficacy or safety targets). However, this is, not necessarily the case for neglected diseases. In the DB289 program, the additional Phase I trial which was requested by the US FDA to complete the safety database, had to be conducted at an unduly late stage because of obstacles such as funding gaps. The discontinuation of the DB289 program was a major setback in drug development for HAT. However, many positive outcomes resulted from this project. Major sustainable improvement of infrastructure and of technical capacity was achieved. Furthermore, it is notable that the incidence of HAT has shown a significant and sustained reduction over the time frame of the DB289 trials. This suggests that the conduct of the large scale clinical trials, along with other initiatives such as the WHO-sponsored surveillance and drug distribution campaigns and enhanced engagement of various non-governmental organisations has contributed to the decrease in HAT witnessed over the past decade.

Scientists: S. Bernhard, C. Burri (head), D. Kalemwa, G. Pohlig
Students: I. Küpfer
Collaboration: Consortium for Parasitic Drug Development (CPDD), University of North Carolina, Chapel Hill USA; Instituto de Combate e de Controlo das Trypanosomiases (ICCT), Luanda Angola; Immtech Pharmaceuticals Int., Vernon Hills, USA; Kikongo Missionary Hospital, Democratic Republic of the Congo; Malteser International, Cologne Germany; Programme Nationale de Lutte contre la Trypanosomiase Humaine Africaine (PNLTHA), Kinshasa Democratic Republic of the Congo; Vanga Missionary Hospital, Vanga Democratic Republic of the Congo.

Funding: University of North Carolina through a grant of the Bill & Melinda Gates Foundation (B&M GF)

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Pevion Biotech Ltd. and the Molecular Immunology Unit of the Swiss TPH have jointly developed a malaria vaccine candidate based on virosome-formulated malaria peptidomimetics (AMA-1 and CSP), representing a reconstituted empty influenza virus envelope presenting *Plasmodium falciparum* derived synthetic peptides on its outer surface.

A Phase Ia safety trial was organised at the University Hospital in Basel in 2004. The goal was to determine if the ma-
Malaria vaccine candidate could produce an appropriate immune response and to determine its safety and tolerability in healthy adult volunteers without pre-exposure to malaria. The promising results encouraged the conduct of a successive Phase Ib clinical trial in children living in African countries (the main target population of the vaccine). The aim of this trial was to gain a better understanding of the humoral and cellular immune response as well as the vaccine’s safety within the malaria-exposed target population. The trial was also coordinated by the Swiss TPH-PMU and was conducted at the Bagamoyo Research and Training Centre (IHI-BRTC) in Bagamoyo, Tanzania. Ten adults and 40 children were enrolled into this joint “PMAL03”-project and received two vaccine doses (in January and June 2008). The follow-up of the patients lasted until mid 2009.

The two administrations of PEV3B yielded very promising results. No serious or severe adverse events related to the vaccine were observed in the two trials. The safety data demonstrated that two vaccinations with PEV3B are safe and well tolerated. PEV3B has induced a humoral response against both target antigens with the strongest response generally observed 30 days after the second immunisation in both populations. These trials justify the present development of a multivalent, multi-stage virosomal vaccine.

**Scientists:** T. Aebi (Swiss TPH, IHI-BRTC), C. Burri (head), P. Cech, C. Daubenberger (MPI), H. Garden, B. Genton (EPH), B. Ley, M. Tanner, G. Pluschke (MPI)

**Collaboration:** Bagamoyo Research and Training Centre (IHI-BRTC), Tanzania

**Funding:** Pevion Biotech Ltd., Mymetics Corporation, Swiss TPH

**ARCEAU-RDC: Alliance for Clinical Research & Clinical Epidemiology in the Democratic Republic of the Congo (DRC)**

The ARCEAU-RDC was founded under a tripartite agreement between the School of Public Health (ESP Kin), University of Kinshasa, the Biamba Marie Mutombo Hospital (BMMH), Kinshasa and the Swiss TPH with the vision to become a platform for the promotion of clinical and epidemiological research in the Democratic Republic of the Congo.

It is the intention of ARCEAU-RDC to contribute to research on malaria, tuberculosis and HIV/AIDS, as well as non-communicable diseases like hypertension, diabetes and cancer. In the framework of this collaboration, the Swiss TPH has also signed an agreement with the Ministry of Health and officially became an NGO in the country in July 2009.

To allow for the conduct of clinical trials according to the best ethical standards and international guidelines, the need for strengthening the infrastructure and implementation of a quality assurance system was identified. The respective activities were begun in 2008 and continued over the past two years including a series of training courses in good clinical practice (GCP), parasite diagnostic techniques, quality management and project management.

In 2009 the (re)construction of the laboratories was initiated. Two laboratories for clinical research were planned, constructed and equipped. They were officially inaugurated by the local authorities on March 27th 2010 and are ready for use for clinical research projects. Another project is the elaboration of a comprehensive quality assurance (QA) system. With assistance of Swiss TPH professionals, staff of the two partner institutions have been outlining standard operating procedures (SOPs) for all research related activities and the first SOP was signed off and implemented in August 2010. For further information please visit: http://www.arceau-rdc.org/en.html

**Scientists:** C. Burri (head), E. Huber, D. Kalemwa

**Collaboration:** Ecole de Santé Publique, Kinshasa Democratic Republic of the Congo; Hôpital Biamba Marie Mutombo, Kinshasa Democratic Republic of the Congo

**Funding:** Bill & Melinda Gates Foundation (B&MGF)
Abridged Schedule for Treatment of Second-Stage Human African Trypanosomiasis with Melarsoprol (Impamel III)

Human African Trypanosomiasis (HAT) is a parasitic disease that occurs in a chronic form caused by *Trypanosoma brucei gambiense* in Western and Central Africa, and an acute form caused by *Trypanosoma brucei rhodesiense* in Eastern and Southern Africa. The treatment of HAT is very problematic; for over 50 years melarsoprol (Arsobal®) has been the only drug active to treat second stage infections. However, the use of melarsoprol is hampered by high toxicity and also the complicated treatment schedules. An abridged 10-day melarsoprol schedule with significantly socio-economic advantages had been developed in the Impamel I & II programs (1997–2004) for treatment of *T.b. gambiense* HAT and was recommended as standard treatment in 2004. Whereas therapy for the West-African form could recently be further improved (see NECT program), the collection of lengthy melarsoprol schedules remains the treatment of choice for the East-African form. Therefore, the conduct of the Impamel III program in *T.b. rhodesiense* affected areas was declared a high priority by the WHO and the affected countries.

The investigator-driven Impamel III program aimed at the assessment of the safety and efficacy of the 10-day melarsoprol schedule in *T.b. rhodesiense* patients and the rationalisation of the suramin pre-treatment prior to melarsoprol. The program consisted of the sequential conduct of a proof-of-concept trial and a utilisation study using historic controls as comparator. A total of 137 patients were enrolled in two treatment centres in Uganda and Tanzania.

Based on the results of the first trial, suramin pre-treatment was discontinued in the utilisation study. The overall incidence of the feared encephalopathic syndromes was 11.2% (CI 5–17%) and 13% (CI 9–17%) in the historic data and respective case fatality rates were 8.4% (CI 3–13.8%) and 9.3% (CI 6–12.6%). Twelve months after discharge, 97% of all patients eligible for follow-up were considered clinically cured.

Based on these results, the International Scientific Committee for Trypanosomiasis Research and Control (ISCTRC) recommended the 10-day melarsoprol schedule as standard treatment schedule for second stage *T.b. rhodesiense* HAT in September 2009.

**Scientists:** C. Burri (head)  
**Students:** I. Küpfer  
**Collaboration:** Lwala Hospital, Kaberamaido District Uganda; Kaliua Health Centre, Urambo District Tanzania  
**Funding:** Bill & Melinda Gates Foundation (B&MGF); Swiss Agency for Development and Cooperation (SDC); Swiss Tropical and Public Health Institute
Introduction

The Department of Medical Services and Diagnostics of the Swiss Tropical and Public Health Institute serves as the “National Reference Centre for Imported Human Parasitic Diseases” and is the only institution in Switzerland providing preventive, diagnostic and curative services for imported infectious diseases. Close collaborative contacts exist with the Travel Clinic of the Institute for Social and Preventive Medicine of the University of Zurich and all major University Travel Clinics and departments of infectious diseases in Switzerland, including Swiss specialists in tropical and travel medicine. Formal collaborations exist with the medical faculties of Basel, Bern, Genève, Lausanne and Zürich. The department provides an expert umbrella for tropical and travel medicine issues to the Outpatient Departments of the University Hospitals of Bern (Inselspital) and Basel. The head of the department is the president of the Swiss Society of Specialists in Tropical and Travel Medicine (FMH), the chairperson of the (Swiss) Expert Committee for Travel Medicine (ECTM), member of several scientific committees of national and international conferences, and editorial member of an internet-based information source on travel medicine recommendations for lay people (www.safetravel.ch). The department has regularly been present at the Annual Basel Travel Fair for 19 years.

The department’s senior staff teach more than 400 contact hours in over 100 national and international tropical and travel medicine courses and seminars every year. Regular one-week courses in travel medicine have been offered for 16 years, and, in 2009, the first European preparatory course for the examination of the International Society for Travel Medicine (ISTM) was held in Basel. All travel medicine courses are conducted in collaboration with the World Health Organization, the International Society of Travel Medicine, the Swiss Society of Specialists in Tropical & Travel Medicine and the Expert Committee for Travel Medicine. Clinical tropical medicine is taught biannually in a 3-week course in Tanzania, offering also excellent opportunities for continuing education of the staff. One of the staff has been repeatedly invited to teach at the Gorgas Course in Lima, Peru. The private practice activities of a specialist in general, tropical and travel and internal medicine (PD. Dr. J. Blum) guarantee integrated health care for patients of the medical department in Basel.

Medical services

Travel clinic

Pre-travel services are offered in the travel clinic, which is the largest of its kind in northwestern Switzerland and also serves the populations of neighbouring areas in Germany and France. It is open 5 days a week in the afternoons (no appointments necessary). 9,000 to 10,000 clients received travel advice in both 2008 and 2009.

Close follow-up of international health events and the research of the Expert Committee for Travel Medicine are used to harmonise and keep pre-travel advice services at the highest standard of quality. A telephone advice (partly as payphone) service, to which other centres in Switzerland are connected, serves more than 30,000 callers each year.

Out-patient Department

Five experienced specialists in tropical and travel medicine, three of them part-time, offer diagnosis and treatment services for travel-related diseases and check-up investigations for people returning from or going to tropical countries. Consultant services are offered to neighbouring hospitals in the Basel region and to other Swiss hospitals. A 24-hour emergency service for advice and treatment of tropical and emerging diseases is offered to the general public, to patients from national and international organisations and to medical doctors in private practice and hospitals. The department recorded 2,560 patient contacts in 2009. First consultations of returning travellers accounted for more than 1,200 per year, some 500 of them were emergency contacts. The physicians also serve as staff doctors for the Swiss TPH employees and overseas students.
Diagnostic Services

National Reference Centre for Imported Human Parasitic Diseases and Molecular Diagnostics Unit

Some 30,000 serological, 6,000 haematological and 8,500 coprological examinations were performed per year. In addition, the emergency diagnostic service examines more than 170 blood films a year for malaria outside regular working hours.

Polymerase chain reaction tests to investigate leishmania species, malaria and amoebiasis are established in the accredited laboratory. In addition, a PCR test for detection of Trypanosoma cruzi in cord blood has been included.

Serological tests against Anisakis, Angiostrongylus, Paragonimus and Gnathostoma are performed for many European centres, leading to additional requested tests.

The staff of the laboratories regularly conducts quality control examinations for field projects in Côte d’Ivoire, Democratic Republic of Congo, Tanzania, Cambodia and Laos. Teaching laboratory practice has been extensively conducted with courses in Switzerland, Côte d’Ivoire, Cambodia and Tanzania. Since 2004, the laboratory is audited annually for certification of the quality of laboratory services according to EU standards EN ISO/IEC 17025.

A working group with members of service and research departments is working on the improvement and new development of diagnostic tests for various parasitic diseases.

Vector Control Unit

The Vector Control Unit focuses on vector control aspects. Through active contributions, the work of the unit aims to bring services, research, teaching and training in vector biology under one roof at Swiss TPH. In terms of services, the unit continues to evaluate pesticides, including arthropod repellents and insecticides. It also provides life arthropods for in-house teaching, academic institutions and industry, and informs the public about vector-related issues. During the report period, the main activities of the Vector Control Unit were the provision of services. For the next report period, it is expected that, through external funding, new activities in research on mosquito biology can be initiated. The unit is also actively taking part in BSc and MSc programs as well as teaching in post-graduate courses.

In terms of services, the unit has been particularly active in three areas: efficacy testing of topical repellents for the application on human skin, testing mosquito adulticides on treated fabrics and supply of life arthropods. A particular feature of our repellent testing is the institute’s quality label “Getestet vom Schweizerischen Tropeninstitut”, awarded to products that show efficient and prolonged repellent activity against biting mosquitoes. Currently, thirteen products obtained the label and are being tested annually to confirm they still show the vital repellency needed to avoid arthropod bites, particularly in the tropics. Equally, our label is a selling point for the manufacturer and a good way of branding our name in Switzerland and Europe. The quality label was introduced in 1997 by Werner Rudin (see photograph). He retired in May 2009 and was followed by Pie Müller, a medical entomologist who worked for the Liverpool School of Tropical Medicine before moving to Basel. We thank Werner for his invaluable commitment and his devotion to the institute over 35 years.

Until the first half of 2009, a colony of the green bottle fly, Lucilia sericata has been reared and maintained for maggot therapy. The fly’s larvae debride wounds in clinical application and their secretions also help tissue regeneration. The unit provided larvae (maggots) of the fly in sterile bags to hospitals and clinics for maggot therapy. With the retirement of Werner Rudin our colony of L. sericata is no longer maintained at Swiss TPH and is now under the care of a private company (Entomos AG) that guarantees continuous supply of maggots. In addition to the green bottle fly, other insects, predominantly eggs of the yellow fever mosquito, Aedes aegypti, were mass produced and sold to both academia and industry from which large numbers of mosquitoes are reared, particularly for R&D of novel insecticide compounds and formulations.

Evidence-based clinical and diagnostic advice (© HP Marti).

Werner Rudin, well known for his high quality scientific work and for his numerous media commitments retired in early summer 2009 from the Institute.
Research in Public Health, Tropical and Travel medicine

H1N1-Influenza

A major activity of the department during 2009 was our involvement in the evaluation of a novel H1N1-vaccine and the deployment of mass vaccination. As one of European 12 centres of a randomised, single-blind, dose-ranging multi-centre study, we evaluated the immunogenicity, safety and tolerability of different formulations of adjuvanted and non-adjuvanted egg-derived and inactivated novel swine origin A/H1N1 monovalent subunit influenza virus vaccine in healthy subjects 18 or more years of age. The results showed satisfactory immunogenicity and reactivity results after one vaccination. Elderly groups had better tolerability, but met all three European Union Committee for Medicinal Products for Human Use (CHMP) criteria only after two doses.

Swiss TPH was subsequently designated as an official vaccination centre during the mass vaccination of the population of Basel. More than 3,000 people were vaccinated over six weeks, the majority of them at-risk patients with chronic diseases or their relatives and a substantial number of pregnant or post-partum women and their families. Two patients with H1N1 influenza were seen at the facility with the respective precautions.

