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Preface
The years 2014 and 2015 were marked by the latest Ebola outbreak, which for the first time struck West Africa and grew into a devastating epidemic. Owing to preparatory work by Prof. Günther, BNITM found itself in a prominent position. Some years ago, Stephan Günther had set out to coordinate a European consortium that, on behalf of the European Commission, developed portable laboratory devices to safely diagnose Ebola and other highly pathogenic viruses. It turned out to be a fortunate coincidence that the first prototypes of this “European Mobile Laboratory” (EMLab) had been finalised by the end of 2013 and could be employed right from the beginning of the outbreak. In addition, the Guinean Minister of Health remembered the Institute favourably and trusted us. He had known Thomas Kruppa and colleagues who, in the mid-1990s, established the African laboratories of BNITM in Guéckédou and Macenta, the exact areas in Guinea where Ebola now broke out. At the time, Jan ter Meulen of the Institute had intensely studied Lassa fever in the region. On March 25, 2014, Stephan Günther and a team left to install the first EMLab in Guinea. The mission is expected to last for more than two years.

Causing alarm in early August 2014, the numbers increased dramatically and a Liberian lawyer travelled to Nigeria and appeared to do all he could to spread Ebola in Africa’s most populated country. Fortunately, our virologists had worked for years on Lassa fever in Nigeria, where they had firmly established the necessary diagnostic devices in a hospital in the city of Irrua. Immediately, they shifted their focus to Ebola. It was likely that these circumstances together with the relentless radio propaganda and vigorous outbreak management of the Nigerian government enabled infection to be traced within a few weeks in order to prevent further spreading.

Subsequently, Ebola became a major focus of the Institute. Initially, this work was funded internally. Virology was fully engaged with the EMLabs – every four weeks there was a change of personnel, which meant recruiting volunteers and organising their job replacements, visas, health insurances, etc. At first these were mainly colleagues from BNITM, but later also Italians, Frenchmen, and Romanians.
An important unresolved issue was the return of staff to Europe in case of an infection. This is a public employer’s legal duty and could be realised only when the patient-transport “Robert Koch” airbus had been equipped and was ready to operate. I dare not even think about such an event occurring and a court having to state that no civil service personnel was allowed to be sent to the crisis area.

In an attempt to counteract later allegations and to demonstrate that we tried all options, we signed a high-priced contract with an international backhaul service knowing full well that the company could not guarantee a return transport of an Ebola patient. Apparently, the “Robert Koch” airplane has meanwhile been dismantled – difficult to understand in light of the several hundred millions Euros that have been made available by the Federal Government for better preparedness in the future.

Following our engagement in the crisis, hundreds of samples of suspected cases arrived at our Institute in Hamburg from all over Germany but also from many other countries from as far away as Myanmar. All colleagues involved took this responsibility very seriously. A single misdiagnosis – be it a false positive or worse, a false negative – would have had very serious consequences and, in addition, would have resulted in a severe punishment by the media.

Likewise, public relations work grew steadily, with more Ebola cases every day, dubious forecasts and drastic scenarios, hospital infections in Spain and the US, terminally-ill patients transferred to Germany and even to Hamburg. To cope with the numerous enquiries, responses had to be delegated and harmonised among several colleagues, always searching to strike the balance between underplaying the risks and inciting panic.

While Stephan Günther commuted between West Africa, Brussels and Geneva and was only rarely able to attend press conferences. Jonas Schmidt-Chanasit mostly represented the Institute in the media. After his TV appearance in a talk show, one third of all clicks to the BNITM homepage were in search of his name. Although advertising professionals might prefer the Institute to be represented in the media by only one face, we will stick to our habit of leaving it to the individual experts to speak and present themselves.

I was granted the honour to advise high-level politicians, even the chancellor herself in a small circle in September 2014. My subsequent statement on public TV was not broadcasted, however. Perhaps it was not appreciated that I did not join in the general criticism that German politicians had reacted too late to the epidemic. I think many commentators overlooked that a single country – be it from the Minister of Health himself – is not authorized to announce any news about outbreaks in other countries. Communications of this kind, which could do serious economic harm to a country, are reserved for the World Health Organisation and should continue to be so.

Time for a particular word of gratitude. Great thanks and admiration go to all colleagues who volunteered to work in the EMLabs under such extremely challenging physical and psychological conditions. We are also grateful to those at home who resisted infection by the, at times, hysterical fear of returnees from West Africa. One may remember, among others, the house arrest in New York City. Our EMLab personnel sometimes had to face similar experiences with some party invitations being cancelled. Furthermore, our gratitude extends to all colleagues who contributed to the stellar diagnostic work in Hamburg. Significantly, Martin Gabriel who coordinated personnel and material logistics for the EMLabs efficiently and calmly.

The day the first Ebola team left for Guinea, the new homepage of the Institute was unveiled. The real challenge will now be to continuously update the content.

A few weeks later, the first joint W3 professorship with the Faculty for Mathematics, Informatics and Natural Sciences (MIN) of the University of Hamburg was conferred to Prof. Tim Gilberger. This was long overdue because 80-90% of our doctoral students graduate in this faculty. It’s a special professorship for us, since it is the first one jointly run by the University and the Institute.
With great sadness, the members of the Scientific Advisory Board (SAB), the Board and all staff of the Institute have reacted to the unexpected death of Prof. Klaus Lingelbach, who as the chairman of the SAB did an eminent service for the Institute. Particularly sad are those of us who enjoyed his day-to-day extraordinarily kind personality when he worked as a group leader at the Institute in 1990s.

Like him, the Institute owes many thanks to all members of the SAB, who spent their valuable time to familiarise themselves with our scientific and structural challenges and provided us with competent advice.

The Board of Directors would like to thank the staff of the Hamburg Ministry of Science, Research and Equalities (BWFG) and the Federal Ministry of Health (BMG), who are responsible for the supervision of the Institute, for their support. We are particularly grateful to the State Secretaries Dr. Horst-Michael Pelikahn and Dr. Eva Gümbel, who as Chairpersons of the Board of Trustees represented the interests of the Institute with empathy and great engagement.

Not least, we thank our supporters from the Vereinigung der Freunde des Tropeninstituts (Association of Friends of the Institute). Manfred Schüller and Dr. Lothar Dittmer as chairpersons proved prudence and skills when redesigning the aims of the association and renewing its appearance.

Once again, the Board of Directors owes all staff members the greatest gratitude for their constant and extraordinary loyalty and identification with the Institute. Their enormous engagement was of particular value during the Ebola crisis. And once again we would like to highlight the additional work of those colleagues who have participated as representatives in the Institute’s staff council and numerous other committees.

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Members of the Board of Directors (from left): Egbert Tannich, Bernhard Fleischer, Udo Gawenda, Rolf Horstmann

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As we near the end of 2015, the largest Ebola epidemic of modern times seems to have subsided. More than 28,000 people have been affected and more than 11,000 have died. The question remains: why did this outbreak spread so widely in comparison to all others that had arisen in Central and East Africa previously? Interestingly, a few Ebola and Marburg outbreaks have been recorded in Uganda in the past several years but they remained locally contained and therefore were not noticed by the rest of the world (Am J Trop Med Hyg 2014; 90:790). Certainly, it is of great interest to understand why the recent West African epidemic was so different. It appears not to be due to a difference between the viruses, and therefore, it would not be surprising if social anthropology played an important role.
In March 2014, an outbreak of a febrile illness with vomiting, severe diarrhoea, and high fatality was reported to the World Health Organisation (WHO) from Guinea, West Africa. Virological examination indicated that it was an Ebola outbreak. An international consortium led by our virologists found that it was a new Ebola strain, a cross of viruses from previous outbreaks in the Congo and in Gabon, which emerged unexpectedly far to the west, possibly carried by migration of bat colonies. Apparently, the epidemic arose from a two-year-old child who had died in December 2013 in the area of Guéckédou in Northeast Guinea. As the clinical syndromes were dominated by organ failure rather than the classical sign of bleeding, the term Ebola Haemorrhagic Fever was replaced by Ebola Virus Disease (EBVD).