Treatment of Cutaneous Leishmaniasis in Travellers

The broad availability of PCR allows a rapid determination of species. A species-specific treatment approach has been evaluated for many species and is widely applied in many centres. These treatment options need to be regularly adapted, integrating new knowledge and data. An update of the previous recommendations was recently published by our group. Initiated by the Swiss TPH, an international consortium of specialists is working on the harmonisation of the diagnostic and treatment standards for cutaneous leishmaniasis in travellers (TropNetEurop).

Vector Control

The main research objective of the Vector Control Unit is to contribute to the understanding of mosquito biology and the development of new tools for the control of mosquito vectors through bridging laboratory and field-based research. With the launch of Swiss TPH, national aspects are now also in the spotlight and, as part of a larger initiative together with the Institute of Parasitology (University of Zürich), an update on the distribution of potential disease vectors in Switzerland has been initiated. This and future projects also aim at building currently lacking capacity in medical entomology in Switzerland.

Neuropsychiatric Safety of Artesunate-Mefloquine in Acute Plasmodium Falciparum Malaria in Young Children

213 children treated for uncomplicated P. falciparum with artesunate/mefloquine were followed up for 2 months. Re-
Suits indicated that 50 neurological and neuropsychiatric adverse events occurred in 28 patients, thus in 3.8% of all patients. Sleeping and eating disorders were among the most common adverse events. All neurological and neuropsychiatric disorders resolved spontaneously. This study documented the neurological safety in African children treated with artesunate and mefloquine.

**HIV/AIDS Treatment Cohort in a Rural Tanzania Setting**

More than 5,000 patients have been enrolled since the start of the National Aids Control Program (NACP) at St Francis Designated District Hospital (SFDDH) from 2004 up to June 2010. All of those in need of an antiretroviral treatment (ART) began one. The supply of antiretroviral drugs (cART) was uninterrupted because the dispensing of them started at the new Chronic Disease Department Ifakara (CDDI). A study of more than 4,000 subjects focusing on HIV-testing behaviour before and after the National HIV testing campaign in 2008 showed an increase of HIV-positive subjects who presented at an earlier stage after the start of the campaign. This confirmed the lack of early testing, especially in rural areas where a large proportion of patients present with late-stage disease. (This was documented in an earlier study in the Kilombero District.) New research projects have been started to: (i) determine whether effective anthelmintic treatment delays the progression of HIV by engaging in an open-label, randomised clinical trial using specific anthelmintic drugs in HIV-positive patients; (ii) observe the clinical features of a cohort of HIV-positive subjects in the Kilombero District; (iii) assess resistance development and follow up in this rural setting; (iv) closely monitor the roll out of the National Aids Control Program campaign in two remote districts. Results are integrated into the teaching activities within the health facility and in different international courses. Supportive supervision services are offered to peripheral hospitals in two districts.

The Kilombero-Ulanga-Anti-Retroviral-Cohort (KIULARCO) will generate further data on clinical features and outcome, drug resistance and adherence to ART of patients attending CDDI and thereby expand our knowledge about the impact of the availability of cART in rural Tanzania.

**Studies on Cardiac Involvement in Human African Trypanosomiasis (T.gambiense)**

In Human African Trypanosomiasis (HAT), neurological symptoms dominate, and cardiac involvement has been suggested. Because of increasing resistance to the available drugs for HAT, new compounds are desperately needed. Evaluation of cardiotoxicity is one parameter of drug safety, but without knowledge of the baseline heart involvement in HAT, cardiologic findings and drug-induced alterations will be difficult to interpret.

ECGs of 406 patients with first stage HAT were compared to the ECGs of healthy volunteers (n=61) and to those of patients with second-stage HAT (n=56). In first and second stage HAT, a prolonged QTc interval, repolarisation changes and low voltage were significantly more frequent than in healthy controls. Cardiac involvement in HAT, as demonstrated by ECG alterations, appears early in the evolution of the disease. The prolongation of the QTc interval comprises a risk of fatal arrhythmias if new drugs with an additional potential of QTc prolongation will be used. During treatment, ECG abnormalities (such as repolarization changes, consistent with peri-myocarditis) occur frequently and appear to be associated with the disease stage, but not with a specific drug.

**Other topics**

- Malaria risk assessment and management of infection for travellers in various endemic countries.
- Adverse events of hepatitis A vaccination in travellers.
- Immunogenicity and safety of yellow fever vaccination in HIV-infected travellers.
- Defining risk incidence for travellers to endemic areas.
- Health risk perception of travellers attending the travel clinic.
- Surgical site infections in Subsaharan Africa.
- Efficacy and safety of anthelmintic treatment in tropical countries.
- Dermatological disorders in Subsaharan Africa.


**Collaboration:** M. Schiltknecht (Solothurn); S. Koch (Wohlen), M. Frei (Luzern); S. Frey, P. Weber (University Hospital Bruderholz, BL); M. Battagay, P. Häusermann, A. Widmer, M. Zellweger (University Hospital, Basel); R. Nüesch, (St. Anna Klinik, Luzern); B. J. Evison, R. J. Furrer, C. Fux, M. Täuber, S. Zimmerli (University Hospital, Bern); M. Funk, P. Lang, M. Muetsch, A. Navarini, F. Ruggieri, P. Schlagenhaus, B. Schönfeld, R. Steffen (University of Zürich); S. Abdulla, E. Chiwena, E. Ikongoli, B. Jullu, F. Kibatala, A. Magoda, E. and R. Mchomvu, E. Mossdorf, V. Mushi, E. Mwai-gomole, H. Urassa (Ifakara Health Institute and St. Francis Designated District Hospital, Ifakara)
1. Teaching at the University of Basel

The Swiss Tropical and Public Health Institute (Swiss TPH) is an Associated Institute of the University of Basel. There are 27 Swiss TPH scientists with teaching responsibilities in the university. The majority are part of the Faculty of Sciences and the Faculty of Medicine and some are part of the Faculty of Arts and Humanities (see list). Swiss TPH collaborators are teaching in the macro-focus “Life Sciences”, in the new biology curriculum and in the old and new curriculum in medicine. Our contributions to university teaching have increased tremendously over the years, in part because of the integration of the former Institute of Social and Preventive Medicine (ISPM).

From the beginning, Swiss TPH has been heavily involved in the development and implementation of the new biology curriculum at the University of Basel: for the Bachelor’s degree we offer two courses in the first or second year (“Parasitologie & Parasitismus” and “Protozoologie”). Over the years, our 6-week block course “Infektionsbiologie und Epidemiologie” has attracted a high number of interested students: In 2009 30 students registered, and for the academic year 2010/11 more than 50 students announced their interest for this intensive course.

The three-semester Masters programme “Infection Biology and Epidemiology” includes thesis work in either epidemiology (population-based studies or desktop data analysis/modelling) or infection biology (laboratory work). A total of 26 students graduated in spring 2010 in this MSc programme (see inlet). In the MSc programme on Infectious Diseases, jointly run with the National University of Singapore, the Biozentrum of the University of Basel and the Novartis Institute for Tropical Diseases, a total of 15 students graduated between 2005 and 2009. In addition, through modules on epidemiology, medical anthropology and ecology, the Swiss TPH contributes significantly to the new MA in African Studies offered by the Faculty of Arts and Humanities. With the integration of the former ISPM, Swiss TPH is now a significant contributor to the teaching of the new and existing curriculum in medicine.

More than 140 students are enrolled in the PhD programmes in infection biology, medical parasitology, epidemiology and public health, including a PhD programme supported and implemented by the Swiss School of Public Health+ (SSPH+). During the last 2 years, 37 students have been awarded a PhD degree by the University of Basel, and several students completed an MD or DVM degree (see list).

2. Master in International Health – a Joint Programme with European, African, Asian and Central American Partner Institutes

For more than a decade, Swiss TPH has been offering a postgraduate programme, “Master of Advanced Studies in International Health” (MIH), which was accredited by the University of Basel in 2001. In 2007, the programme gained national accreditation by the “Organ für Akkreditierung und Qualitätssicherung der Schweizerischen Hochschulen” (OAQ) for the full period of seven years. It is a joint Masters degree programme in the field of international public health and is recognised and offered by nine European universities.

The MIH degree was established by an association that now comprises 31 institutions in 13 European and seven overseas countries (China, Indonesia, Mexico, South Africa, Tanzania, Thailand and Vietnam). All of them are members of the Network for Education in International Health (tropEd), of which Swiss TPH is a founder member. During the last two years, the institute has had representatives on the Execu-
tive Committee of the association (General Secretary) and in several task forces (e.g. Quality Assurance and Curriculum Development).

The aim of tropEd is to promote excellence in postgraduate education and training in international health. The curriculum of the Masters programme takes into account the change in emphasis in international health from a concentration on tropical medicine to a focus on public health issues. The course’s approach includes an exchange of ideas and resources (rather than the classical one-way transfer of knowledge) and encourages collaboration and coordination among institutions within Europe and between the northern and southern hemispheres.

At Swiss TPH, the programme begins with a mandatory core course “Health Care and Management in Tropical Countries” (see below). This is followed by a series of optional advanced modules, equivalent to about 14 weeks of full-time study. To enable students to broaden their experience and participate in different teaching and learning approaches, a substantial amount of optional modules must be taken outside the home institution. The course is completed with a project that leads to a dissertation, typically taking three to six months. The projects are often directly connected with the student’s professional work. The transfer of credits for courses taken in different places is regulated by the European Credit Transfer and Accumulation System (ECTS).

Most of the students enrolled in the MIH at Swiss TPH are senior professionals taking the programme part-time, which allows them to finish their study within a period of five years.

The Information and Documentation Centre

The information and documentation centre is a vital link in the dissemination of scientific information. The integration of the collection of the former Institute for Social and Preventive Medicine brought the library an important additional stock of literature in Public Health. There is a growth in the need for services that rely on electronic resources, such as online data sources, library catalogues, scientific databases, electronic journals and many more. The library team, which has grown to four members, offers assistance, guidance and training for students and other users. The team organises the publications and maintains the website of the Institute. The library not only serves scientists in Switzerland, but it is also actively engaged in assisting partner institutions in the South to increase their library services.

Knowledge Management and eLearning

A Knowledge Management (KM) group is also part of Teaching and Training at the Swiss TPH and is operational both within the institute and in external projects. KM at the Swiss TPH reflects a holistic approach that provides all staff members with the information and knowledge they need to perform to the highest standards. It incorporates new technologies, such as document management systems.

Externally, the Swiss TPH is currently responsible for the KM component of the EU FP7 project, accessing medicines in Africa and South Asia (AMASA) and designing and implementing an information repository within the Mother and Child Health programme in Ukraine.

The development, implementation and application of eLearning programmes has been part of the Swiss TPH teaching and training activities for nearly a decade. Educational software for the bachelor course on infection biology and parasitology is available in German and English (www.infektionsbiologie.ch). For example, the Cholera Outbreak Training and Shigellosis (COTS) programme was developed and implemented with experts from ICDDR,B in Dhaka, Bangladesh. The COTS programme is a “to the point” guide to managing cholera and shigellosis outbreaks. It is distributed on CD-ROM and was funded by the US Office of Foreign Disaster Assistance (OFDA), a division within USAID responsible for facilitating and coordinating US government emergency assistance overseas. “Introduction to Diagnostic Medical Parasitology” is a training program using a virtual microscope, and it was created at the Swiss TPH. This software allows beginners to gain experience in diagnosing the most important helminth and protozoan diseases of humans. Students can gain basic knowledge through short overviews of parasites, diseases, diagnostic methods and strategies. Even more important, they can train their diagnostic capabilities using a virtual microscope. The learning programme is accessible free over the Internet, and it can be explored by everyone interested in the diagnosis of parasite infections (http://www.parasite-diagnosis.ch).

Another important activity in the field of eLearning is the East African Telemedicine and eLearning Network (EATEN), a team effort between the Swiss TPH, the Novartis Foundation for Sustainable Development and the Tanzanian Training Centre for International Health (TTCH) in Ifakara, Tanzania. eLearning modules were developed in close cooperation with our Tanzanian partners to improve the training of assistant medical officers. This project is part of the eHealth strategy of the Swiss TPH.
At present, 95 students are enrolled in the MIH programme at the University of Basel, and 16 completed the programme during the report period. Because the tutorial support for these students requires a large investment of time, the Swiss TPH has limited the number of places available in the programme. As a result, the selection of candidates is highly competitive.

3. Swiss TPH Postgraduate Courses

The Swiss TPH offers a large range of courses for health professionals who wish to prepare themselves for work in public health at the national or international level. All of the courses encourage a student-centred learning approach, so *ex cathedra* lectures have been largely replaced by a broad spectrum of teaching methods, including group work and presentations, field exercises, laboratory practices, visits, round-table discussions, seminars, demonstrations and tutorials.

Facilitators come from within the Swiss TPH, from other institutions of higher education and from international organisations. Most of them have had substantial experience working in countries where resources are limited. The involvement of teachers from the South is promoted, and former course participants are invited to participate in the teaching. The courses are taught in English.

Health Care and Management in Tropical Countries (HCMTC)

The focus of this annual three-month course is public health, particularly from the perspective of working at a district level. The course is designed for people who already have a first qualification in a health-related profession and at least two years of working experience. Scholarships are offered by the Swiss Agency for Development and Cooperation (SDC) and the Canton of Basel-Stadt to participants from countries with resource constraints; thus around half of the maximum of 30 participants can be invited from countries in the South or from the former Soviet bloc. With participants coming from so many backgrounds, the course offers an exciting inter-cultural teaching and learning setting. The course is accredited by tropEd and the University of Basel as a core course for the MIH degree. After successful completion, participants receive the diploma “University Professional – Health Care and Management in Tropical Countries”.

Short Courses

The Swiss TPH offers several self-contained short courses. Most of these are accredited by the University of Basel as postgraduate certificate courses and by tropEd as optional advanced modules which can be taken by MIH students to obtain credits. The courses are also open to other suitably qualified candidates. Besides the courses listed below, some modules of the HCMTC can be taken as independent courses. Some of these are accredited as modules for the Master of Public Health (MPH) degree of the Swiss universities of Bern, Basel and Zürich. Between 150 and 200 health professionals are participating in these courses each year.

Health District Management

Swiss TPH offers two two-week courses on this topic: *Planning and Programme Design* and *Priority Setting and Resource Allocation*. The first course is a realistic simulation of a programme design process, using the logical-frame-
work approach and other tools for strategic management. For this very intensive course, each group of five to six students has a facilitator. Former high-performing participants — mostly from countries in the South — have joined the faculty for this course as facilitators over the last few years.

In the second course, students try to plan a rural health district with all of its facilities and services. Rapid feedback on the appropriateness of resource allocations is given from a computer programme, the “Health Resource Allocation Model”, developed by the Swiss TPH. In addition, students define burdens of disease for a case study linking population health needs with the health system, applying computer-based applications to allocate an optimal mix of resources to incrementally scale-up coverage for these interventions. Due to the high demand for this topic, a combination of the above two courses is also run as a three-week course at the Tanzanian Training Centre in International Health (TTCIH) in Ifakara, Tanzania.

Clinical Priorities in Tropical Countries

The three-week course on clinical tropical medicine for medical and paramedical personnel takes place in the St Francis Designated District Hospital, in Ifakara, and in the Amana Hospital, Dar es Salaam, Tanzania. The course combines new teaching methods, recent scientific knowledge and medical practice with limited resources into a new form of education for medical professionals working at the district level in developing countries. The interaction between academic staff and practitioners from the North and South facilitates knowledge exchange among everyone involved, benefiting not only the course participants but also the local hospital staff, who are incorporated into the teaching process. The course is unique because it combines theoretical knowledge directly with the reality of a hospital in a country with severe resource constraints.

Travellers’ Health

This one-week course provides up-to-date information on tropical diseases and their medical treatment. It is mainly designed for participants from industrialised countries who need to provide travellers with reliable information and advice, and who must assess travel-related problems that occur in patients who have returned from tropical countries.

Rational Medicine Management – A Focus on HIV/AIDS, Tuberculosis and Malaria

The aim of this two-week course is to enable health professionals to understand and apply the concepts and principles of essential medicines and rational medicines management. Lectures from renowned international experts demonstrate the need for national and international drug policies. In the past, the course took place at TTCIH in Ifakara, Tanzania. In 2010, the course venue will be at the Department of Pharmacy of the Medunsa Campus (previously the Medical University of Southern Africa), Pretoria, South Africa.

Bayesian Disease Mapping in Epidemiology and Public Health

This two-week course is intended for researchers working in the field of epidemiology and public health, statisticians, geographers and planners who deal with spatial data. It gives a comprehensive introduction to Bayesian spatial modeling. Participants are also introduced to remote sensing and geographical information systems (GIS) in order to extract environmental predictors from satellite sources, process satellite data and map raw data as well as model-based predictions. The course was run for the first time in summer 2010.

The General Tropical Course

The eight-week “Allgemeine Tropenkurs” is open to any student interested in tropical countries and in the problems of development. In its new form, this course is held as two independent blocks of four-weeks each. It provides an overview of global economic, ecological, cultural, geographical and social relations and their influence on the lives of people in tropical countries. The Swiss TPH also contributes to a series of one-day preparation courses run by the foundation “cinfo” for people going to work in the tropics.

4. Other Teaching and Training Activities

Members of the Swiss TPH staff also have teaching appointments in universities other than Basel, and they supervise
Teaching and Training

SECTION 25

It would be too difficult to provide a comprehensive list of the formal and informal teaching and training activities in which Swiss TPH staff are involved in Basel and elsewhere. Almost any project involves elements of on-the-job training. For example, the Swiss TPH participates in the practical training of graduate research assistants (ATA) and medical laboratory technicians. In addition, it offers courses in Basel and elsewhere on the “Diagnosis of Human Pathogenic Parasites”.

Continuing education in tropical and travel medicine for Swiss medical doctors has been offered for many years. Since 2002, the Swiss TPH has been recognised by the Swiss Association of Pharmacists (FPH) as an official provider of continuing and postgraduate education. Around 50 one-day courses in the fields of pharmaceutical competence, management, epidemiology and public health are offered on a regular basis each year.

Members of the teaching and training unit are organising and implementing training courses at the request of donors, ministries, etc., in Vanuatu and the Solomon Islands. In addition they teach also in various tropEd partner institutions.

5. The Swiss School of Public Health+ (SSPH+)

Seven universities (Basel, Bern, Geneva, Lausanne, Lugano, Neuchâtel and Zürich) established a cooperation in public health and health economics, which has become a foundation funded by the Swiss government. The Swiss TPH represents the University of Basel in this venture. The role of SSPH+ is to facilitate exchange, collaboration and networking between the various programmes and to promote the development of new training programmes. The Swiss TPH is represented on the school board and in the extended management group of SSPH+.

One common activity of SSPH+ is the Summer School in Public Health Policy, Economics and Management, where Swiss TPH is represented in the Academic Advisory Board and in the Organisational Committee. Operating for two weeks, the Summer School, which changed its venue from Ascona to Lugano in 2009, offers up to eight courses in Public Health Policy and Management. Through SDC scholarship funds, which are administered by Swiss TPH, 25–30 health professionals from Albania, Belarus, Bosnia-Herzegovina, Kyrgyzstan, Northern Caucasus, Moldova, Tajikistan and Ukraine bring their experiences in the management of health systems. Several Swiss TPH colleagues teach each year in these courses.

### Staff members responsible for Swiss TPH courses

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axel Hoffmann</td>
<td>Head of unit, course co-ordinator (MIH, advanced modules, FPH courses, tutoring MIH students, representative in SSPH+, MPH-CH and tropEd)</td>
</tr>
<tr>
<td>Bernadette Peterhans</td>
<td>Course co-ordinator (HCMTC, advanced modules, tutoring MIH students, representative in tropEd)</td>
</tr>
<tr>
<td>Christoph Hatz</td>
<td>Co-ordinator curative modules</td>
</tr>
<tr>
<td>Peter Odermatt</td>
<td>General Tropical Course and in MMS, tutoring MIH students courses in parasitology and for Cinfa</td>
</tr>
<tr>
<td>Hanspeter Marti</td>
<td>Courses in parasite diagnosis</td>
</tr>
<tr>
<td>Karin Wiedenmayer</td>
<td>Courses for FPH, Rational Medicine Management</td>
</tr>
<tr>
<td>Gaby Gebler</td>
<td>Courses for FPH</td>
</tr>
<tr>
<td>Annamaria Fahrlander</td>
<td>Co-ordinator for the Summer School Lugano</td>
</tr>
</tbody>
</table>

### Course secretariat

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yvonne Gilgen</td>
<td>Organisation and student administration of advanced optional modules (tropEd), ATK and courses in parasite diagnosis</td>
</tr>
<tr>
<td>Christine Mensch</td>
<td>Organisation of BSc and MSc in Infection Biology and Epidemiology and for the joint master, student administration for BSc, MSc and PhD students</td>
</tr>
<tr>
<td>Erna Schäfer</td>
<td>Organisation and student administration of HCMTC and advanced optional modules (tropEd); modules for the Swiss MPH programme</td>
</tr>
<tr>
<td>Doris Stamm</td>
<td>Organisation of BSc in Infection Biology and Epidemiology, student administration for BSc and MD students</td>
</tr>
<tr>
<td>Antoinette Zen-Ruffinen</td>
<td>Organisation and student administration of advanced optional modules (tropEd), FPH, student issues in MIH</td>
</tr>
<tr>
<td>Rachel Gutknecht Nilly</td>
<td>Organisation of modules for the Swiss MPH programme</td>
</tr>
</tbody>
</table>

### Responsible course co-ordinators for modules in the Swiss MPH programme

<table>
<thead>
<tr>
<th>Name</th>
<th>Module</th>
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</thead>
<tbody>
<tr>
<td>Charlotte Braun-Fahländer</td>
<td>Evidence from Interventions in Public Health</td>
</tr>
<tr>
<td>Christian Lengeler</td>
<td>Umwelt und Gesundheit</td>
</tr>
<tr>
<td>Charlotte Braun-Fahländer</td>
<td>Statistische Methoden zum Umgang mit Confounding und Interaktionen in epidemiologischen Studien</td>
</tr>
<tr>
<td>Martin Rössli</td>
<td>Health Systems and Services in International Comparison</td>
</tr>
<tr>
<td>Christian Schindler</td>
<td>Genetische Epidemiologie: hier und heute</td>
</tr>
<tr>
<td>Kaspar Wyss</td>
<td>Strategisches Projektmanagement</td>
</tr>
<tr>
<td>Nicole Probst-Hensch</td>
<td>Reproductive and Child Health</td>
</tr>
<tr>
<td>Axel Hoffmann, Bernadette Peterhans, Claudia Kessler, Bernadette Peterhans, Marcel Tanner, Don de Savigny</td>
<td>Priority Setting and Resource Allocation</td>
</tr>
</tbody>
</table>
Completed PhD

Alba Sandra (12.03.2010): Evaluating integrated interventions to improve access to malaria treatment in Tanzania

Aye Rafaela (26.06.2009): Determinants of household cost and access to care for tuberculosis in Tajikistan

Béchir Mahamat (11.03.2010): Etude épidémiologique de la malnutrition en milieu nomade au Tchad; diagnostiques et approche d’interventions

Christen Andri (25.03.2009): BoliviaWET – Impact of solar water disinfection (SODIS); Experience from a community randomised trial

D’Acremont Valerie (29.04.2010): Understanding and improving malaria diagnosis in health facilities in Dar es Salaam, Tanzania

Dahl Benjamin (30.04.2009): From sentinel surveillance for sleeping sickness treatment failure to the development of a pharmacovigilance approach

Dongus Stephan (31.3.2009): Urban agriculture and operational mosquito larval control: Mitigating malaria risk in Dar es Salaam, Tanzania

Durán Gonzalo (11.06.2009): Analysing cluster randomised trials with count data by frequentist and bayesian methods. The BoliviaWET trial: Assessing the effect of SODIS on childhood diarrhoea

Falk Nicole (17.12.2008): Var gene diversity and their serological recognition by naturally exposed individuals


Frei Patrizia (26.04.2010): Persönliche Exposition gegenüber hochfrequenten elektromagnetischen Feldern und mögliche Auswirkungen auf die Gesundheit

Hodel Eva Maria (20.10.2009): The effects of pharmacogenetics on pharmacokinetics of artemisin-based combinations in malaria patients

Jans-Glass Tracey (04-07.2010): Epidemiology and impact of adherence to antiretroviral therapy on clinical outcomes in HIV-infected individuals: results from the Swiss HIV cohort study

Khatib Rashid (03.12.2009): Malaria control dynamics in rural Tanzania: Evaluation of implementation of Artemisinin antimalarial combination therapy

Knopp Stefanie (01.04.2010): Diagnosis, epidemiology and control of soil-transmitted helminth infections in Zanzibar, Tanzania

Küpper Irene (30.04.2009): Improved melarsoprol therapy for Trypanosoma brucei rhodesiense sleeping sickness

Mak Tippi (02.02.2009): Evidence and guidance on vaccine safety and effectiveness in sub-populations

Manzi Fatuma (27.02.2009): The development and implementation of a public health strategy – Cost and health system analysis of Intermittent Preventive Treatment in Infants


Mwifadhi Mrisho (17.09.2008): Neonatal survival in rural Tanzania: Home deliveries, neonatal mortality and subsequent help and health seeking behaviour for the newborn by mothers in rural Tanzania

Oberle Michael (11.06.2009): Crossovers between Trypanosoma brucei and the Tsetse fly

Ong Swee Hoe (28.5.2009): Molecular epidemiology of Dengue viruses from Complete Genome Sequences

Plüss Bianca (02.06.2009): Malaria control: generating evidence from local to global level

Santosh Karvande, Shilpa (29.04.2009): Process of couple communication in reproductive health among rural married couples in India

Sarica Jansmin (06.11.08): System-level metabolic effects of trematode infections in rodent models

Sayasone Sompou (25.06.2009): Epidemiology and morbidity of food-borne trematodiasis in Lao PDR with particular consideration to opisthorchiasis

Schäfer-Keller Petra (08.09.2008)): Patient self-management in kidney transplantation, definition, measurement, and intervention

Schöpflin Sonja (25.06.2009): Infection dynamics of F. falciparum in Papua New Guinea

Schröter, Maria (15.09.2008): Rationing of Nursing Care: Associations with Patient Safety and Quality of Hospital Care

Schütte Daniela (26.09.2008): Approaches to improve treatment and early diagnosis of Buruli ulcer, the role of local and systemic immune responses

Tedeschi Fabrizio (09.11.09): Simulation of the spread of droplet-transmitted diseases

Tschopp Rea (10.12.2008): Bovine tuberculosis in Ethiopian local cattle and wildlife: Epidemiology, economics and ecosystems

Vanner Miriam (28.01.2010): Evaluation of national interventions to promote physical activity in Switzerland with a focus on Internet-based approaches

Weibl Daniel (20.02.2009): Health and demographic surveillance in Sahelian mobile livestock production systems

Yukich Joshua (26.06.2009): Costs and consequences of malaria control in sub-Saharan Africa: the economics of vector-control and parasitological diagnosis

Completed MSc in Infection Biology and Epidemiology

Abdulsalama Akaiyat: Prevention and control of HIV/AIDS in Jordan, and its socio-cultural aspects among Jordanians at work site

Adelbert Nadine: Interactions between Trypanosoma brucei strains in vitro

Amegah Julius Kwabena: Staffing of Ghana National Malaria Control Program and Malaria Control Implementation from 2000 to 2008

Anderegy Claudia: Routine malaria monitoring in children under five years in Tanzania

Barnabas Ester: Humoral immune response elicited against the synthetic malaria peptides UK-39 and AMA-1 after vaccination of malaria semi-immune volunteers in Bagamoyo, Tanzania

Baima Krischan: Persistence of a clonal complex of serotype 1 Streptococcus pneumoniae in Northern Ghana and Burkina Faso

Bhardawaj Naveen Shivani: Care seeking pattern of fever and malaria patients in India – Literature review

Bolz Miriam: Local immune response in Buruli ulcer patients

Brancucci: The role 5’ untranslated regions in epigenetic regulation of Plasmodium falciparum var genotypes

Croll David: Social mixing patterns relevant to the spread of droplet-transmitted diseases

Diboulo Eric: Geographical information (GIS)/Global database of malaria vector biometrics

Dietz Olivier: Characterisation of novel nuclear proteins in Plasmodium falciparum

Edelmann Simone: Validation of chemically synthesised peptide 90 (P90) malaria vaccine candidate in a comparative analysis with recombinantly expressed PfDQ0200

Ferrario Alessandra: Determinants of Child Survival Disparities in Tanzania: A National Census Analysis

Forrer Armelle: Spatial risk factor analysis and risk mapping of Opisthorchis viverrini infections in the Champasack province, rural southern Laos

Fugel Matthias: Mode of action of Artemisinin and OZ277 (RBx-11160) and New Calorimetric method to determine onset of action and stage specificity of a selection of antimalarials

Ghizbani Heny: Analytical investigation of 4 Tanzanian plans for implementing Artemisin-based combinations in malaria control in Tanzania

Graf Fabrice: Molecular mechanisms of drug resistance in Trypanosoma brucei rhodesiensis

Gumi Donde Balako: Prevalence of tuberculin reactions in pastoral cattle herds in the Oromia region, Southern Ethiopia

Haefiger Nicolas: Quantification and comparison of common health risks in Switzerland

Completed PhD at other Universities


Students awarded degrees from September 2008 to August 2010

Cost and health system analysis of Intermittent Preventive Treatment in Infants


Mwifadhi Mrisho (17.09.2008): Neonatal survival in rural Tanzania: Home deliveries, neonatal mortality and subsequent help and health seeking behaviour for the newborn by mothers in rural Tanzania

Oberle Michael (11.06.2009): Crossovers between Trypanosoma brucei and the Tsetse fly

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Schöpflin Sonja (25.06.2009): Infection dynamics of F. falciparum in Papua New Guinea

Schröter, Maria (15.09.2008): Rationing of Nursing Care: Associations with Patient Safety and Quality of Hospital Care

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Yukich Joshua (26.06.2009): Costs and consequences of malaria control in sub-Saharan Africa: the economics of vector-control and parasitological diagnosis

Ghizbani Heny: Analytical investigation of 4 Tanzanian plans for implementing Artemisin-based combinations in malaria control in Tanzania