Lisa Oestereich, Toni Rieger, Daniel Cadar, Martin Gabriel, Dennis Tappe, Jonas Schmidt-Chanasit, Stephan Günther and external co-operation partners (see publication)

Figure: A group of Ebola viruses under the electron microscope. In the blood of infected persons, the number of viruses may exceed 100 million per millilitre.
As the EMLabs performed diagnostics from the beginning of the Ebola outbreak, we collected patient samples at various sites throughout the epidemic. By sequencing large parts of the genomes of 179 virus isolates sampled between March 2014 and January 2015, we were able to follow mutations over time. Thereby, we reconstructed the formation of various viral lineages and traced the spread of the epidemic. The results confirmed observations that the virus passed the border from Guinea to Sierra Leone between the end of April and beginning of May 2014. The lineages of the two countries crossed paths in the summer of 2014 as progeny of the early Guinean lineage was later found again in Guinea. In addition, the data show that the Ebola virus did not have an unusually high mutation rate indicating that the risk of emerging viral mutants that could escape vaccine protection was small.

Marlis Badusche, Beate Becket-Ziaja, Britta Liedigk, Lisa Oestereich, Romy Kerber, Martin Gabriel, Stephan Günther and external co-operation partners (see publication)

Figure: Working in the “European Mobile Laboratory” at the onset of the Ebola epidemic in Guinea.

Carroll MW et al., Nature 2015, 524:97-101
On August 27, 2014, a special aircraft arrived at Hamburg airport, carrying an Ebola patient from Sierra Leone to be treated at the University Medical Center Hamburg-Eppendorf (UKE). The patient’s samples were closely followed for viral load and infectivity by polymerase chain reaction (PCR) and by viral cultures in Vero cells, respectively. In the course of his disease, the patient experienced several complications including bacterial septicemia, respiratory failure and brain involvement. Intensive care including forced intravenous fluid substitution of up to ten litres per day, broad-spectrum antibiotic treatment and temporary non-invasive artificial respiration resulted in complete recovery without applying experimental treatment. Discharge of the patient was delayed by persistent detection of viral RNA in sweat and urine for four and six weeks although viruses could be cultured only for 2 and 3.5 weeks, respectively. The case shows that even severe Ebola disease can be treated successfully by conventional intensive care.


Benno Kreuels, Petra Emmerich, Jonas Schmidt-Chanasit, Stephan Günther and external co-operation partners (see publication)

Figure: Training inside the containment ward (Photography: Tom Hildebrandt, UKE).
On one of the following pages, the identification of a new virus that can infect humans will be described. A straightforward method was applied that has become feasible only by exploiting sophisticated bioinformatics. Simply, all genes of an infected animal were sequenced and the sequences were searched for genes not belonging to the animal. Thus, genes of a virus were found. It is foreseeable that this approach of DNA sequencing of biological samples containing more than one organism – called “metagenomics” – will reveal many more new viral infections in the future.

Figure: Graphic depiction of metagenomics of bacteria, archaea, and viruses (Design by Vaughn Iverson, metagenome, CC BY-NC 4.0).
It started with a failure of our diagnostics department to find the cause of a fatal brain infection of a man from Saxony-Anhalt. Inquiries revealed that the man was a breeder of South American coloured squirrels and that two of his breeder colleagues had also died from unclassified brain infections one and one and a half years ago, respectively. All re-examinations for known pathogens again were negative, also in the squirrels. Finally, colleagues from the Friedrich Loeffler Institute sequenced all RNA genetic material from the brain of a squirrel and were successful. In addition to the squirrel’s mammalian genes, sequences were found that clearly originated from a virus. Virus-specific tests, designed based on these sequences, revealed the presence of the new virus in several squirrels and, notably, in the brains and cerebrospinal fluids of the deceased breeders. The new virus, a Borna virus, clearly differs from all Borna viruses identified so far, most of which cause encephalitis in horses. The new virus had presumably been transmitted to the breeders by bites or scratches of the squirrels.


Dennis Tappe, Daniel Cadar, Jonas Schmidt-Chanasit and external co-operation partners (see publication)

Figure: Variegated squirrel (Sciurus variegatoides atripinaceus), carrier of a new Borna virus causing fatal encephalitis in humans (Photography: Hans Hillewaert, CC BY-SA 3.0).
It was in BNITM’s National Reference Centre for Tropical Pathogens where the first case of a Zika infection imported into Europe was diagnosed in 2013. By the end of 2015, there were four. Travellers had been infected in Tahiti, Borneo and more recently, in Brazil. They came down with mild fever, skin eruptions, conjunctivitis, muscle and joint pain, ankle oedema, and swollen lymph nodes. Temporary hearing impairment was found in one case, apparently due to involvement of the central nervous system. Most recently, a co-incidence of prenatal deformations and Zika infections during pregnancy was observed in Brazil. The virus was first identified in Uganda in 1947 and later spread to tourist places in the Western Pacific and Southeast Asia, and more recently Senegal and Latin America.

Similar to the related Dengue virus, Zika is transmitted by Aedes mosquitoes, and therefore, outbreaks might occur in large parts of Southern Europe where the tiger mosquito Aedes albopictus is firmly established.

ZIKI VIRUS ON THE RISE

Tappe D et al., Emerg Infect Dis. 2015, 21:911-3;
Zammarchi L et al., Euro Surveill. 2015, 20: pii: 21153;

Dennis Tappe, Stephan Günther, Lisa Oestereich, Daniel Cadar, Jonas Schmidt-Chanasit and external co-operation partners (see publication)

Figure: Original Zika biotope
Using DNA tests, we traced three unusual worm infections. One of them was a dirofilariasis. Dirofilaria are transmitted by mosquitoes and normally affect dogs. If humans are infected, the worms develop in the skin and form visible nodules. Now for the first time, a person has been infected inside Germany with the worms presumably having been imported with dogs from Southern Europe. Likewise, humans are rarely affected by canine onchocerciasis. We have found DNA of this worm in a sample extracted from the eye of a traveller returning from Turkey. Apparently, Southern Germany was the site where a man acquired a fatal infection with the horse worm *Halicephalobus gingivalis*. He must have had a skin lesion that came into contact with forest soil. Fortunately, the infection is very rare in humans. It was the first of its kind recorded in Europe.

Monuranu CM et al., Open Forum Infect Dis. 2015, 2:ofo061;
Bergua A et al., Euro Surveill. 2015, 20 pii: 21099;
Tappe D et al., Euro Surveill. 2014, 19:2-4

Dennis Tappe, Birgit Muntau, Egbert Tannich and external co-operation partners (see publication)

Figure: Tissue section through a skin nodule of a patient with *Dirofilaria repens* infection.
At over a hundred sites in metropolitan Hamburg, we have collected more than ten thousand mosquitoes and mosquito larvae. For the first time, *Culex modestus* was among them, which originates from the Mediterranean basin and has never been found this far north. Likewise of Mediterranean origin is *Anopheles algeriensis*, which after half a century now pops up again in Northern Germany. In particular, the northern spreading of *Cx. modestus* may possibly relate to climate change. Of note, *Cx. modestus* is in Europe one of the most important vectors of West Nile virus, which – emerging from Africa – spread at a tearing pace all over North America between 2000 and 2003. *Cx. modestus* preferably breeds in mineral wetlands like the North German marsh. All the more interesting is the disappearance of *Anopheles atroparvus*, which was the prime malaria vector here before World War II and prefers similar breeding sites. Two more mosquitoes also found for the first time in Hamburg favour floodplains for breeding as well. In addition, the classical „floodplain mosquito“ *Aedes vexans* was found significantly more often than in 1970, obviously as a result of the systematic restoration of floodplains in Hamburg. The good news was that even after directed searches in the port and airport, no Asian tiger mosquitoes or bush mosquitoes were found, which transmit dreaded viruses like the Dengue and West Nile virus, respectively.

Krüger A et al., Parasitol Res. 2014, 113:2907-14

Andreas Krüger*, Jessica Börstler, Marlis Badusche, Renke Lühken, Rolf Garms, Egbert Tannich and external co-operation partners (see publication)

* in house Tropical Medicine Department of the Bundeswehr

Figure: Prof. Rolf Garms and Prof. Egbert Tannich collect mosquitoes in a Hamburg biotope.
It was not before 1953 that the WHO declared Germany officially malaria-free. In the past decade, the mosquito *Anopheles atroparvus* was essential for malaria transmission in Germany. As it prefers salty breeding waters, it was particularly widespread in Northern Germany and constituted a large proportion of the mosquito population there. In our last assessment in 2011-2013, we found *An. atroparvus* much less frequently – both in distribution and in numbers. It was restricted to the coastal areas of Lower Saxony and Schleswig-Holstein. A similar development has been observed in the Netherlands. The cause for its disappearance remains speculative. Possibly, modern, closed buildings may have reduced the mosquitoes’ hibernation retreats. Dutch researchers have also proposed that *An. atroparvus* might be particularly sensitive to the pollution of stagnant waters, which could damage their breeding sites and thus impair their reproduction.


Renke Lühken, Hanna Jüst, Jonas Schmidt-Chanian, Egbert Tannich and external co-operation partners (see publication)

Figure: The malaria vector female *Anopheles atroparvus* taking a blood meal.
Neglected Tropical Diseases (NTDs) belong to poverty-related infectious diseases. They affect the poorest populations in third world countries and are often severe and long lasting. The causative agents of NTDs include helminths, protozoa, bacteria and viruses. Even if the disease outcome is not fatal, NTDs can put a lot of strain on patients, their relatives and the economies of whole countries. For example, a massive outbreak can turn farmland into uninhabitable areas.

Worldwide, NTDs affect 1.4 billion people in 149 countries with a further two billion people at risk. Each year, about half a million people die directly or indirectly thereof. The WHO lists 17 NTDs as particularly relevant. In the near future, containment of NTDs may be possible, but it will require intense research, effective control measures, improvement of health systems and the development of simple diagnostic tests. At the BNITM, several NTDs are studied, e.g. helminth infections, Leishmaniasis, and Chagas disease.
In sub-Saharan Africa, it is common practice to treat all children with fever for malaria. If they don’t get better within a few days, other causes for the disease are considered. In the past years, we have found that many children diagnosed with severe malaria have bacteria in their blood. As they are only treated for malaria, bacteremias progress rapidly and 50% of these cases are fatal. Diagnosing bacteremias requires blood cultures and these are too laborious and expensive for most settings in malaria-endemic countries. Hence, we searched for simple methods to differentiate severe malaria from bacterial blood infections. In rural Ghana, we have found that among 1915 children with high fever and malaria parasites in their blood, 46 (6%) had bacteremias, mostly salmonellae and streptococci. Unfortunately, we did not identify any simple clinical signs that in practice could help to identify the latter group for antibiotic treatment. Because of the great clinical relevance of bacteremias, we continue our work by searching for serum markers.

 Nielsen MV et al., PLoS One 2015, 10:e0122139

Maja Nielsen, Solomon Amemasor, Alex Agyekum, Wiibke Loag, Nimako Sarpong, Denise Dekker, Jürgen May and external co-operation partners (see publication)

Figure: Infant with severe malaria in a tertiary referral hospital in Africa (Photography: Mika Väisänen)
A 30-year-old farmer from Savannakhet Province in Laos had developed on his right foot a large, brownish-coloured, painless swelling from which oozed a discharge containing bacteria of the *Nocardia aobensis* species. It was a case of actinomycosis, often called mycetoma. Mycetoma is described as a chronic infection of the skin, soft tissues or bones caused by either bacteria or fungi, which presumably enter by small skin lesions, mostly of the feet. Wearing shoes or flip-flops would probably prevent most cases. Antibiotic treatment was initiated according to international guidelines, but after two weeks, the patient left the hospital to go to work and thereby terminated treatment, although guidelines recommend continuation for several months. Several months later, the patient reported that without further antibiotics the lesion spontaneously had improved after approximately 20-25 weeks. This case suggests that short-term antibiotic treatment might be sufficient.


Jörg Blessmann and external co-operation partners (see publication)

Figure: Foot of a patient with characteristic signs of a mycetoma at hospital admission (left) and ten months after a 14-day course of antibiotics (right).
Scrub typhus is prevalent in large areas of Asia and Oceania. It is caused by particularly small bacteria (*Orientia tsutsugamushi*), which are transmitted by the bites of mites. High fever, headache, lymph node swelling, and rashes are the most frequent signs of disease. Occasionally the brain and the heart can be affected, and in recent years, dangerous lung involvements have been reported. There is no vaccine, but a simple antibiotic treatment is very effective, if given early. We have infected laboratory mice by pinprick and followed the course of infection, first from the skin to the regional lymph nodes and later into the liver, heart, lungs and the brain. Most of the bacteria were found in the lungs, accompanied by severe signs of inflammation. We hope this animal model will facilitate a better understanding of this widely-spread but also widely-neglected tropical disease.

Keller CA et al., PLoS Negl Trop Dis. 2014, 8:e3064

Christian Keller, Matthias Hauptmann, Julia Kolbaum, Mohammad Gharabeh, Bernhard Fleischer and external co-operation partners (see publication)

Figure: Right: Histology of the lungs in a mouse infection with *Orientia tsutsugamushi* shows a strong inflammatory reaction (brownish coloured phagocytes [macrophages]). Left: Normal lung.
In a survey in Central Africa, ophthalmologists found a series of eye infections by parasites. After surgical removal of suspicious material, DNA tests identified parasites of the genus *Armillifer*, also called pentastomes. These are worm-like parasites phylogenetically related to shellfish. Their larvae normally infect inner organs, but also the eyes. Further examinations in Central Africa revealed that several patients were multiply infected, often in the abdomen, sometimes by various parasite species. Patients appear to have been infected by ingestion of raw snakes contaminated with pentastome eggs.