Graf Fabrice: Molecular mechanisms of drug resistance in Trypanosoma brucei rhodesiensis

Gumi Donde Balako: Prevalence of tuberculin reactions in pastoral cattle herds in the Oromia region, Southern Ethiopia

Haefiger Nicolas: Quantification and comparison of common health risks in Switzerland
Haggenmüller Yolanda: Development and validation of an in vitro drug screening assay based on S. mansoni schistosomula
Hug Melanie: Analysis of trafficking signal and function of Plasmodium falciparum MAHRP1
Karabulut Fatma: Microbial source tracking with Vibdobacteria, rhodococi and multiresistant Escherichia coli to discriminate faecal contaminations of human and animal origin in drinking water
Knoblauch Astrid: Analyse de la dynamique et des caractéristiques des points de vente des préparatifs au Cameroun et en République Centrafricaine
Kopp Nadja: Immunochemistry characterisation of cross-reactive antibodies induced by a BDA6 epitope
Lenz Nicole: Parasite-Density Dependent expression of the Plasmodium falciparum protein PDCP during asexual stage development
Lottner Jeanne: Tanzania Malaria Indicator Surveys 2001–2008: Morbidity Indicators and Coverage of Major Malaria Prevention and Control Interventions
Luedin Samuel: Characterisation and evaluation of malaria blood stage vaccine candidates P27 and P27A
Majic Ivana: In vitro and in vivo activity of Daptomycin against implant-associated Enterooccus faecalis infections
Moes Charles: Recombinant protein expression for the generation of monoclonal antibodies
Muffler Angelika: Development towards a new Hepatitis C Virus Bioassay
Mwosu Uzoma: In vitro Activity of Tribendimidine and 1st Metabolites, PF1022A in Comparison to Marketed Drugs Against Heligmosomoides polygyrus
Perera Dushan: Chapter I: Identification of data gaps pertaining to Salmonella enterica serovar paratyphi A in medium HDI countries between 1984–2009/Chapter II: Perivascular origin of follicular dendritic cells
Puller-Giger Andreas: Characterisation of novel nuclear proteins in Plasmodium falciparum
Quaye Stephen: A wave of Serogroup A, ST2859 Neisseria meningitidis colonisation in the Kassena Nankana District of Northern Ghana
Riedel Nadine: Geographical patterns and predictors of parasitaemia risk and haemoglobulin levels: model-based mapping using the Zambia malaria indicator survey data
Röltgen Katharina: Genetic diversity of Mycobacterium ulcerans
Rupinski Bryan: Emergence of Serogroup A, Sequence Type 2859 Neisseria meningitides in West Africa
Schwaller Silvia: Environment change in Harena Forest, Bale Mountains National Park, Ethiopia
Seitz Patrick: Localisation, mode of action and target identification of a new antimalarial compound
Speich Benjamin: Costs and cost-effectiveness of the FLOTAC and Kato-Katz technique for the diagnosis of low-intensity soil-transmitted helminth infections in Zanzibar, Tanzania
Tafah Ngwi: Estimation of underreporting of anfrax in humans and livestock in Africa: Case study, Mali
Thoyray Chantal: Testing of a new in vitro method to evaluate antimalarial activity and in vitro stage sensitivity of Plasmodium falciparum to OZ439 and QN254
Urbinello Damiano: Hepatitis B vaccination of healthcare workers: A seroepidemiological retrospective analysis in Switzerland
Wüst Rolf: Establishment of an in vitro model to study drug transport across the blood-brain barrier to facilitate the selection of compounds for 2nd stage human African trypanosomiasis
Ziegelbauer Kathrin: Assessment of the self-rated quality of life and changes therein following intestinal helmint control interventions in Yunnan Province, China
Completed Joint MSc in Infectious Diseases, Vaccinology and Drug Discovery
Bela-Ong Dennis: Cellular immune responses of dengue patients in Singapore
Bratschi Martin: Discovery of host lipid biomarkers for tuberculosis infection in mice
Müller Christla: Regulation of the branch point between the glyoxylate shunt and the TCA cycle in mycobacteria
Murima Paul: Diagnostic expression profiles for mechanism of inhibitor action in mycobacteria
Pang Vincent: FRMD4A regulates the entry of west nile virus into biloablastoma cells
Quek Boon Zhi: Essentially of acyl-CoA carboxylases in mycobacterium
Rao Martin Vijayakumar: Understanding the physiological role of cofactor F420 in mycobacterium
Song Zhengying: Amino acid substitutions in the epstein-barr virus associated oncoproteins latent membrane protein 1 impact upon the immunogenicity of nasopharyngeal carcinoma cells
Yap Peiling: I. Mechanic studies of anti-malarial spiroindolones and II. Synthesis and structure-activity relationship studies of an inhibitor of dengue proliferation
Completed MSc in Pharmacy
Ludwig Nicole: Epidemiology and treatment of human African trypanosomiasis in children
Blumenth Petra: Feasibility of NECT treatment for HAT under field conditions in rural health structures of the Democratic Republic of the Congo
Completed MPhil (Master of Advanced Studies in International Health)
Capone, Susanna: Quantitative analysis of medical morbidity and mortality at Saint Camille Rural District Hospital, Nanoro, Burkina Faso (November 2009)
Dégloise, Carole: SMS for the control of communicable and non-communicable diseases in developing countries: a systematic review (September 2009)
Evard, Brigitte: Health seeking behaviour of “Gypsy and Traveller” women in South Finistère, France: an assessment focusing on maternal health prevention (June 2010)
Gertler, Maximillian (Erasmus Mundus): Practical implementation of a clinical trial in a resource-poor country: from a systematic evaluation of ProCort 1 – Clinical Trial to a general checklist of dos and don'ts for the support of independent and autonomous local research teams (November 2009)
Greutelears Benedikt (Erasmus Mundus): The impact of malnutrition on the efficacy of malaria treatment in children (April 2010)
Gross, Corina: Health needs of undocumented migrants and main barriers to health care: a qualitative study of undocumented migrants’ health coverage in the Zürich area (September 2009)
Haas, Christine: Mainstreaming HIV and AIDS: experiences of a learning process on HIV and AIDS within German Red Cross: the influence of a HIV competence programme on attitudes ans priority setting among key staff in development and relief work (October 2009)
Jost, Marianne: Multidrug-resistant tuberculosisis in Manila, Philippines: effect of treatment interruptions on treatment outcomes: factors leading to treatment interruptions and default (October 2008)
Krüger, Gabriele: A critical appraisal looking at traditional birth attendants: their potential impact on the health of mothers and newborns in developing countries and the policy on traditional birth attendants (September 2009)
Labhardt, Niklaus Daniel: Task shifting to non-physician clinicians for integrated management of hypertension and diabetes in rural Cameroon: a programme assessment at two years (June 2010)
Ovando, Ivan (Erasmus Mundus): Participatory appraisal of the illness experiences and health needs of families affected by sickle cell disorders in Benin (October 2008)
Schmid, Gerhard: Quality assessment of the safe motherhood programme in rural Tanzania the case of Rufiji District (July 2009)
Sterk, Esther: Filovirus haemorrhagic fever: a comparison between supportive treatment regimes provided in Western medical settings and resource-poor outbreak settings in sub-Saharan Africa (July 2009)
Ternes, Peter: HIV/AIDS Vulnerability in Most at Risk Population in Sylhet City, Bangladesh (August 2010)
Van Ooyen, Sara: What are the bottlenecks of access to Highly Active Antiretroviral Therapy in the Democratic Republic of the Congo? The example of Kisantu, a semi-rural health zone in Bas-Congo province (August 2010)
Biostatistics and Computational Sciences


Ecosystem Health Sciences


Publications


Environmental Epidemiology and Risk Assessment


Publications

Environmental Exposure Sciences


Gender and Health


Health Interventions


Genton B & Loutan L (2009) [Good access to health care or access to good health care?]. Rev Méd Suisse Rom 5, 995–996.


Publications


Health Social Sciences


Health Systems


**Human and Animal Health**


Gene Regulation


Helminth Drug Development


Publications


Molecular Immunology


Parasite Chemotherapy


Wang X, Creek DJ, Schlaffo CE, Dong Y, Chollet J, Scheurer C, Wittlin S, Charman SA, Dussault PH, Wood JK & Vennerstrom JL (2009) Spirodo-mantyl 1,2,4-trioxolane, 1,2,4-trioxane, and 1,2,4-trioxepane pairs: relat-ionship between peroxide bond iron(II) reactivity, heme alkylating ef-ficiency, and antimalarial activity. Bioorg Med Chem Lett 19, 4542–4545.


The Swiss Centre for International Health (SCIH)


Tuberculosis Research


Publications

Tuberculosis Research


Medicines Research


Medical Services and Diagnostic (MEDIQA)


Publications


Teaching and Training


**Further activities**

**Positions and functions of Swiss TPH staff in other institutions, organisations, foundations and review teams**

### Switzerland

**AGUASAN-Gruppe: D. Mäusezahl**

**Aidsfocus Switzerland: Steering Committee, K. Molesworth**

**Arbeitsgruppe Klima und Gesundheit (Bundesamt für Gesundheit): J. Utzinger, C. Braun-Fahrländer, M. Tanner**

**Art for the Tropical Forests: M. Tanner**

**Basel Biometrics Society: P. Vounatsou (Board Member)**

**Basel Institute for Clinical Epidemiology: Scientific Advisory Board, M. Tanner**

**Basler Stiftung für experimentelle Zoologie: R. Brun (Chair)**

**Calcutta Project: Board, K. Molesworth**

**Commission of the Natural History Museum Basel: Board, M. Tanner**

**Competence Center Environment and Sustainability of the Federal institute for Technology, Zurich, ETHZ, External review Board: M. Tanner (Chair)**

**Cooperation Unit, Federal institute of Technology Lausanne, EPFL – Vice Presidency for Institutional Affairs & UNESCO Chair in Technologies for Development: External Review Board, M. Tanner (Chair)**

**Coordination Committee Swiss Society of Microbiology: H. Marti**

**E. Guggenheim-Schnurr Stiftung, Basel: R. Brun**

**Erweiterte Studienleitung Master of Public Health: M. Rööslí**

**Expert advisor for parasitology for the Swiss Centre for Quality Control (CSCQ): H. Marti**

**Expert Committee for Travel Medicine: C. Hatz (Chair); Committee, B. Genton**

**Federal Commission for Air Quality (Eidgenössische Kommission für Lufthygiene – EKL): N. Künzli**

**Foundation Biobank Suisse: N. Probst-Hensch (Member Foundation Council)**

**Freie Akademische Stiftung, Basel: R. Brun**

**GUMEK (Federal Expert Committee on Law on Genetic Testing in Humans): N. Probst-Hensch**

**IAMANEH Switzerland: Board, M. Tanner**

**Ipsilon – Initiative for the Prevention of Suicide in Switzerland: Research Group, M. G. Weiss**

**Jubilee Foundation of the STI: M. Tanner (President), C. Hatz**

**Master of Public Health (MPH) Programme, Universities of Basel, Bern, Zurich: M. Tanner, A. Hoffmann, E. Zemp**

**NADEL (Nachdiplomstudium für Entwicklungsländer), ETH Zürich: C. Lengeler, P. Odermatt, J. Pelikan, M. Störmer, J. Utzinger, K. Wyss**

**Nationale Expertenkommission für das MD PhD Programm der SAMW: C. Braun-Fahrländer**

**Organe consultatif sur les changements climatiques de la Suisse: C. Braun-Fahrländer**

**PharmaCenter (interdisciplinary center for excellence in pharma sciences), Basel: C. Burri (Executive Board)**

**Public Health Switzerland: N. Probst-Hensch (Member of Directorate; President Scientific Committee)**

**R. Geigy Stiftung, Basel: M. Tanner (President), G. Pluschke**

**Stiftung Gesundheit und Gerechtigkeit: G. Pluschke**

**Stipend Commission for Students from Developing Countries of the Canton of Basel-Stadt: M. Tanner**

**Swiss Cancer, Expert Committee Colorectal Cancer: N. Probst-Hensch**

**Swiss Cohort Study on Air Pollution and Lung Diseases in Adults (SAPALDIA): L.-J. Sally Liu (Directorate Member)**

**Swiss Commission for Research Partnership with Developing Countries (KFPE): M. Tanner (Co-chair)**

**Swiss Development Cooperation; Humanitarian aid; Zoonoses Intervention group (AG ZOD): E. Schelling, J. Zinsstag**

**Swiss Forum for Epidemiology and Animal Health: Board, E. Schelling**

**Swiss Foundation for sexual and reproductive health, PLANeS: E. Zemp (President)**

**Swiss Gender Health Research Network: E. Zemp (President)**

**Swiss Health Promotion: N. Künzli, (Scientific Board; Wissenschaftlicher Beirat “Gesundheitsförderung Schweiz”)**

**Swiss Malaria Group: C. Lengeler**

**Swiss Public Health Society: N. Künzli (Scientific Board)**

**Swiss School of Public Health: Board, M. Tanner; Extended Management Board, A. Hoffmann, C. Braun-Fahrländer**

**Swiss Society for Public Health: Global Health Focus, N. Lorenz (Group Leader)**

**Swiss Society of Public Health: J. Dratva (Directory Board Member)**

**Swiss Society of Tropical and Travel Medicine FMH: Ch. Hatz (President), J. Blum (Prüfungskommission)**

**Swiss Society of Tropical Medicine and Parasitology: C. Lengeler (President), Committee, D. Mäusezahl**
Further activities

Swiss Working Group on Travel Medicine: C. Hatz (Chair); Committee, B. Genton
Swissmedic Human Medicine Expert: B. Genton
Transdisciplinarity-Net/Swiss Academy of the Natural Sciences: E. Zemp (Scientific Board)
UBS-Optimus Foundation Board: M. Tanner
University Hospital Basel and University Basel; Clinical Research Center: N. Künzli (Chair Planning Commission)
University Professional in Insurance Medicine UPIM, University of Basel: E. Zemp (Member of Directorate)
Vétérinaires sans Frontières Suisse: Board, J. Zinsstag