*Sulyok M et al., PLoS Negl Trop Dis. 2014, 24:8:e3041*

Dennis Tappe, Birgit Muntau and external co-operation partners (see publication)

Figure: Eye infection with larvae of the pentastome *Armillifer granulis* in a woman in the Democratic Republic of Congo (Photography: Richard Hardi).
The efficiency of the recently licensed malaria vaccine RTS,S (Mosquirix™) has decreased considerably over time and, after four years, has been reduced to 16%. The WHO discusses at present whether it should recommend to countries in malaria regions to include the vaccine in national vaccination campaigns.

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<th>Observation period</th>
<th>Protection rate</th>
<th>Reference</th>
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<td>6 months</td>
<td>65%</td>
<td><em>N Engl J Med</em> 2008; 359:2533</td>
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<td>8 months</td>
<td>56%</td>
<td><em>N Engl J Med</em> 2008; 359:2521</td>
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<td>12 months</td>
<td>56%</td>
<td><em>N Engl J Med</em> 2011; 365:1863</td>
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<tr>
<td>12 months</td>
<td>31%</td>
<td><em>N Engl J Med</em> 2012; 367:2284</td>
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<tr>
<td>48 months</td>
<td>16%</td>
<td><em>N Engl J Med</em> 2013; 368:1111</td>
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As the efficiency of the malaria vaccine RTS.S (Mosquirix™) has decreased considerably over time, we have looked for a means to prolong the protective effect by manipulating the immune response in a mouse model. We looked at animals genetically-deficient in so-called regulatory T lymphocytes, a group of cells that inhibit other immune cells. These animals showed a temporarily stronger reaction to both the first and second vaccinations but no development of so-called memory cells, which mediate long-term protection. Immunological memory therefore appears to be regulated by other, yet unknown mechanisms.

**Poor memory**

**REMOVAL OF INHIBITORY IMMUNE CELLS TEMPORARILY INCREASES EFFICIENCY, BUT NOT DURATION, OF VACCINE PROTECTION**

Maria del Rosario Espinoza Mora, Christiane Steeg, Susanne Tartz, Volker Heussler, Bernhard Fleischer, Thomas Jacobs and external co-operation partners (see publication)

*Figure: In the course of the immune response, antigen-presenting cells (APC) take up antigens and present them to activate effector T lymphocytes (T_{eff}). Consequently, T_{eff} multiply and produce messenger molecules mediating the destruction of pathogens. However, APC as well as T_{eff} can be inhibited by so-called regulatory T lymphocytes (T_{reg}).*
Apparently, worms play it safe with respect to immunosuppression. At least the intestinal roundworm *Strongyloides* does so in an experimental infection of mice. On one hand, the worms directly inhibit central helper cells of the immune system (CD4+T lymphocytes) by increasing the numbers of inhibitory receptors (BTLA) on their surfaces. On the other hand, they cause a proliferation of regulatory T lymphocytes (Treg), which inhibit other immune cells including T helper lymphocytes. Deletion of either the inhibitory molecules on T helper cells or the regulatory T cells themselves increased the ability of mice to expel the worms from their intestines. In this experimental model, interleukin 9 played a pivotal role as a messenger molecule. It stimulated so-called mast cells, specialised immune cells in the intestinal mucosa which enhance bowel movements and mucous production to wash out the worms. Mast cells also greatly contribute to allergy-type immune reactions.


Birte Blankenhau, Wiebke Hartmann, Marie-Luise Eichbach, Martina Reitz, Yannick Brenz, Irma Haben, Thomas Jacobs, Minka Breloer and external co-operation partners (see publications)

Figure: Microscopic image of the host intestinal mucosa during a worm infection. Cross-section of invaginations of the mucosa, which serve to enlarge the bowel surface area for efficient absorption of nutrients. Cells stained in dark red are mast cells which enhance mucous production and peristalsis to expulse worms (Photography: Anja Kühl, Charité, Berlin).
The tissue worm disease onchocerciasis is spread over many African countries. The worms dwell in nodules underneath the skin and produce numerous larvae, which fan out all over the skin including the eye where they ultimately cause blindness. Therefore, and because of the breeding sites of the transmitting insects, the disease is called river blindness. Based on an analysis of serum samples from persons who appear naturally immune to onchocerciasis, we have assembled a cocktail of worm proteins that, in a mouse model, function as a vaccine. We now construct a vaccine from the genes coding for these proteins. It will be initially tested in a pilot experiment performed at the University of Veterinary Medicine Hannover and later in a field trial in African cattle, because in Africa cattle suffer from onchocerciasis as well.

VACCINE AGAINST ONCHOCERCIASIS

Steisslinger V et al., Vaccine 2015, 33:5861-7
Vera Steisslinger, Simone Korten, Norbert Brattig and Klaus Erttmann

Figure: In cattle with onchocerciasis, the worms – like in humans – lie in palpable nodules underneath the skin (Photography: Alfons Renz, University of Tübingen).
Until the 1980s, it was not known that the bacterium *Helicobacter pylori* colonized the human stomach and was a major cause of stomach ulcers and cancer. When the AIDS pandemic was recognized, it was found that persons with HIV and concomitant *H. pylori* infection had relatively low HIV loads in the blood and relatively high numbers of helper T cells (CD4+ T lymphocytes). CD4+ T cells are the immune cells that are normally destroyed by HIV and whose loss primarily contributes to the characteristic immunodeficiencies of AIDS. Comparing HIV-positive persons with and without *H. pylori* infections, we now found that CD4+ T lymphocytes from persons with *H. pylori* are less activated and in vitro, show lower proliferation rates and fewer signs of exhaustion than CD4+ T cells from persons without *H. pylori*. As HIV preferentially infects activated and proliferating CD4+ T cells, these findings may help to explain why *H. pylori* infections may delay the progression of HIV infections towards AIDS.


Kirsten Eberhardt, Gerd Burchard and external co-operation partners (see publication)

Figure: Outpatient department in a Ghanaian hospital.
Amoebas causing amoebic dysentery carry on their surfaces a substance that significantly enhances a specific immune reaction in the host. The substance is composed of an interesting combination of carbohydrates, peptides, phosphate residues and lipid chains. It causes a release of messengers that attract and activate certain immune cells and thereby could trigger or increase the pathogenic effect of these amoebas. In what regard this helps the amoebas to survive in humans remains elusive. Possibly the immunostimulatory activity – or indeed the amoeba pathogenicity itself – is merely an accident. It is clear, however, that the immunostimulatory activity of this amoeba product can be used to enhance our immune reaction against other pathogens such as *Leishmania* or *Mycobacterium tuberculosis* or to modulate our immune response to vaccines.


Hanna Lotter, Hannah Bernin, Egbert Tannich and external co-operation partners (see publication)

Figure: Schematic sketch of the structure of a highly specific immunostimulatory product of pathogenic amoebae.
At present, the Centre for Structural Systems Biology (CSSB), which may be considered unique worldwide, is being built on the campus of the German Electron Synchrotron (DESY), and nine research institutions are filling it with life, among them our institute. CSSB will combine DESY’s outstanding competence and infrastructure in radiation sources with state-of-the-art experimental designs in infection research and will offer exceptional structural investigations into the molecular biology and, in particular, the cellular biology of infection.
These are the boring and unloved results that no scientific journal likes to publish, yet are very important. Nearly all biological and immunological studies use pathogens that are artificially grown in incubators. The culture conditions under which each pathogen survives and multiplies best in the test tube have been explored at some point. Subsequently, it is rarely studied how the artificial conditions influence other pathogen properties. Malaria parasites are cultured in red blood cells suspended in growth media. We now find that simply replacing human serum by a frequently-used serum-like mixture significantly altered relevant properties of the parasites. These results should remind researchers to repeatedly check whether laboratory conditions still reflect real life.

Tilly AK et al., Sci Rep. 2015, 5:16766

Ann-Kathrin Tilly, Jenny Thiede, Nahla Metwally, Pedro Lubiana, Anna Bachmann, Stephan Lorenzen, Egbert Tannich, Iris Bruchhaus and external co-operation partners (see publication)

Figure: Petri dishes for the cultivation of malaria parasites (Photography: NeoLab catalogue).
Red blood cells that are infected by malaria parasites adhere to the walls of our small blood vessels thereby causing alterations of the microcirculation and organ damage. When this occurs in the brain, it’s known as cerebral malaria. Since this mechanism was discovered some thirty years ago, there have been 15 different molecules identified that serve as attachment sites for these infected red blood cells, among them a prominent receptor on the vessel walls inside the brain. At present, there are attempts to design a vaccine that inhibits adherence to this receptor in order to combat life-threatening cerebral malaria. In most of those studies, commonly-used laboratory-grown strains of malaria parasites have been used. Using a mixture of malaria parasites recently obtained from Ghanaian children, we have examined ten additional molecules expressed on human brain vessel walls and found that seven of them may likewise serve as attachment sites for infected red blood cells. It appears that malaria-infected red blood cells are rather promiscuous in their attachment to human vessel walls and different parasite isolates may use different adherence molecules. These findings suggest that it may be difficult to develop a vaccine that can prevent all variants of adherence of malaria-infected red blood cells to the vessel walls inside the brain.

Esser C et al., Cell Microbiol. 2014, 16:701-708
Claudia Esser, Anna Bachmann, Daniela Kuhn, Kathrin Schuldt, Birgit Förster, Meike Thiel, Jürgen May, Iris Bruchhaus, Rolf Horstmann and external co-operation partners (see publication)

**Figure:** Adherence of red blood cells (red) infected by malaria parasites (cell nuclei as small blue spots) to animal cells (large blue ovals) carrying on their surface proteins from human brain blood vessel walls (small green spots).
Although it is usually very hot in their homelands, parasites that are transmitted by insects must survive a heat shock when they encounter humans or other warm-blooded organisms. With temperatures exceeding 40°C, our bodies are much hotter than the insects’ or the tropics. A “heat shock” is well known from experimental research – it is a standard method to subject living cells to stress. The cells then produce an entire range of proteins known as chaperones, which prevent other proteins from clumping and the cell from dying. The heat shock encountered by the transmission from insects to humans helps Leishmania parasites to survive an additional gross change in their living conditions: while they can move freely in the sandfly insects, in humans they prefer to live inside cells, namely phagocytic cells of the immune system. We have now found that a small chaperone called HSP23 is essential for the survival of Leishmania in human cells. If it is eliminated by gene knock-out, the parasites die at body temperature and when re-introduced, the gene enables them to survive again. Accordingly, the chaperone protects the nucleus of the parasite from heat damage and is therefore a promising target for new anti-parasitic drugs.

Antje Hombach, Gabi Ommen, Andrea MacDonald and Joachim Clos

Figure: Leishmania at body temperature. Its nucleus (n) and a DNA-containing organelle (k) is marked in blue and chaperone HSP23 labelled in red. HSP23 is concentrated around the nucleus.
Molecules that are located at the surface of pathogens are of particular interest for the infection process. In pathogenic amoebas (Entamoeba histolytica), they influence the migration from the intestinal cavity into the tissues and the development of intestinal ulcers and organ abscesses. Therefore, we have studied the “surface proteome” of E. histolytica, i.e. the entirety of proteins the amoebas carry on their surface. We have labelled live amoebas with a substance that spontaneously binds to all accessible proteins, isolated the labelled proteins and subjected them to mass spectrometry. Bioinformatic analysis of the protein fragments revealed in about half of the nearly 700 proteins, no evidence of structures that commonly anchor proteins to a cell surface. We selected 23 of them at random, labelled these with a fluorescent marker and found that 20 of them indeed fluoresce at the amoeba surface. Apparently, the rapid turnover of the amoeba cell membrane temporarily flushes many intracellular proteins onto the surface.

Laura Biller, Jenny Matthiesen, Vera Kühne, Hanna Lotter, Ghassan Handal, Egbert Tannich, Iris Bruchhaus and external co-operation partners (see publication)

Figure: Immunofluorescence microscopy to show surface localisation of several amoeba proteins (Entamoeba histolytica). The nucleus of the amoeba is stained in blue, proteins as indicated in green. In the centre, an enlarged amoeba with all the surface proteins studied labelled.
Mycobacteria like *Mycobacterium tuberculosis* reside and multiply inside our cells. While their invasion and survival are under intense investigation, it is largely unknown how they leave the cells – something they need to do to spread the infection. During their exit, the cells mostly remain intact. We investigated how intracellular pathogens perforate the membranes of their host cells so gently. The host cells, like many other cells, can form intracellular inclusion bodies ("autophagosomes"), which are surrounded by a membrane and digest non-functional metabolic compounds and recycle the degradation products back into the cell. We have found that these inclusion bodies move at the rear pole of mycobacteria to the site of exit and close the membrane gap the bacteria leave behind. This observation raises the question whether such inclusion bodies also fix holes in cellular membranes caused by other kinds of injuries.

*Gerstenmaier L et al., Proc Natl Acad Sci U S A. 2015, 112:E687-92*

Lilli Gerstenmaier, Rachel Pilla, Lydia Herrmann, Hendrik Herrmann, Monica Prado, Margot Kolonko, Monica Hagedorn and external co-operation partners (see publication)

*Figure:* Transmission electron microscopy image of a mycobacterium during its exit from a cell ("egress"). Marked is an inclusion body (autophagosome) at the rear pole of the bacterium, which will close the membrane gap after egress has been completed.
Sickle cell disease is an inherited disorder prevalent only in populations from malaria endemic areas. Affected children may suffer from pneumonias and other life-threatening complications early in life. Therefore, in many countries of the world including France, Belgium, the Netherlands and Great Britain – not in Germany, however – newborns are routinely tested for the condition in screening programmes. Thus, they can be protected by antibiotic treatments and vaccinations right from birth and all affected children in these countries nowadays reach adulthood.

Together with colleagues from the University Medical Center Hamburg-Eppendorf, we have found that, in Hamburg, 1 out of 2400 children is born with sickle cell disease, which is more frequent than any disease included in the German newborn screening programme. Most affected are children of the largest Ghanaian community in Germany comprising an estimated 20,000 members. Together with the Intercultural Migration Integration Centre (IMIC), we inform the Ghanaian community in Hamburg about inheritance and consequences of sickle cell disease in order to reach as many carriers of the sickle cell trait as possible. First results indicate that every fifth citizen of African descent carries the trait. If both parents are carriers, statistically one out of four children will be born with the disease. Our study is supported by the “Association of Friends of the Institute for Tropical Medicine, Hamburg”.