International

ABIME (American Board of Independent Medical Examiners): E. Zemp (Board of Advisors)
ASPHER subcommittee on doctoral education: C. Braun-Fahrländer
ATS Environmental and Occupational Health Assembly Project Novel risk factors and the global burden of COPD: N. Künzli (Appointed Member)
Barcelona Centre for International Health Research (CRESIB), Scientific & Technical Advisory Committee: M. Tanner (Chair)
Bill & Melinda Gates Foundation IPTi-Consortium: Executive Committee, M. Tanner
Bill & Melinda Gates Foundation Malaria elimination R&D agenda: M. Tanner (Co-chair), D. de Savigny, C. Lengeler, T. Smith
Bill & Melinda Gates Foundation: Expert Oversight Committee ACT-Consortium, M. Tanner (Chair)
Bill & Melinda Gates Foundation: External Scientific Advisory Group for Innovative Vector Control Consortium (IVCC), C. Lengeler
Concept Foundation: Board, C. Kessler
Consortium for Parasitic Drug Development: Governance Council, M. Tanner
COSMOS (prospective cohort study of mobile phone users): Advisory board of the Swedish, M. Röösli
Cyprus International Institute for Environmental and Public Health (CII): Science Advisory Board, N. Künzli (Member)
Drug Discovery for Tropical Diseases Initiative, University of Dundee: Scientific Advisory Committee, C. Burri
Drugs for Neglected Diseases Initiative (DNDi): Board of Directors, M. Tanner (Chair), R. Brun
Eastern Africa Network for Trypanosomiasis (EANETT): Board of Management, R. Brun; M. Kaiser (Secretary)
Empower School of Health, New Delhi, India: C. Burri (Visiting Professor)
European & Developing Countries Clinical Trial Partnership: Partnership Board, C. Burri
European Association of Social Anthropologists, Medical Anthropology Network: B. Obrist (Chair)
European Bioelectromagnetics Association (EBEA), Council for biological and medical science: M. Röösli
European College of Veterinary Public Health: J. Zinsstag (Diplomate)
European Respiratory Society Environment and Health Committee: N. Künzli (Member)
Expert group for the Swedish Radiation Safety Authority (SSM): M. Röösli
Festival committee for the biennial Frame of Mind Film Festival, Schizophrenia Research Foundation, Chennai, India: M. G. Weiss (Chair)
Foundation for Essential Medical Devices: Foundation Council, M. Tanner
Foundation for the Centre Suisse de Recherches Scientifiques en Côte d’Ivoire: Foundation Council, M. Tanner
French National Science Agency (Agence Nationale de la Recherche); French cohort programme in the ministerial initiative “Investments for the future”: Scientific Review Committee, N. Künzli (President)
Gates Malaria Partnership Expert Oversight Committee: D. de Savigny
German Cooperation for Tropical Medicine and International Public Health: M. Zahorka
German Federal Ministry of Education and Research, Scientific Advisory Board on Zoonoses and Infectious Diseases: M. Tanner (Chair)
German National Platform for Zoonoses Research: Scientific Advisory Board, M. Tanner
Global Alliance for Vaccines and Immunization (GAVI): Independent Review Committee on Systems Strengthening, N. Lorenz
Global Fund for AIDS Tuberculosis and Malaria, Technical Review Panel: B. Genton (Member)
Health Effects Institute (HEI) Panel on Traffic-Related Health Effects: N. Künzli (Appointed Member)
Health Metrics Network TAG: D. de Savigny (Chair)
HealthBridge Canada: Board of Directors, D. de Savigny (Director)
Helmholtz Cohort planning process: N. Künzli (Ad-hoc External Advisory Board)
Ifakara Health Institute, Ifakara, Tanzania: Board of Trustees, M. Tanner (since 1997); Board of Governors, G. Pluschke, M. Tanner
INDEPTH: Board of Trustees, Marcel Tanner; Scientific Advisory Board, T. Smith, D. de Savigny
Indo-Swiss Bilateral Research Initiative: Scientific Advisory Board, M. G. Weiss
Institut de la Francophonie pour la Médecine Tropicale, Laos: Conseil d'Administration, M. Tanner
International Association for Ecology and Health (IAEH): J. Zinsstag (Vice-President)

International Atomic Energy Agency (IAEA), Division of Human Health, Department of Nuclear Sciences and Applications: Global Upgrading of Radiotherapy Services Working Group, M. Raab

International Centre of Diarrhoeal Diseases Research Dhaka, Bangladesh (ICDDR,B): Board of Trustees, N. Lorenz (Chair)

International Clinical Epidemiological Network (INCLEN): Board of Directors INCLEN Inc, M. Tanner; Board of Trustees INCLEN Trust, M. Tanner

International Consortium for Research & Action against Health-Related Stigma (ICRAAS): Steering Committee, M. G. Weiss

International Forum for Transport and Development, Programme of Networked Research on Mobility and Health: Steering Committee, K. Molesworth

International Society of Travel Medicine: C. Hatz (Co-chair CISTM11)

London School of Hygiene and Tropical Medicine: D. de Savigny (Honorary Professor)

Malaria Clinical Trials Alliance: Board of Mentors, M. Tanner

Medicines for Malaria Venture – ADAC External Scientific Advisory Committee: M. Tanner, C. Lengeler

Medicus Mundi International: N. Lorenz (Chair)

MENTOR Advisory Board: C. Lengeler

NetWorks Project: Technical Advisory Group, C. Lengeler

Novartis Institute for Tropical Diseases: Scientific Advisory Board, M. Tanner

Partnership for Social Sciences in Malaria Control (PSSMC): Steering Committee, B. Obrist, M. G. Weiss

Prince Leopold Institute of Tropical Medicine, Scientific Advisory Committee: J. Zinsstag

Program Electromagnetic Fields and Health (EMF&H) from ZonMw in The Netherlands: M. Röösli (Committee Member)

Race/Ethnicity/Gender Study Group of the American Psychiatric Association for development of DSM-V: M. G. Weiss (Advisor)

Rapid Response Group (RRG) for the Japan EMF Information Center: M. Röösli

Roll Back Malaria Working Group for Scalable Malaria Vector Control: D. de Savigny, C. Lengeler

Romanian-Swiss Centre for Health Sector Development (CRED): Board, M. Zahorka; N. Lorenz (Chair)

School of Population Health, Australian Centre for Tropical Health & Nutrition, University of Queensland: External Review Team, M. Tanner (Chair)

Society for the Study of Psychiatry and Culture (SSPC): Board of Directors, M. G. Weiss

Swiss Vector Entomology Group: C. Lengeler, P. Müller

Swiss-South African research partnership: Joint Steering Committee, M. Tanner

tropEd – Network for Education in International Health: B. Peterhans (President); A. Hoffmann (Executive Secretary)

TropNetEurop – Network for Clinical and Epidemiological Collaboration in Tropical and Travel Medicine: C. Hatz (Moderator)


University of Leeds, UK: External Examiner for the Master programme in Health Management Planning and Policy, A. Hoffmann

University of Queensland, School of Population Health: M. Tanner (Honorary Professor)

University of Washington, Dept of Environmental & Occupational Health Sciences: L.-J. Sally Liu (Affiliate Professor), M. Tsai (Affiliate Faculty)

Vienna School of Clinical Research: Educational Advisory Board, G. Pohlig

Wellcome Trust: Public Health and Population Sciences Committee, T. A. Smith

Wellcome Trust: Capacity Building Committee, M. Tanner (Chair)

Working group 3 “Epidemiology and Human Studies”; COST Action BM0704: Emerging EMF technologies: health risk management: M. Röösli

World Association of Cultural Psychiatry (WACP): Board of Directors, M. G. Weiss

World Psychiatric Association, Transcultural Psychiatry Section (WPA-TPS): Section Committee, M.G. Weiss

WHO and WHO/TDR

STAC: TDR Scientific & Technical Advisory Committee: M. Tanner (until 2009)

WHO Buruli Ulcer Diagnostics Sub-Working Group: G. Pluschke (Chair)

WHO Collaborating Centre for Health Systems Development: M. Raab

WHO Collaborating Centre for Water and Sanitation: M. Tanner (Chair)

WHO Expert Committee on Schistosomiasis: M. Tanner

WHO Expert Committee on Ultrasound Diagnosis in Schistosomiasis: C. Hatz

WHO Global Malaria Programme/Initiative for Vaccine Research Joint Technical Expert Group on Malaria Vaccines in Pivotal Phase 3 Trials & Beyond: B Genton (Member)
Further activities

WHO Immunization Practices Advisory Committee (IPAC): X. Bosch-Capblanch
WHO Insecticide Resistance Study Steering Committee: C. Lengeler
WHO Leptospirosis Burden Epidemiology Reference Group (LERG): J. Zinsstag
WHO Malaria Vaccine Advisory Committee: B. Genton, T. A. Smith, M. Tanner (until 2009)
WHO Network for Household Water Treatment and Safe Storage: D. Mäusezahl (Member)
WHO Product Development Team for the malaria vaccine candidate MSP1-42 at WHO: B. Genton (Chair)
WHO Steering committees for the development of the malaria vaccine candidates AMA-1, PfCS102 and PCP-2.9: B. Genton (Chair)
WHO Technical Advisory Group on Buruli Ulcer: G. Pluschke
WHO Thematic Reference Group on Social Sciences and Gender: M.G. Weiss
WHO European Centre for Environment and Health in Bonn, Germany, L.-J. Sally Liu (Temporary Advisor)
WHO Technical Consultation group on Radio Frequency Research Agenda, Geneva: M. Röösli
WHO/AFRO African Malaria Expert Committee: D. de Savigny (Member)
WHO/FAO/IDRC Scientific and Technical Advisory Committee for the Safe Use of Excreta, Wastewater and Greywater: G. Cissé (Member)
WHO/TDR M. tuberculosis Strain Bank Advisory Committee: S. Gagneux
WHO/TDR Scientific Advisory Committee for Evidence for Anti-malarial Policy and Access: D. de Savigny (Chair)
WHO/TDR Scientific Advisory Committee for Malaria Vaccines (MALVAC): B. Genton (Member)
WHO/TDR Scientific Advisory Committee on Drug development and evaluation for helminths and other neglected tropical diseases (HNR/BL6): J. Keiser
WHO/TDR Thematic Reference Group IV on Environment, Agriculture and Infectious Diseases of Poverty: J. Utzinger
WSSCC (Water Supply and Sanitation Collaborative Council)- Global Sanitation Fund (GSF): Advisory Committee (AC), G. Cissé (Member)

Clinical Infectious Diseases, Travel Medicine special section: C. Hatz (to 31.12.2009)
Culture, Medicine and Psychiatry: M. G. Weiss
Czech Veterinary Journal: J. Zinsstag
Environmental Health Perspectives: N. Probst-Hensch
Epidemiology: N. Künzli (Editorial Board)
Expert Opinion on Pharmacotherapy: J. Utzinger
Geospatial Health: J. Utzinger (Associate Editor)
International Journal of Public Health: M. Röösli, N. Künzli (Associate Editor)
Journal of Travel Medicine: C. Hatz
Malaria Journal: C. Lengeler, T. Smith, M. Tanner
Medecine Tropicale (Marseille): J. Zinsstag
Parasitology International: M. Tanner
PLoS Neglected Tropical Diseases: J. Keiser, J. Utzinger (Deputy Editor), J. Zinsstag (Associate Editor), M. Tanner
PLoS ONE: J. Keiser
Public Health Genomics: N. Probst-Hensch
Respiration: N. Künzli (Editorial Board)
Revue de Médecine Tropicale (Marseille): J. Zinsstag
Swiss Medical Weekly: N. Künzli (International Advisory Committee)
Transcultural Psychiatry: M. G. Weiss
Tropical Medicine and International Health: C. Hatz, T. A. Smith, M. Tanner
Veterinarny Medicina (Brno): J. Zinsstag

Clinical Trial Monitoring Boards

“An equity and cost-effectiveness analysis of alternative strategies for the deployment of artemisinin-based combination therapy (ACT) at the community level” and “Effects of restricting the use of Artesunate plus amodiaquine combination therapy to malaria cases confirmed by a dipstick test: A cluster randomised control trial, ACT consortium”: B. Genton

Efficacy, acceptability and cost-effectiveness of Long Lasting Insecticidal Nets (LLIN) in the prevention of Kala Azar: C. Lengeler

Independent Data Monitoring Committee for the Phase II study of GlaxoSmithKline (GSK) Biologicals’ Hib-MenAC vaccine in Ghana: B. Genton

Independent Data Monitoring Committee for the Phase III study of pneumococcal vaccine in Papua New Guinea: B. Genton (Chair)

Editorial Boards

Acta Tropica: C. Hatz, P. Steinmann, J. Utzinger
Anthropology and Medicine: B. Obrist, M. G. Weiss
Bulletin of the World Health Organisation: M. Tanner
**Guest Scientists**

Dr. Maria Victoria Valero Bernal, National University, School of Public Health, Bogota, Colombia (1–2/2010)

Prof. Paul Johnson, Infectious Diseases Department and University of Melbourne, Austin Health, Austin Hospital, Heidelberg, 3084 VIC, Australia (1–6/2010)

Prof. Xiao Shu-Hua, National Institute of Parasitic Diseases, Chinese Centre for Disease Control and Prevention, Shanghai, PR China (since 1998)

**Institutional Membership**

Aidsfocus Switzerland

Air & Waste Management Association

American Association for Cancer Research

American Chemical Society

American Thoracic Society

European Network for Health Technology (EUnetHTA)

European Respiratory Society

Ingenieur Hospital Schweiz (HIS)

International Association for Ecology and Health

International Consortium for Research and Action against Health-Related Stigma (ICRAAS)

International Society for Environmental Epidemiology

International Society for Exposure Sciences

International Society of Exposure Assessment

LivestockNet, Swiss Network for international Livestock production

Medicus Mundi Switzerland

Partnership for Social Sciences in Malaria Control (PSSMC)

Society of Epidemiologic Research (SER)

Society Swiss Public Health

Swiss Association for Telemedicine and eHealth (SATMeH)

Swiss Commission for Research Partnership with Developing Countries (KFPE)

Swiss Network for Health Technology Assessment (SNHTA)

Swiss Physicians for the Environment

tropEd, Network for Education in International Health

Tropical Biology Initiative

TropMedEurope

TropNetEurop

Washington State Air Toxics Working Group
Staff list

Staff of the Swiss Tropical and Public Health Institute during the period September 1st 2008–August 31st 2010

(Students who have successfully completed a degree and left Swiss TPH are listed only in Section Teaching and Training.
Professor, Senior Lecturer and Lecturer refer to teaching appointments at the University of Basel; ATA (akademisch-technische Assistenz-In); Graduate technical assistant, RN; registered nurse)

**Director**
Tanner Marcel, Professor, PhD, DSc h.c., MSc, MPH

**Deputy Director**
Hatz Christoph, Professor, MD, DTMH
Künzli Nino, Professor, MD, PhD

**Administrative Director**
Mörgeli Stefan, BSc, MAS, Administrative Director (since 01.01.2010)

**Board of Directors**
Burri Christian, Senior Lecturer, PhD, MPharm, Head of Medicines Research (since 01.05.2009)
Hatz Christoph, Professor, MD, DTMH, Head of Medical Services and Diagnostic
Künzli Nino, Professor, MD, PhD, Head of Epidemiology and Public Health (since 01.01.2010)
Lorenz Nicolas, MD, MPH, Executive MBA, Deputy Director of Research/Teaching (since 01.01.2010)

**Administrative Director**
Mörgeli Stefan, BSc, MAS (since 01.01.2010)

**Board of Directors**
Burri Christian, Senior Lecturer, PhD, MPharm, Head of Medicines Research (since 01.05.2009)
Hatz Christoph, Professor, MD, DTMH, Head of Medical Services and Diagnostic
Künzli Nino, Professor, MD, PhD, Head of Epidemiology and Public Health (since 01.01.2010)
Lorenz Nicolas, MD, MPH, Executive MBA, Deputy Director of Research/Teaching (since 01.01.2010)

**Administrative Director**
Mörgeli Stefan, BSc, MAS (since 01.01.2010)

**Directorate**
Tanner Marcel, Professor, PhD, DSc h.c., MSc, MPH, Director

**Administrative**
(Finances, Human Resources, Informatics, Infrastructure/External PhD students)

**Wasser Ulrich**, MA, Administrative Director (to 31.12.2009)

**Mörgeli Stefan**, BSc, MAS, Administrative Director (since 01.01.2010)

**Finances**

**Bourgeau Dominique**, Head
Barbe André (since 15.10.2009)

**Department of Epidemiology and Public Health**
Künzli Nino, Professor, MD, PhD, Head (since 01.05.2009)
Weiss Mitchell G., Professor MD, PhD, MA, Deputy Head