Grose R et al., Pediatr Blood Cancer. 2015, 63:168-70

Christian Timmann, Christa Ehmen, Birgit Mautau, Bernd Nöck and external co-operation partners (see publication)

Figure: A project partner distributes information material on sickle cell disease during a service of an African religious community in Hamburg.
From 1.11.2011 to 31.12.2015, the institute took an important first step towards applying its competence in the diagnostics of tropical and emerging infections to commercial product development. In a public-private partnership with the Hamburg company Altona Diagnostics (ADT), which was generously supported by the European Regional Development Fund (ERDF), we established a platform to develop marketable diagnostic test kits. While ADT broadened its portfolio of PCR-based tests, the institute complementarily focused on serological assays to be applied later in the course of an infection. Thus, the partners can jointly offer a set for a continuous infection diagnostics. In the project, tests have been developed for West Nile fever, Crimean Congo haemorrhagic fever and various serotypes of Dengue fever. The serological assays are based on a novel method for detecting antigen-antibody complexes freshly formed in the test tube, which is substantially more sensitive and specific than established systems. As for quality management, well-defined reference samples are indispensable, and therefore, controlled storage capacities and an electronic sample administration were installed. Samples previously collected in the institute were registered and, through missions to Asia, Africa and South America, complemented by samples required for on-going test development. At present, BNITM has a collection of more than 300,000 reference samples at its disposal.

Figure: First draft of a package for diagnostic test kits of BNITM.
of them in high impact journals. KCCR laboratories are well equipped with state-of-the-art equipment with support from BNITM for cutting-edge biomedical research. The existing biosafety level three (BSL3) laboratory has recently been upgraded to handle the training of scientists within the West African subregion with funding from the German Ministry of Foreign affairs. There are currently six research groups actively conducting cutting edge research in diverse biomedical fields addressing non-communicable diseases in the tropics, tuberculosis, Buruli ulcer, ageing, lymphatic filariasis, onchocerciasis, paediatric fevers as well as viral zoonoses.

Projects on Buruli ulcer seek to identify biomarkers that predict early response to treatment and to understand oedematous disease and the influence of *Mansonella perstans* co-infection and doxycycline treatment on host immunity against mycobacterial disease and disease susceptibility in children and adolescents. The haematology group funded by the University of Pittsburgh examines the progressive deterioration in organ function with age and to identify generic markers of specific organ dysfunction and end-organ damage in sickle cell disease patients at the Komfo Anokye Teaching Hospital. Medicine in the Tropics group examines cohort of hypertensive and diabetes mellitus patients for clinical outcomes over a period five years. Others include assessing the burden of drug resistant tuberculosis (MDR/XDR TB) and immunological assays to diagnose tuberculosis in children. Studies on the genotypic prevalence of HPV infection among women in Kumasi and use of electronic health information and surveillance system to develop and evaluate a basic, symptom-oriented clinical algorithm at the Agogo Presbyterian Hospital, have been completed. This group recently hosted the dissemination of findings of a multicentre project on obesity and type 2 diabetes mellitus (T2DM) among migrant Ghanaian populations in Europe and their counterparts in rural and urban Ghana (RODAM) in Accra with major stakeholders from across Africa and Europe. Projects on filariasis examine a combination of ivermectin plus albendazole compared to ivermectin alone. Other studies examine the use of SNPs as biomarkers for identifying persons at greater risk of developing pathology. The virology and zoonoses group examines the biology and ecology of bats and human determinants as possible factors for disease transmission. The paediatric fevers group examines different causes of fever in children with unknown causes of fever in selected populations in the Ashanti region of Ghana.

During the year, the centre commenced accreditation for Ebola Virus Disease (EVD) diagnostics and is spearheading training of scientists in some selected francophone countries within West Africa. Having plans to build a critical mass of Scientists, the centre has recently cut sod for the construction of state-of-the-art cool house for the creation of biorepository for teaching and research with funding from the Volkswagen (VW) foundation. Three PhD and MPhil students have completed their thesis work while eleven others (seven PhDs and four MSc/Mphil) have been enrolled in the current year. KCCR hosted several skills training programs for scientists and students such as Basic and advance statistics, Certificate Course in Tropical Medicine and Bioinformatics. KCCR works with the Office of Grants and Research at KNUST to organize skills and training to several young scientists in scientific writing and scientific proposal writing. Several life-science students have done their National Service and internships at KCCR from various institutions within and outside of Ghana.

The centre is grateful to the current and past funders such as Beausus-Foundation; German Research Foundation (DFG); European Union, German Federal Ministry of Research and Education (BMBF), BNITM; GIZ, Gesellschaft für internationale Zusammenarbeit, German Center for Infection Research (DZIF); Gilead Sciences, National Institutes of Health (NIH); LOYOLA University USA; Deutsche Lepros-und Tuberkulosehilfe (DAHW); Canadian Institute of Health Research (CIHR); Bill and Melinda Gates Foundation; VW Foundation; Federal Ministry of Foreign Affairs Germany; and the University of Pittsburgh.
The year 2014 was marked by the Ebola epidemic in West Africa and the resulting challenges. Our soldiers had to be protected against a potential outbreak of disease, particularly in the Mali theatre of operations. Capabilities for transporting and treating patients in Germany and abroad had to be developed. The Department of Tropical Medicine was involved in one way or another in all scenarios. In August, the Department of Tropical Medicine assisted its cooperation partner, the University Medical Centre Hamburg-Eppendorf, in the treatment of the first patient diagnosed with Ebola in Germany. It contributed to the medical care of this patient, which required a large number of personnel. A few weeks later, a Medical Service officer was dispatched to the University Hospital Frankfurt to also assist in the treatment of an Ebola patient.

The Department provided German volunteers with specialist and practical training for the mission to deliver humanitarian aid to West Africa (HumHiWA). At the NCO school in Appen, 129 participants were trained, 70 of whom were eventually deployed to Monrovia in Liberia. From the advance party in October 2014 up to the completion of the mission in early March 2015, personnel of the Department were involved. At the end of the year, Department Head Dr. Hinrich Sudeck (Lieutenant Colonel, Medical Corps) left the Department, the Bundeswehr and his active medical work for a well-deserved retirement.

Special diagnosis of tropical diseases and infection epidemiology

In 2014 the special research project „New development and evaluation of molecular diagnostic processes for detecting pathogens and for symptom-oriented clarification of infectious tropical diseases“ was completed. The focus was on evaluating 16S rRNA gene sequencing procedures for blood culture testing in the tropics using samples retained from blood cultures in Ghana, on testing commercial beta-lactamase polymerase chain reactions (PCRs) using swabs from Malagasy volunteers, and on supplementing the molecular gastroenteritis panel used in the Department with in-house real-time PCRs for soil-transmitted helminths and African schistosomes. As a result, the faeces of children from the highlands of Madagascar showed rates of schistosomiasis higher than 70%. A comparative study of serological test methods for the diagnosis of schistosomiasis was carried out to meet the growing demand for screening tests for soldiers returning from the tropics which fulfilled quality control criteria.

Entomology

Since 2013, this subunit has been a cooperation partner in a project that is part of the Program for Excellence in Biological and Health Security, which is financed by the German Federal Foreign Office. Various public institutions in Kosovo act as partner organisations. The main focus of the project is on the diagnosis and surveillance of Crimean-Congo haemorrhagic fever in Kosovo. The virus causing the infection is spread by the bite of ticks of the genus Hyalomma. Their geographic distribution, frequency of infestation and phylogeography of isolated virus strains were examined. Of more than 1000 ticks, 3.6% tested positive for the virus. The virus isolates belong to two genetic lines. Outside of the pathogenic line, an isolate has been identified in Kosovo for the first time. This isolate is related to supposedly apathogenic lines in Greece and Turkey.
Courses
The objective of the Diploma Course is to prepare physicians for professional missions in tropical and subtropical countries, to teach them the skills to diagnose and to treat tropical diseases in travellers and migrants and to enable them to provide pre-travel health advice.

The central topics of the Diploma Course are human diseases that are especially prevalent in tropical and developing countries. Teaching focuses on the pathogenesis, diagnosis, clinical presentation, treatment, epidemiology and prophylaxis of parasitic, bacterial, viral and non-communicable diseases in tropical environments. In addition, the biology, epidemiology and control of pathogens as well as their vectors and reservoirs are addressed. Further topics include the particular features of the various clinical disciplines in tropical environments, aspects of community health in low-income countries, structures of medical developmental cooperation, and health in emergencies.

The curriculum is divided into twelve sections of one week each. Differential diagnosis is the major guideline for the curriculum. Taxonomy is an additional criterion in order to facilitate systematic learning. Entomology is considered in its relation to the etiology and transmission of disease. Malaria, tuberculosis and HIV/AIDS, because of their outstanding relevance, are regarded as separate topics.

Scientific coordinator:
Prof. Dr. Christian G. Meyer
INSTITUTE LECTURERS

PD Dr. Norbert Bratzig; PD Dr. Milena Breidbach; Prof. Dr. Iris Brechbühler; PD Dr. Joachim Ciez; Dr. Jakob Comer; Dr. Torsten Feldt; Prof. Dr. Bernhard Fleischer; Dr. Martin Gabriel; Prof. Dr. Ralf Gaub; Prof. Dr. Stephan Günther; Prof. Dr. Ralf Hurntman; Dr. Christian Keller; Dr. Ralf Krumkamp; Prof. Dr. Jürgen May; Prof. Christian G. Meyer; Dr. Berndt Noack; Prof. Dr. Paul Raci; PD Dr. Jonas Schmidt-Chanasit; Prof. Dr. Herbert Schmidt; Dr. Michael Schreiber; Prof. Dr. Eberhard Tannich; PD Dr. Dennis Tappe; Dr. Klara Tenner-Racz; Dr. Christian Timmann

EXTERNAL LECTURERS

Prof. Dr. Marylyn Addo; University of Minnesota, USA; PD Dr. Kei-kawas Arai Kunito; August-Wilhelm Ehrlich, Berlin; Dr. Mary Atton-Yelagin; Entomologist, labors; Dr. Michael Riedel; Gynaecologist, Hamburg; Dr. Christoph Dehne; Witten University Medical Center; Dr. M. Mannih Dole Aneuctologist, Hamburg; Dr. Kurt-Otmar Eisele; Eisele Medical Examination Office, Hamburg; Dr. Thomas Faehren Labor Dr. Faehren and Kölken; Hamburg; Dr. Manzil Fischer Fundamenteral Hospital, Hamburg; Rainer Fleischmann Medical Mission Institute, Wiesbaden; Dr. Antje Ful; Medical Mission Institute, Wiesbaden; Dr. dent. Roland Gans; Eisele Private University, Krefeld; Bernd Gollan; Cap Asnyn; Cologne; Dr. Matthias Gras; Christian Hospital Guetskindt, Quaken- bruck; Prof. Dr. Wolfgang Gransinger University Hospital, Vienna; General Hospital, Vienna; Dr. Johannes Granitsch; Ophthalmologist, Dis- sembra; Dr. Gunar Gansier Research Center Borstel, Borstel; Prof. Volker Heuserer Institute of Geology, Bern; Prof. Dr. Klaus Holf- mann Center for Psychiatry, Eichstett; Dr. Frank Hörnig; Dörflendorf, Dortmund; Dr. Elizabeth John; Consultant Epidemiologist, London; Prof. Dr. Klaus Käthein Carl Zeiss Microscopy GmbH, Göttingen; Prof. Dr. Volker Kaul; Ophthalmologist, Marsch; Prof. Dr. Michael Krawinkel Institute for Nutrition, University of Göttingen; Dr. Beate Krousial University Medical Center Hamburg-Eppendorf, Hamburg; PD Dr. Andreas Krüger; Krankenhaus Hospital, Hamburg; Dr. Günter van der Meer; Federal Foreign Office / Medical Service (FOMS), Berlin; Prof. Dr. Christoph Lange Research Center Borstel, Borstel; Prof. Dr. Ute Lippert Occupational Health Office, Hamburg; Prof. Dr. Thomas Lüscher Department of Infectious Diseases & Tropical Medicine at the University of Munich, Munich; PD Dr. Stefan Luth University Medical Center Hamburg-Eppendorf, Hamburg; Prof. Dr. Dieter Meiss Institute of Forensic Medicine, Frankfurt/Main; Dr. Carlos E. Minella de la Garce; CDC, Wiesbaden, Wiesbaden; PD Dr. Peter Muller Department of Pa- cifications and Adolescent Medicine, Ulm University Medical Center; Dr. Andreas Meyer General Practitioner, Hamburg; Dr. mening Matheren University Hospital, Geneva, PD. Dr. Matthias von Müller Medical Service Lufthansa AG, Lenerath; Dr. Ellis Swiss-Bio University of Karachi, Ghana; Prof. Dr. Istvan National Reference Center for Yersinia, Göteborg, Dr. Dieter Reinheit Dermatologist, Hamburg; Dr. Matthias von Rotenbach Gynaecologist, Bremen; Dr. Camilla Roth University Medical Center Hamburg-Eppendorf, Hamburg; Dr. Sabine Rösch-Götz Medical Research Center Borstel, Borstel; Johannes Schabell, Chair for Tropical Diseases, Paul-Leshof Hospital, Hamburg; Dr. Salvatore Schmidt R-af Medical Service, Munich; Dr. Peter Schmitz Institute for Hygiene and Public Health, University of Bremen; Dr. Urs Schmidt; University Hospital for Neurology, Berlin; Prof. Dr. Walter Siebke Pediatric Surgery, Dublin University Medical Center Schloßwanger-Holstein, Campus Lübeck, Dr. Michael Stockow Cen- tre for Clinical Research, Kiel; Prof. Dr. August Sticht Medical Mission Hospital, Wiesbaden; Dr. Tankerd Stolpe Medical Services, sans Froh- teres, Berlin, Dr. Günther Tirschek Meteorologist, Dornbirn; Dr. Urs Tissi-Kleinhuth, Lindau; Dr. med. Klaus J. Vollmer Central for Tropical Medicine, Heidelberg; Dr. Ute Vieweg Medical Mission Institute, Wiesbaden; Dr. Dominick Wieloch University Medical Center Hamburg-Eppendorf, Hamburg; Dr. Urs Wight; University, Switzerland; Dr. Neuer-Andreas Wellberg Consultant, Potsdam; Dr. Michael Zöllfel Carl Zeiss Microimaging, Göteborg
The course provides basic knowledge and skills in tropical medicine and explicitly addresses the topics of public health and health care management in the tropics. The courses in the years 2014 and 2015 were both held in February.

**TARGET GROUPS:**
Medical staff (nurses, technical assistants, midwives, health economists, etc.) preparing for professional assignments in tropical low-income countries.