**Administrative and Secretarial Staff**
Bauer Nora (since 01.06.2009)
Slauoi Margrith
Zwygart Maya (since 01.03.2010)

**Research Assistants**
Gosoniu Gabriel Dominic, MSc

**Biostatistics and Computational Sciences**
(Section 2)

**Scientists**
Smith Thomas, PhD, MSc, Professor, Head
Boutsika Muckenschnabel Konstantina, PhD
Chitnis Nakul, PhD
Di Pasquale Aurelio, MSc (since 01.09.2009)
Gnaegi Guillaume, MSc (since 01.03.2010)
Gosoniu Laura, PhD
Grize Leticia, PhD (since 01.06.2009)
Hardy Diggory, MSc (since 01.05.2009)
Hegnauer Michael (since 01.07.2010)
Hürlimann Eveline, MSc
KielDirk
Maire Nicolas, PhD, MSc
Penny Melissa, PhD, MSc
Ross Amanda, PhD, MSc
Schaffner Emmanuel, MSc (since 01.06.2009)
Schapira Allan, MD, PhD, MPH (to 31.12.2009)
Schindler Christian, PhD
Schmid Christoph, PhD (since 01.08.2009)
Schoite Ronaldo, PhD (since 01.01.2010)
Studer Alain, Msc (to 30.11.2008)
Tarantino Michael (since 01.06.2009)
Vounatsou Penelope, PhD, MSc,
Senior Lecturer

**Practical Trainees**
Diboulo Eric, MSc (01.03.2010 to 30.06.2010)
Laserna de Himpsi Maiti (since 01.06.2009)

**PhD Students**
Bretschner Michael
Brooks Alan (since 01.08.2010)
Crowell Valerie
Giardina Federica (since 01.10.2009)
Gosoniu Dominic, Uni Neuenburg
Huho Bernadette
Jürgens Verena (since 01.10.2009)
Kasasa Simon
Lutambi Angelina
Msengwa Amina, Uni Tanzania
Musenge Eustarius, Uni South Africa
Ombek Amek
Riedel Nadine
Rumisha Susan
Sartorius Benn Kurt Daniel, Uni South Africa

**Chronic Disease Epidemiology**
(Section 3)

**Scientists**
Probst-Hensch Nicole, PhD, MPH, Associate Professor, Head (since 01.06.2009)
Adam Martin, PhD (since 01.02.2010)
Boes Eva, PhD (since 01.02.2010)
Curjuric Ivan, MD (since 01.06.2009)
Felber Dietrich Denise, MD, PhD, MPH (01.06.2009 to 31.08.2010)
Imboden Medea, PhD (since 01.11.2009)
Kriemler Susi, PD, MD (since 01.08.2010)
Kumar Ashish
Meier Flurina, MSc (since 01.06.2009)
Utzinger Jürg, PhD, MSc, MAS Professor, Scientists
Uehli Katrin (since 01.10.2009)
Thun Gian Andri (since autumn 2009)
Rivera Marcela, based in Barcelona
Foraster Maria, based in Barcelona
Schikowski Tamara, BSc, MPH, PhD (since 15.09.2009)

Projected Assistant/Study Nurses
Bosshard Nicole
Hug Markus
Patru Rebecca, RN (15.01.2010 to 31.07.2010)
Rechsteiner Rosmarie, RN
Schweigler Vicki, RN (since 15.12.2009)

Practical Student
Wullimann Chantal (since 01.08.2010)

PhD Students
Aydin Denis (since 01.02.2009)
Brinolf-Isler Bettina, MD
Hauri Dimitri (since 01.06.2009)
Loss Georg (since 01.02.2009)
Mohlere Evelyn (since 01.02.2009)
Musheke Maurice (since 01.10.2009)
Rajkumar Sarah (since 01.08.2010)
Rochat Masha (since 01.01.2008)
Tekeli-Vesil Sidika (since 01.08.2010)
Urbilino Damiano (since 01.01.2010)

Environmental Exposure Sciences

Scientists

Utzinger Jürg, PhD, MSc, MAS Professor, Head
Cissé Guéladji, PhD, MSc, Eng., Professor (since 01.09.2009)
Knopp Stefanie, PhD (since 01.05.2010)
Kone Braima, PhD
Odertmann Peter, PhD, MSc, MPH
Steinmann Peter, PhD, MSc

Students for Electives
Ginz Dominic (01.03.2009 to 30.06.2009)
Speich Benjamin (01.03.2010 to 15.07.2010)
Ziegelbauer Kathrin (01.03.2010 to 15.07.2010)

PhD and MD Students
Becker Sören (to 01.04.2010)
Boko Nadjé
Coulibaly Jean (since 01.09.2009)
Fürst Thomas
Garba Amadou
Khiou Virak
King Jonathan
Knopp Stefanie (to 31.03.2010)
Kousoukou Etienne Y.
Lv Shan
Mbuba Caroline Kathomi
Murto Christine (since 01.10.2009)
N'Guessan Sosthène
Phongluxa Khampheng
Righetti Aurelia (since 01.07.2009)
Sayasone Somphou
Schär Fabian (since 01.05.2009)
Sidé Bétiò
Soukthamnavong Phonepassong
Vonghatchack Youathanavan
Wicki Melanie
Winkler Mirko

Environmental Epidemiology and Risk Assessment

Scientists

Rööhi Martín, PhD, MSc, Assistant Professor, Head
Bitter Sondhya, MD
Braun-Fahrlander Charlotte, MD, MPH
Frei Patrizia, PhD (to 31.08.2010)
Henrichs Sina, PhD
Hug Kerstin, MD
Rajkumar Sarah (to 31.07.2010)

Administrative and Secretarial Staff
Rutschii Marianne
Contin Sofia
Savastano Gerardo
Wieg Alexander (since 01.08.2010)

PhD Students
Aydin Denis (since 01.02.2009)
Brinolf-Isler Bettina, MD
Hauri Dimitri (since 01.06.2009)
Loss Georg (since 01.02.2009)
Molihere Evelyn (since 01.02.2009)
Musheke Maurice (since 01.10.2009)
Rajkumar Sarah (since 01.08.2010)
Rochat Masha (since 01.01.2008)
Tekeli-Vesil Sidika (since 01.08.2010)
Urbilino Damiano (since 01.01.2010)

Health Interventions

Scientists/Technicians

Lengeler Christian, PhD, MSc, Professor, Head
Aebi Thomas, MD
Alba Sandra, PhD (since 01.05.2010)
Brown Nicholas, Team Leader ITNs, based in Tanzania
D'Accrement Valérie, MD, PhD, DTM&H (since 01.05.2010)
Genton Blaise, Professor, MD, PhD, DTM&H
Mnzava Ali PhD, MSc
Omari Susan

PhD Students
Alba Sandra (to 30.04.2010)
Cui Fuqiang (since 01.08.2010)
D'Accrement Valérie (to 29.04.2010)
Kabanywany Abdunoor Mulokosio
Kahama Judith (since 01.02.2008)
Küümmerle Andrea
Onyiri Nnadozie (since autumn 2008)
Plues Bianca (to 30.06.2009)
Rambaud Althaus Clotilde (since 01.04.2010)
Senn Nicolas
Singh Dillip Angel
Valero Maria (since 01.02.2010)
Yukich Joshua (to 30.06.2010)

Health Social Sciences

Scientists

Weiss Mitchell G., Professor, MD, PhD, MA, Head
Henley Robert Reed (to 30.06.2009)
Kessy Flora
Nathan Fabien (to 30.06.2009)
Obrist van Eeuwijk Brigit, Professor, PhD, MA
Pfeiffer Constanze, PhD, MA
Salamanca Luis
Siegmann Karin

PhD and MD Students
Ackumey Mercy
Alkaiyat Abdulzalalm
Büchi Silvia
Dillip Angel
Gross Karin
Paralikar Vasuedo (since 01.08.2010)
Sambaiga Richard Faustine (since 01.02.2009)
Sauerborn Claudia
Schärti Christian
Schwarzler Patricia
Stahmilus Ellen (to 31.12.2009)
Wang Jen

Health Systems

Scientists

De Savigny Donald, PhD, MSc, Professor, Head
Alba Sandra, MSc, PhD, based in Tanzania
Boutsika Konstantina, PhD
Hattendorf Jan, PhD
Hetzel Manuel, PhD, MSc (to 30.04.2009)
Küppir Irie, PhD (since 15.03.2010)

PhD Students
Alba Sandra (to 30.04.2010)
Cui Fuqiang (since 01.08.2010)
D'Accrement Valérie (to 29.04.2010)
Kabanywany Abdunoor Mulokosio
Kahama Judith (since 01.02.2008)
Küümmerle Andrea
Onyiri Nnadozie (since autumn 2008)
Plues Bianca (to 30.06.2009)
Rambaud Althaus Clotilde (since 01.04.2010)
Senn Nicolas
Singh Dillip Angel
Valero Maria (since 01.02.2010)
Yukich Joshua (to 30.06.2010)

Health Social Sciences

Scientists

Weiss Mitchell G., Professor, MD, PhD, MA, Head
Henley Robert Reed (to 30.06.2009)
Kessy Flora
Nathan Fabien (to 30.06.2009)
Obrist van Eeuwijk Brigit, Professor, PhD, MA
Pfeiffer Constanze, PhD, MA
Salamanca Luis
Siegmann Karin

PhD and MD Students
Ackumey Mercy
Alkaiyat Abdulzalalm
Büchi Silvia
Dillip Angel
Gross Karin
Paralikar Vasuedo (since 01.08.2010)
Sambaiga Richard Faustine (since 01.02.2009)
Sauerborn Claudia
Schärti Christian
Schwarzler Patricia
Stahmilus Ellen (to 31.12.2009)
Wang Jen

Health Systems

Scientists

De Savigny Donald, PhD, MSc, Professor, Head
Alba Sandra, MSc, PhD, based in Tanzania
Boutsika Konstantina, PhD
Hattendorf Jan, PhD
Hetzel Manuel, PhD, MSc (to 30.04.2009)
Küppir Irie, PhD (since 15.03.2010)
Staff list

Department of Medical Parasitology and Infection Biology

**Scientists/Technicians**
- **Pluschke Gerd**, PhD, MSc, Professor, Head
- **Brun Reto**, PhD Professor, Deputy Head
- **Beck Rahel**
- **Endriß Yvette**
- **Gysin Karin**
- **Steiger Pascale**

**Administrative and Secretarial staff**
- **Györffy Zsuzsanna**

**Molecular Parasitology and Epidemiology (Section 12)**

**Scientists/Technicians**
- **Beck Hans-Peter**, PhD, MSc, Professor, Head
- **Gaida Annette**, PhD
- **Müller Dania**
- **Rusch Sebastian**, PhD

**PhD Students**
- **Ballif Marie**
- **Dietz Oliver** (since 01.02.2009)
- **Ley Serej** (since 01.03.2010)
- **Pachlatko Esther**

**Molecular Diagnostics (Section 13)**

**Scientists/Technicians**
- **Felger Ingrid**, PhD, MSc, Senior Lecturer, Head
- **Perchuc Anna** (since 01.10.2009)
- **Steiger Sylvia**, ATA

**PhD Students**
- **Köpfli Cristian**
- **List Claudia**
- **Masimba Pax**

**Gene Regulation (Section 14)**

**Scientists/Technicians**
- **Voss Tij**, PhD, MSc, SNF-Professor, Head
- **Flück Christian**, PhD, MSc
- **Niederwieser Igor**, PhD, MSc

**PhD Students**
- **Brancucci Nicolas** (since 01.02.2009)
- **Oehring Sophie**
- **Witmer Kathrin**

**Helminth Drug Development (Section 15)**

**Scientists/Technicians**
- **Keiser Jennifer**, PhD, MSc, SNF-Professor, Head
- **Vargas Mireille**

**Students in Elective**
- **Corfu Augustine**

**PhD Students**
- **Duthaler Urs**
- **Ingram Katrin** (since 01.05.2010)
- **Kirchofer Carla** (since 01.11.2008)
- **Manneck Theresia**
- **Tritten Lucienne** (since 01.05.2009)

Molecular Immunology (Section 16)

**Scientists/Technicians**
- **Pluschke Gerd**, PhD, MSc, Professor, Head
- **Bénard Angèle**, PhD (since 01.12.2008)
- **Dangy Jean-Pierre**
- **Daubenberger Claudia**, DVM, PhD, Senior Lecturer
- **Hauser Julia**
- **Henson Sonal**, based in Kenya (since 01.01.2010)
- **Käser Michael**, PhD (to 28.02.2009)
- **Odongo David Onyango**, PhD
- **Scherr Nicole**, PhD (since 01.05.2009)
- **Tamborini Marco**, PhD, MSc

**PhD Students**
- **Bolz Miriam** (since 01.05.2010)
- **Bratschi Martin** (since 01.05.2009)
- **Dreyer Anita**
- **Huber Charlotte**
- **Mensah Ernestina**
- **Olds Cassandra** (since spring 2010)
- **Röltgen Katharina** (since 01.02.2009)
- **Ruf Marie-Thérèse**

Parasite Chemotherapy (Section 17)

**Scientists/Technicians**
- **Brun Reto**, PhD Professor, Head
- **Braghiroli Christiane**
- **Cal Monica**
- **Fischli Christoph**
- **Freymond Céline** (since 01.08.2009)
- **Gillingwater Kirsten**, PhD (since 14.04.2010)
- **Kaiser Marcel**, MSc
- **Kamber Jolanda** (since 01.05.2010)
- **Keller-Märki Sonja**
- **Kunz-Renggli Christina**
- **Mäser Pascal PhD, MSc, SNF-Professor** (since 01.05.2009)
- **Maurer Melanie** (to 31.08.2009)
- **Papastogiannidis Petros**
- **Riccio Guy**
- **Wittlin Sergio**, PhD

**Practical Student**
- **Günter Ella** (17.05.2010 to 16.11.2010)

Project Assistants

- **Darkhan Jaïl**, MSc
- **Schwarzzer Patricia**, MA

PhD Students

- **Baljinnayam Zolzaya**
- **Béchir Mahamat** (to 11.03.2010)
- **Dean Anna**
- **Decristophoris Paola** (since 01.05.2008)
- **Francini Valentina**
- **Gumi Donde Balako**
- **Jean-Richard Verena** (since 01.01.2010)
- **Kaba Mirgissa**
- **Kasyimbekov Jolodishbek**
- **Kimani Tabita**
- **Kim Anh Le**
- **Meisser Andrea**
- **Mauti Stephanie** (since 01.11.2009)
- **Bongo Nári Ngandolo Richard, Uni Dakar**
- **Pham Duc Phuc**
- **Søvd Tugsdelger** (since autumn 2009)

Human and Animal Health (Section 11)

**Scientists**
- **Zinsstag Jakob**, DVM, PhD, Professor, Head
- **Baumer Anette**, DVM (01.08.2009 to 31.07.2010)
- **Crump Lisa**, DVM (since 07.04.2010)
- **Fokou Gilbert**, PhD, MA based in Bamako, Mali (to 30.11.2009)
- **Hattendorf Jan**, PhD, MSc
- **Keita Moussa**, PhD
- **Koffi Maturin**, PhD
- **Münch Anna**, PhD (to 31.01.2009)
- **Nguyen Viet Hung**, PhD
- **Ould Taleb Moustapha**, PhD (to 31.10.2008)
- **Schelling Esther**, DVM, PhD
- **Tschopp Rea**, DMV, PhD

**Practical Student**
- **Greter Helena** (17.05.2010 to 16.11.2010)

**PhD Students**

- **Baljinnayam Zolzaya**
- **Béchir Mahamat** (to 11.03.2010)
- **Dean Anna**
- **Decristophoris Paola** (since 01.05.2008)
- **Francini Valentina**
- **Gumi Donde Balako**
- **Jean-Richard Verena** (since 01.01.2010)
- **Kaba Mirgissa**
- **Kasyimbekov Jolodishbek**
- **Kimani Tabita**
- **Kim Anh Le**
- **Meisser Andrea**
- **Mauti Stephanie** (since 01.11.2009)
- **Bongo Nári Ngandolo Richard, Uni Dakar**
- **Pham Duc Phuc**
- **Søvd Tugsdelger** (since autumn 2009)

Department of Medical Parasitology and Infection Biology

**Scientists/Technicians**
- **Pluschke Gerd**, PhD, MSc, Professor, Head
- **Brun Reto**, PhD Professor, Deputy Head
- **Beck Rahel**
- **Endriß Yvette**
- **Gysin Karin**
- **Steiger Pascale**

**Administrative and Secretarial staff**
- **Györffy Zsuzsanna**

**Molecular Parasitology and Epidemiology (Section 12)**

**Scientists/Technicians**
- **Beck Hans-Peter**, PhD, MSc, Professor, Head
- **Gaida Annette**, PhD
- **Müller Dania**
- **Rusch Sebastian**, PhD

**PhD Students**
- **Ballif Marie**
- **Dietz Oliver** (since 01.02.2009)
- **Ley Serej** (since 01.03.2010)
- **Pachlatko Esther**

**Molecular Diagnostics (Section 13)**

**Scientists/Technicians**
- **Felger Ingrid**, PhD, MSc, Senior Lecturer, Head
- **Perchuc Anna** (since 01.10.2009)
- **Steiger Sylvia**, ATA

**PhD Students**
- **Köpfli Cristian**
- **Kulangara Caroline**
- **List Claudia**
- **Masimba Pax**

**Gene Regulation (Section 14)**

**Scientists/Technicians**
- **Voss Tij**, PhD, MSc, SNF-Professor, Head
- **Flück Christian**, PhD, MSc
- **Niederwieser Igor**, PhD, MSc

**PhD Students**
- **Brancucci Nicolas** (since 01.02.2009)
- **Oehring Sophie**
- **Witmer Kathrin**

**Helminth Drug Development (Section 15)**

**Scientists/Technicians**
- **Keiser Jennifer**, PhD, MSc, SNF-Professor, Head
- **Vargas Mireille**

**Students in Elective**
- **Corfu Augustine**

**PhD Students**
- **Duthaler Urs**
- **Ingram Katrin** (since 01.05.2010)
- **Kirchofer Carla** (since 01.11.2008)
- **Manneck Theresia**
- **Tritten Lucienne** (since 01.05.2009)
Tuberculosis Research (Section 18)
**Scientists/Technicians**
Gagneux Sebastien, PhD, MSc, SNF-Professor in Microbiology, Head (since 01.04.2010)
Borrell Farnov Sonja, PhD (since 01.03.2010)
Coscollà Devís Mireia, MSc, PhD (since 01.05.2010)

**Assistants**
Fenner Lukas MD (since 15.05.2010)
PhD Student
Malla Bijaya (since 01.01.2009)
Stucki David (since 01.05.2010)

Department Swiss Centre for International Health
**Senior Experts**
Lorenz Nicolaus, MD, MSc, Executive MBA, Head of Department
Kessler Bodiang Claudia, MD, MPh, Deputy Head of Department

**Administrative Assistants**
Baks Ria
Liebers Claudia
Lützelschweab Sabine (since 13.10.2008)
Stampa Michel (since 04.06.2009)

**Communication and Tender Writing**
Blackwell Joanne, BA (since 01.06.2009)

**Health Systems and Economics Unit (HSEU) (Section 19)**
**Senior Experts**
Lorenz Nicolaus, MD, MSc, Executive MBA, Head of Department
Kessler Bodiang Claudia, MD, MPh, Deputy Head of Department

**Administrative Assistants**
Baks Ria
Liebers Claudia
Lützelschweab Sabine (since 13.10.2008)
Stampa Michel (since 04.06.2009)

**Communication and Tender Writing**
Blackwell Joanne, BA (since 01.06.2009)

**Health Technology and Telemedicine Unit (HTTU) (Section 20)**
**Senior Experts**
Raeb Martin, MSc, MPH, Unit Head
Blunier Marc, MSc
Nogier Cyril, MSc (to 30.09.2009)
Worlein Reinhold, MSc, Deputy Head

**Project Officer**
Zawug Claudia, MSc, MIS (since 01.11.2008)

**Project Associate**
Salvador Ribeiro (since 01.07.2010)
Castro Gonçalo, MSc (since 01.07.2010)

**Based in Egypt**
Ragey Ahmed, MD

**Based in Malawi**
Homere Dieter, MSc (to 31.10.2009)

**Based in Ukraine**
Riabtseva Natalia, MPh
Rimarenko Kateryna, MPh
Solodarenko Andrey, MD

**Sexual and Reproductive Health Unit (SRHU) (Section 21)**
**Senior Experts**
Kessler Bodiang Claudia, MD, MPh, Unit Head
Martin Hilber Adriane, MPh (since 09.02.2009)
Molesworth Kate, PhD
Zahorka Manfred, MD, MPh

**Project Officer**
Renggli Verena, MSc, MIH Pharma (since 01.07.2010)

**Project Associates**
Schwarz Joelle, MA, MDev (to 30.06.2010)
Secula Florence, MDev (since 15.06.2010)
Stucki Christina, MA (since 01.11.2008)

**Based in Romania**
Fota Nicusor, MSc, MPh, Head CRED Foundation
Acs Betty, MD
Iliescu Roxana, MD

* The Romanian team – the CRED Foundation was locally implemented by the RoNeonat project until 12.07.2010. CRED Foundation continues to exist and is active as a national NGO affiliated with the SCIH.

**Based in Tanzania**
Coppard Dorothea, MPh, Head of Local Office (to 31.12.2008)
Heinrichs Heinrich, PhD, Head of Local Office (since 01.01.2009)
Deric Mutoka

**Based in Rwanda**
Savagodo Bonaventure, MD, MSc, Head of Local Office
Ndagiijimana Jean
Niyodushima Jocelyne

**Based in Burundi**
Pose Barbara, MD, MPH, DTM&PH, Head of Local Office (since 01.01.2010)
Cowley Judith, MSc, Medical Anthropologist, Head of Local Office (to 31.12.2009)
Ncbawenge Sylvère, BSc, Psychologist (to 31.12.2009)
Nyomwungere Claude-Francois, MD (since 01.04.2010)
Mbarushimana Jean-Claude, BSc

**Based in the Democratic Republic of Congo DRC**
Touré Mohamed Lamine, MD, Head of Local Office (since 01.01.2009)

Mufungizi Mahazi Juvénal
Longolongo Kiza Martin

**Systems Performance and Monitoring Unit (SPMU) (Section 22)**
**Senior Experts**
Wyss Kaspar, PhD, MPH, Senior Lecturer, Unit Head
Bosch Capblanch Xavier, MD, MSc, Deputy Unit Head
Clary Bruno, DPharm
Goscher Karin, MA
Kristiansson Charlotte, PhD
Pham-Tan Odile, MD, MPH, MBA (since 01.05.2009)
Wiedenmayer Karin, PhD, MSc, MPH

**Project Officers**
Guinot Dominique, MA
Juif Jean-Pierre, MA (since 01.06.2010)
Koller-Thürck Gertrud, MBA (since 01.05.2010)
Lenoir William, MSc (since 01.04.2010)
Renggli Verena, MSc, MIH Pharma (01.2009 to 30.06.2010)
Segura Garcia José Luis, MD, MSc (since 01.02.2010)
Weiss Marti Svenja, MSc

**Project Associates**
Auer Christian, PhD, MSc, (since 15.03.2010)
Albrecht Heike, MAS
Beck Lise, PhD (since 15.03.2010)
Eckert Tobias, MD (to 31.08.2008)
Konstanzy Violetta, MD (to 30.11.2009)
Mathys Barbara, PhD, MSc
Nicola Alexandra, MA, MAS (since 15.11.2008)
Rosenthaler Sabine, MSc, MAS (to 30.11.2008)
Viana Bruno, PharmD, MBA (since 01.05.2010)
Wymann Monica, PhD, MSc (to 30.04.2009)

**PhD Student**
Aye Raffael (to 30.06.2009)
Nordstrom Curtis (since 1.08.2010)

**Based in Bolivia**
Urquita Carlos (since 01.11.2008)
Urquita Rodrigo (since 01.01.2009)

**Based in Burkina Faso**
Bollinger Hans Peter, MSc, MAS

**Based in Benin**
Dossouvi Christophe (since 01.01.2009)
Midou Amadou (since 01.10.2009)

**Based in Cameroon**
Gbaguidi Emmanuel, MD, MPH, Head of Local Office
Shura Barthson Ursula Fru

**Based in Cambodia**
Kim Sovann Yadian, MD, MPH, Head of Local Office
Chukmel Santepheap
Hin Yuthika
Kuoch Céline
Sitruk Alexei, MBA, Pharma (since 01.01.2010)
Staff list

**Department of Medicines Research**  
*Section 23*

**Senior Experts**
- Pohlég Gabriële, PhD
- Schmid Cäcilia, MSc, PhD

**Project Officers**
- Buxtorf Mucklow Rosine, MSc  
  (since 01.04.2010)
- Czech Patrick, PhD (to 31.03.2010)

**Junior Project Managers**
- Huber Eric, MSc
- Vogel-Aellig Monique

**Pharmaceutical Medicine Unit**

**Senior Experts**
- Burri Christian, Senior Lecturer, PhD, MPharm, Head

**Administrative Assistants**
- Vogel-Aellig Monique

**Lead Clinical Research Associates & Junior Project Managers**
- Bernhard Sonja, PhD
- Ley Bettina, MSc

**National Reference Centre for Diagnostic Parasitology and Immunology**

**Medical Consultations, Medical Practice Föhre and Travel Clinic**

**Staff in Chad**
- Daugla Moto Doumagoum, MD, MPH  
  Kladoumadji Berinan

**Based in Djibouti**
- Awaleh Ilmi Elabeh
- Bouh Ismail Said

**Based in El Salvador**
- Gavídia Ricardo (since 15.11.2008)
- Sanchez Jaime (since 01.02.2009)
- Gavidia Ricardo (since 15.11.2008)
- Sanchez Jaime (since 01.02.2009)

**Staff in Laos**
- De Jong Jan Cornelis, Head of Local Office  
  (since 01.01.2009)
- Southammavong Manivanh  
  (since 01.01.2009)
- Luangkhot Bounthamaly (since 15.05.2009)

**Based in Mali**
- De Niet Erik (since 15.10.2008)
- Kamsu Linda (since 01.09.2009)
- Touré Alíssa (since 01.03.2010)

**Staff in Myanmar**
- Youssef Sameh, PhD, MB, ChB, DTM&H, IDHA,  
  Based in Myanmar
- Touré Aïssa (since 01.03.2010)

**Based in Nicaragua**
- Sanchez Yadira, MBA, Head of Local Office  
  (since 01.01.2009)
- Blandino Aida (since 15.05.10)
- Lara Hernando (since 15.09.09)

**Based in Niger**
- Nassyrou Abdoulkarim, PhD
- Abhouisseini Abdoulaye (since 01.03.2009)

**Based in Palestine (West Bank and Gaza)**
- Ranya Karam, MBA

**Based in Senegal**
- Ablefon Sabine, MPH, Head of Local Office  
  (to 30.06.2010)
- Lab Bruno, MPH, Head of Local Office  
  (since 01.10.2010)
- Diakhité Boubacar (since 01.03.2010)

**Based in Syria**
- Alhaj Hussain Mona (since 01.04.2010)

**Based in Tajikistan**
- Bottone Nick, PhD, Head of Local Office  
  (to 30.06.2009)
- Costa João, PhD, Head of Local Office  
  (since 01.08.2009)
- Abduallimova Khafina
- Abdushaburor Nasrullo
- Baimatova Malika (to 31.05.2010)
- Gulomova Zulfa
- Hakimov Daler
- Hamidova Zarofat
- Ibodova Shukufa, MA (since 01.12.2009)
- Jaborova Delia
- Karimova Gulzira
- Mengliboyeva Zulfira
- Toshmatova Husnida
- Turakhonova Gulraftor

**Department of Tropenmedizin**

**Senior Experts**
- Hong Chong, PhD
- Kaisandlamavong Phomphoun
- Le Lai Anh Phuong
- Ngarmkhouy Xelekhet

**Pharmaceutical Medicine Unit**

**Senior Experts**
- Burri Christian, Senior Lecturer, PhD
- Pohlég Gabriële, PhD
- Schmid Cäcilia, MSc, PhD

**Project Officers**
- Buxtorf Mucklow Rosine, MSc  
  (since 01.04.2010)
- Czech Patrick, PhD (to 31.03.2010)

**Junior Project Managers**
- Huber Eric, MSc
- Vogel-Aellig Monique

**Lead Clinical Research Associates & Junior Project Managers**
- Bernhard Sonja, PhD
- Ley Bettina, MSc

**National Reference Centre for Diagnostic Parasitology and Immunology**

**MD Students**
- Heuer Nadja
- Landmann Emanuelle
- Rosalie Zimmermann

**Medical Consultations, Medical Practice Föhre and Travel Clinic**

**Administrative Assistants**
- Vogel-Aellig Monique

**Lead Clinical Research Associates & Junior Project Managers**
- Bernhard Sonja, PhD
- Ley Bettina, MSc

**Clinical Research Associates**
- Kümmeler Andreas, PhD (since 01.07.2010)

**Based in Kinshasa**
- Ferrari Giovanni Francesco, MSc, Research Assistant  
  (since 15.09.2009)
- Inyamwenyi Jean-Bosco, Finance Officer & Office Assistant, Swiss TPH in Kinshasa  
  (DRC)
- Kalemwa Mitombo Didier, Physician-Biologist, PhD, Representative of Swiss TPH in Kinshasa (DRC)

**Regulatory Affairs Unit**

**Senior Experts**
- Maigetter Karen, BSc, MSc (since 01.09.2009)
- Renggli Verena, MSc, MIH Pharma  
  (since 01.07.2010)

**Department Medical Services and Diagnostic**  
*Section 24*

**Senior Experts**
- Haas Astrid
- Eckert Désirée (since 01.03.2009)
- Escher Elisabeth
- Grilli Isabelle
- Haas Astrid
- Heller-Meudt Irene
- Jermann Simone
- Kohialka Genewefa
- Krebs-Hollinger Christina
- Maag-Heller Eva
- Müller Dani
- Oettli Annelis
- Rimelin Lucie (to 30.04.2009)
- Stoll-Rudin Karin (since 01.04.2010)

**Vector Control Centre**
- Müller Pie, PhD, Dipl. sc. nat., Head  
  (since 01.05.2009)
- Misteli Kurt (since 31.03.2009)
- Jančaršová Danica (since 01.06.2009)
- Rudin Elisabeth (since 31.05.2009)
- Rudin Werner, PhD, Senior Lecturer  
  (since 31.05.2009)
- Rustom Abdual Sater Mohamad (since 01.01.2010)

**8 pregraduate medical students (cand. med.) spent 1-2 month internships each**
- Anne Christe (June 2009)
- Joller Daniel (February/March 2010)
- Marti Nadine (July/August 2009)
- Savic Mirjana (December 2008/January 2009)
- Speiser Joel (August/September 2008)
- Sydow Véronique (July/August 2008)
Odermatt Peter, PhD, MSc, MPH, Lecturer, Course Coordinator
Pelikan Joachim, PhD, MSc, Project Leader, Communication Officer
Peterhans Bernadette, RN, MPH, Project Leader, Course Coordinator
Schäfer Erna, Senior Administrative Assistant
Stamm Doris, Senior Administrative Assistant (since 01.01.2010)
Zen Ruffinen Antoinette, Administrative Assistant

Library and Documentation
Immler Heidi, Chief Librarian
Fust Fabienne, I & D Assistant (to 31.07.2009)
Hellstern Mara, Trainee
Hirsbrunner Rebekka, I & D Assistant (since 01.08.2009)
Gutknecht Rachel (since 01.06.2009)

Guest Scientists
Maria Victoria Valero Bernal, Dr., National University, School of Public Health, Bogota, Colombia
Paul Johnson, Prof., Infectious Diseases Department and University of Melbourne, Austin Health, Austin Hospital, Heidelberg, 3084 VIC, Australia
Xiao Shu-Hua, MD, PhD Prof., National Institute of Parasitic Diseases, Chinese Centre for Disease Control and Prevention, Shanghai, PR China (since 1998 every year 3–4 months at Swiss TPH)

External Collaboration
Based in Bangladesh
Henning Lars, MD, PhD

Based in Tanzania
Balzer Peter, Manager and Project Leader, IHI Dar es Salaam, Tanzania (since 01.05.2009)
Horvath Edith, Lab Technologist, IHI Ifakara, Tanzania
Jugheli Levan, MD, TB Laboratory Manager, IHI Bagamoyo, Tanzania (since 08.03.2010)
Reither Klaus, MD, IHI Bagamoyo, Tanzania (since 01.07.2009)
Sasse Peter, Infrastructure Advisor IHI Bagamoyo, Tanzania (since 08.03.2010)
Vinzenz Anja, TT expert, IHI Ifakara, Tanzania (to 31.07.2009)

Based in Cote d’Ivoire
Raso Giovanna, PhD, MSc, Deputy Director CSRS
Publications

Ulrich (Ueli) Wasser

Administrative Director of the Swiss Tropical Institute and member of the directorate from 1987 to the end of 2009, retired after 22 years of continuous, unfailing service with and for the STI.

Ueli, a graduate in economics from the University of St Gallen, has always shown a keen interest in issues of development and transcultural partnerships and communication. Soon after completing his studies, he chose not to take up a post as a "standard" economist in a safe position in Switzerland, but, instead, he became deeply involved in many missions of the ICRC in numerous difficult and even dangerous global hot spots, ranging from Africa to Southeast Asia. He worked with great commitment at the basic field level for a more peaceful world and alleviation of poverty.

His heart was also always with capacity building. Given all this expertise and experience, he joined STI, his “Tropeli”, and built up the administration alongside the growing institute. Starting with 69 employees, he left the institution 22 years later, and it now has more than 500 employees. He also played a key role in the first steps of the process of integration of the Institute of Social & Preventive Medicine and STI in 2009 (see foreword). Besides looking after the institute, Ueli Wasser was also the administrator of the R.Geigy and Jubilee Foundations, roles that he maintains after his retirement. Ueli Wasser is succeeded by Stefan Mörgeli who – after a most successful career in the public and private sector – came back to the institute in November 2008. Stefan Mörgeli knew our institute for nearly 20 years, beginning when he was administrator of the Swiss Tropical Institute Field Laboratory in Ifakara, Tanzania (now the Ifakara Health Institute).

We are deeply grateful for Ueli’s innumerable contributions to the effective and impressive development of our administrative services and our infrastructure, as well as his contributions to a smooth handing over to Stefan Mörgeli through a shared position spanning more than one year. We deeply thank him for all of his contributions and his fine commitment to the goals of STI. We wish him the very best for his future and a wonderful time in a well-merited retirement (with some doses of Swiss TPH through the further contributions to our foundations). Thank you ever so much, Ueli.

Retirements

A warm thank you to our former collaborators who retired during the last two years

Ulrich (Ueli) Wasser

Besides this important change at the level of the directorate, we also saw the retirement of:

Madeleine Buholzer

From 01.08.1999–31.07.2009: Main Secretariat. Madeleine Buholzer started her work at the Main Secretariat which includes reception desk and telephone exchange in August 1999. With her friendly attitude, she was able to satisfy our demanding internal and external customers.

Rolf Dürr

From 01.10.1969–30.09.2009: Head of Technical Services. Rolf Dürr was one of the key persons that enabled all of the impressive infrastructural development. In addition to his unfailing services, he served as our institutional photographer. He is one of the few persons of Swiss TPH who knows literally all corners of our houses.
Theres Kalt

From 14.04.2003–31.05.2009: Employee Human Resources. Therese Kalt joined the Institute in 2003 and started working at Finances. Later she moved to Human Resources where she worked as an assistant. Many collaborators have contracts that were all prepared by Theres.

Ursula Kupferschmied


Lucie Rimelin

From 01.05.1974–30.04.2009: Administrative Assistant, Diagnostic Centre. After working for more than 30 years with dedication, kindness and indomitable energy as administrative assistant, Lucie Rimelin, the “Voice of the Diagnostic Centre”, finally hung up the telephone receiver and started her well-earned retirement in her beloved Alsace.

Elisabeth Rudin

From 01.06.2003–31.03.2009: Administrative Assistant, Vector Control Centre. Elisabeth Rudin assisted her husband Werner Rudin in the field of vector control for more than six years with diligent enthusiasm.

Werner Rudin

From 01.04.1974–31.03.2009: Head, Vector Control Centre. After almost exactly 25 years of working at the Institute in two departments, PD Dr. Werner Rudin retired in 2009. A highly committed natural scientist and naturalist tourist guide, he joined what is now known as MPI to engage in brand-new electron microscopy research and on immunology of parasites as well as malaria anaemia. In the 1990s, he moved to the medical department as a scientific expert on vector control. Werner also rendered great services to the field sites, particularly as a key person in the handing over of the Medical Assistant Training Centre in Ifakara to the Ministry of Health, where he became familiar with life in the bush and how to beware of elephants. In Switzerland, he is best known as the “Muggedoggter”, as he had the highest media presence, especially in TV, of all of the Swiss TPH staff for decades (owing to his testing of repellents and his advice on mosquito control, malaria and nuisance prevention).

We are most grateful to all of these staff members for their great contributions to the development of our institute. We wish them the very best for a retirement full of joy and satisfaction and carried by good health, and we look forward to seeing them regularly at the joint institutional events. You are all most and always welcome at the Socinstrasse!
Awards

Professor Jürg Utzinger awarded 2010 Chalmers Medal

Professor Jürg Utzinger, head of the Ecosystem Health Unit of Swiss TPH, was awarded the Chalmers Medal 2010 from the Royal Society of Tropical Medicine and Hygiene (RSTMH).

Beginning 1923, the Chalmers Medal from the RSTMH was awarded every other year. Since 1971, the medal has been awarded annually to young scientists who render outstanding services to research in tropical medicine.

Dr. David Rollinson from the Natural History Museum in London nominated Professor Utzinger, and he received the prestigious medal at the annual meeting of RSTMH on “Global Health Challenges 2010” in Liverpool, UK on 8th September.

The Spiroindolone class of compounds has not only shown favourable physical and chemical properties for drug development, but most importantly it has also exhibited a rapid ability to kill the blood-stages of the malaria parasites *P. falciparum* and *P. vivax*. Thus, the Spiroindolones have demonstrated great potential and show significant promise as a next-generation treatment for malaria. Research is ongoing at Swiss TPH and within the consortium to determine their exact mechanism of action on *Plasmodium*. Preliminary evidence, however, suggests that the mechanism is distinct from that of other antimalarial drugs. In the context of emerging drug resistance to known antimalarials, this is most promising news. This project is co-funded by Wellcome Trust, Singapore Economic Development Board, Novartis and MMV.

This is the third time that Swiss TPH has received this prestigious award (also in 2001 and 2006), placing the institution at the forefront of the search for new drugs against malaria.

MMV's Project of the Year for 2009 went to a consortium with Swiss TPH research teams

Dr. Matthias Rottmann and Dr. Sergio Wittlin, both researchers at the Swiss TPH, have been awarded – together with colleagues from the Novartis Institute for Tropical Diseases, Genomics Institute of the Novartis Research Foundation, Novartis Institute for Biomedical Research, Novartis Natural Product Unit and Singapore Immunology Network – the coveted Medicines for Malaria Venture (MMV) Project of the Year 2009 for “Spiroindolones”.

The Spiroindolone class of compounds has not only shown favourable physical and chemical properties for drug development, but most importantly it has also exhibited a rapid ability to kill the blood-stages of the malaria parasites *P. falciparum* and *P. vivax*. Thus, the Spiroindolones have demonstrated great potential and show significant promise as a next-generation treatment for malaria. Research is ongoing at Swiss TPH and within the consortium to determine their exact mechanism of action on Plasmodium. Preliminary evidence, however, suggests that the mechanism is distinct from that of other antimalarial drugs. In the context of emerging drug resistance to known antimalarials, this is most promising news. This project is co-funded by Wellcome Trust, Singapore Economic Development Board, Novartis and MMV.

This is the third time that Swiss TPH has received this prestigious award (also in 2001 and 2006), placing the institution at the forefront of the search for new drugs against malaria.
Third-party funding

Funding Partner

3 R Stiftung
ADEME (French Environment and Energy Management Agency, Paris, France)
Aeras Global TB Vaccine Foundation
Armauer Hansen Research Institute, Addis Ababa, Ethiopia (AHRI)
Basler Kantonalbank
Bayer Consumer Care
Bill & Melinda Gates Foundation (BMGF)
Boehringer Ingelheim Fonds
Bundesamt für Bevölkerungsschutz, BABS (Labor Spiez)
Bundesamt für Gesundheit, (BAG)
Bundesamt für Sport (BASPO)
Bundesamt für Umwelt (BAFU)
Bundesamt für Veterinärwesen, (BVET)
Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung, Deutschland (BMZ) via GTZ
Carolito Stiftung
Coca-Cola Foundation and Agency for Administration of University and Research Grants (AGAUR), Barcelona, Spain
Cogito Foundation
Comic Relief
Commission for Research Partnerships with Developing Countries (KFPE)
Consortium of environmental agencies of 15 Swiss cantons (ZH, SG, UR, SZ, ZG, LU, OW/NW, SO, BE, UD, GE, VS, TI)
Doris Duke Charitable Foundation
Drugs for Neglected Diseases Initiative (DNDi), Geneva
DSM, Sight and Life
Eidgenössische Technische Hochschule Zürich (ETHZ)
Eidgenössisches Departement des Inneren, (EDI)
Electric Power Research Institute (EPRI)
Emilia Guggenheim-Schnurr Stiftung (EGS)
European and Developing Countries Clinical Trials Partnership (EDCTP)
European Cooperation in the field of Scientific and Technical Research (COST)
European Respiratory Society
European Union (EU) and European Union Framework Programme
Fairmed
Federal Office for Forest, Environment and Landscape
Federal Office of Roads and Transport
Financial Mechanism Offices (FMO) of Norway, Iceland and Lichtenstein of the European Economic Area (EEA)
Fonds zur Förderung von Lehre und Forschung, Basel
Forlen Stiftung
Foundation for Innovative New Diagnostics (FIND)
Freiwillige Akademische Gesellschaft Basel (FAG)
French Environmental Protection Agency (AFSSET)
Gabriele Charitable Trust
GlaxoSmithKline Biologicals Ltd
Global Alliance for Vaccines and Immunization (GAVI)
Global Drug Facility of Stop TB Partnership
Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM)
GlycoVaxyn AG
Herzstiftung
Humer Foundation
INDEPTH Network
Indo-Swiss bilateral Research Initiative (SNF)
International Centre for Diarrhoeal Disease Research of Bangladesh (ICDDR,B)
International Committee of the Red Cross (ICRC)
International Development Research Centre, Canada (IDRC)
International Food Policy Research Institute (IPRI (AHRP)
Kanton Basel-Landschaft
Kanton Basel-Stadt
Kanton Bern
Kanton Genf
Kanton Solothurn
Kanton Tessin
Kanton Wallis
Kanton Zürich
KEM Hospital Research Fund
KFW Development Bank
Kommission für Forschungspartnerschaften mit Entwicklungsländern (KFPE)
Lung League Basel
Lux Development
Malaria Vaccine Initiative (MVI)
MARATO TV3 Foundation, Barcelona, Spain
Medicines for Malaria Venture (MMV)
Medicor Foundation
Mobilfunktionsforschungstiftung
National Institutes of Health, USA
NCCR North-South
Netherlands Organization for Health Research and Development (ZonMW)
Novartis Foundation for Sustainable Development, Basel, Switzerland;
Novartis Pharma, Basel, Switzerland.
Novartis Stiftung (vormals Ciba-Geigy Jubiläums-Stiftung)
OncoSuisse
Organization for Health Research and Development (ZonMW)
Pan American Health Organization (PAHO)
PATH MACEP, a Malaria Control Partnership
Quadrimed Foundation
Research Fellow Partnership Programme for Agriculture, Forestry and Natural Resources funded through SDC
Roche Research Foundation
Roll Back Malaria Partnership
Rudolf Geigy Stiftung (RGS)
Sanofi-Aventis S.A.
Schistosomiasis Control and Operational Research and Evaluation (SCORE)
Schweizerische Akademie der Medizinischen Wissenschaften
Schweizerischer Nationalfonds (SNF)
Scientific & Technological Cooperation programme Switzerland-Russia
South African – Swiss Bilateral Research Initiative (SNF)
Staatssekretariat für Bildung und Forschung (SBF)
Stanley-Thomas Johnson Foundation
### Third-party funding

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<td>United Nations Children's Fund (UNICEF)</td>
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<td>Stipendienkommission Basel-Stadt</td>
<td>United Nations Development Programme (UNDP)</td>
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<td>Swiss Cancer League</td>
<td>United Nations Educational, Scientific and Cultural Organization (UNESCO)</td>
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<td>Swiss Accidents Insurance (SUVA)</td>
<td>Universität Basel, Reisefonds</td>
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<td>Swiss Agency for Development and Cooperation (SDC)</td>
<td>University of Basel, Exzellensforschung</td>
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<td>Swiss Brazilian Joint Research Program (SBJRP)</td>
<td>University of California, Berkeley, USA</td>
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<td>Swiss Federal Office for the Environment (BAFU), Bern</td>
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<td>Swiss National Science Foundation (SNSF)</td>
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<td>Talecris Pharmaceuticals GmbH</td>
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<td>Tobacco Prevention Control Fund</td>
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