### Course for Medical Support Staff – 03.02. to 21.02.2014 and 02.02. to 20.02.2015

#### MEDICINE IN THE TROPICS

**Contents:**
- Tropical infectious diseases: malaria, leprosy, tuberculosis, schistosomiasis and other helminth diseases, viral infections
- Arthropods as vectors
- Malnutrition
- Update on global epidemics, basic epidemiology
- General aspects: obstetrics, family planning, paediatrics, venereal diseases, dermatology, HIV/Aids, travel medicine etc.
- Physical examination of patients, laboratory techniques, microscopy
- Socio-cultural comparison of health systems
- Intercultural competence
- Hygiene, drinking water
- Nursing practice in the tropics
- Presentation of organisations for international cooperation
- Information systems, literature and internet search
- Teamwork

**Scientific coordinator:**
Prof. Dr. Christian G. Meyer

Historical photograph

Participants of the Course for Medical Support Staff 2015
The course provides latest knowledge in tropical medicine. It addresses recent disease outbreaks incl. possible disease control, emerging infections, healthcare management in low-income countries as well as topics of travel and migration medicine.

Scientific coordinator:
Prof. Dr. Christian G. Meyer

Course for Physicians – 18./19.10.2014

LATEST INFORMATION ON TROPICAL MEDICINE

The curriculum provides a comprehensive approach for providing health services to refugees – against the background of an increasing number of refugees and asylum seekers in Germany. The course is intended for general practitioners, physicians in public health departments and others involved in the care for these patients. Main topics are: health care delivery for refugees in Germany, social aspects of migration, intercultural competence, implications of violence and trauma, geographical distribution of infectious diseases and important differential diagnoses, non-communicable diseases in refugees, children and unaccompanied minors, screening of migrants.

Scientific coordinator:
Prof. Dr. Gerd Burchard

Course for Physicians – 28./29.11. and 12./13.12.2015

COURSE – “REFUGEE HEALTH”

The course is intended for physicians interested in tropical medicine, in particular former participants of the “Diploma Course on Tropical Medicine” at BNIHM. It addresses recent advances in tropical medicine, including new results from basic research and new recommendations based on clinical guidelines and epidemiological studies.

Training of microscopic examinations for parasites was offered one preceding Friday afternoon (30 October).

Scientific coordinator:
Prof. Dr. Gerd Burchard

Course for Physicians – 27./28.06. and 31.10./01.11.2015

REFRESHER TROPICAL MEDICINE

The course is intended for physicians interested in tropical medicine, in particular former participants of the “Diploma Course on Tropical Medicine” at BNIHM. It addresses recent advances in tropical medicine, including new results from basic research and new recommendations based on clinical guidelines and epidemiological studies.

Scientific coordinator:
Prof. Dr. Christian G. Meyer

Training of microscopic examinations for parasites was offered one preceding Friday afternoon (30 October).

Scientific coordinator:
Prof. Dr. Gerd Burchard
Facts and Figures
Third-party funding has been received from the following organisations:

- Alexander von Humboldt Foundation
- Becton Dickinson GmbH
- BioLegend GmbH
- Bio-X-Charge
- Medical University of Vienna Department of Virology
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
- Else Kröner Fresenius Foundation
- Euroimmun AG
- European Union (EU)
- European and Developing Countries Clinical Trials Partnership (EDCTP)
- European Federation of Immunological Societies (EFIS)
- Federal Ministry of Health (BMG)
- Federal Ministry of Food and Agriculture (BMEL)
- Foundation for the National Institutes of Health
- GeoSentinel-Netzwerk
- Gilead Sciences GmbH
- German Academic Exchange Service (DAAD)
- German National Academy of Sciences Leopoldina
- German Federal Environment Agency (UBA)
- German Federal Foreign Office
- German Federal Ministry of Education and Research (BMBF) / DLR
- German Leprosy and Tuberculosis Relief Association (DAHW)
- German Research Foundation (DFG)
- Hamburg State Office of Science and Research (BWF)
- Helmholtz Centre for Infection Research (SEEL/ZIEP) GmbH
- INSTAND e.V.
- International Union of Immunological Societies (IUIS) Education Committee
- International Vaccine Institute
- IUIS Education Committee
- Joachim Herz Stiftung
- Jürgen Manchot Stiftung
- Kirmser-Stiftung
- Leibniz Association
- Robert Koch Institute (RKI)
- Stiftung Diagnostik Hilft
- The Rockefeller University
- Vereinigung der Freunde des Tropeninstituts Hamburg e.V.
- Volkswagen Foundation
- Werner Otto Foundation

Performance Indicators

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<td>Library³</td>
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<td>Inventory</td>
<td>46,715</td>
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<td>Journals</td>
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<td>Inter-Library Loans</td>
<td>2,347</td>
<td>2,294</td>
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<tr>
<td>KCCR⁴</td>
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<tr>
<td>Projects at KCCR</td>
<td>21</td>
<td>19</td>
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<tr>
<td>External Projects</td>
<td>9</td>
<td>9</td>
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</tbody>
</table>

¹Lessons per semester week

2014 2015
mil. EUR mil. EUR

Public Core Funding from Federal and State Sources 13.5 13.4
Public Funding for Investments 1.6 1.4
Third-Party Funding 9.6 9.3
Forwarded to Co-operation Partners 3.0 1.1
Retained by BNITM 6.6 8.2
Additional Revenue 1.6 1.5

Third-party funding has been received from the following organisations:

- (public funding from DFG, federal, state, and EU sources; funding from foundations, private donors, and other research funding sources, as well as income from services and licensing fees)

- Alexander von Humboldt Foundation
- Beacon Dickinson GmbH
- Bio-X-Charge
- Medical University of Vienna Department of Virology
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
- Else Kröner Fresenius Foundation
- Euroimmun AG
- European Union (EU)
- European and Developing Countries Clinical Trials Partnership
- European Federation of Immunological Societies (EFIS)
- Federal Ministry of Health (BMHE)
- Federal Ministry of Food and Agriculture (BMEL)
- German Academic Exchange Service (DAAD)
- German National Academy of Sciences Leopoldina
- German Federal Environment Agency (UBA)
- German Federal Foreign Office
- German Federal Ministry of Education and Research (BMBF) / DLR
- German Leprosy and Tuberculosis Relief Association (DAHW)
- German Research Foundation (DFG)
- Hamburg State Office of Science and Research (BWF)
- Helmholtz Centre for Infection Research (SEEL/ZIEP) GmbH
- INSTAND e.V.
- International Union of Immunological Societies (IUIS) Education Committee
- International Vaccine Institute
- IUIS Education Committee
- Joachim Herz Stiftung
- Jürgen Manchot Stiftung
- Kirmser-Stiftung
- Leibniz Association
- Robert Koch Institute (RKI)
- Stiftung Diagnostik Hilft
- The Rockefeller University
- Vereinigung der Freunde des Tropeninstituts Hamburg e.V.
- Volkswagen Foundation
- Werner Otto Foundation

1 Teaching and Training
   Knowledge transfer comprises university teaching.

2 Laboratory Diagnostics of the
   Diagnostic Services GmbH
   Number of Cases:
   Number of recorded submissions of samples.
   Number of Tests:
   Number of performed tests.

3 Reference Library for
   Tropical Medicine
   The library participates in a nationwide loan process. Inventory and usage are recorded.

4 KCCR
   Kumasi Centre for Collaborative Research in Tropical Medicine
   Number of projects administered and number of external projects not involving BNITM, respectively.
Staff
A) SCIENTIFIC STAFF

(*) end of employment during the reporting period; in brackets = partial or full third-party funding

### Molecular Parasitology Department

**Molecular Parasitology Department**

Prof. Dr. Egbert Tannich; Prof. Dr. Iris Bruchhaus; Dr. Anna Bachmann*; Dr. Hannah Bernin (DZIF); Dr. Thomas Kruppa*; PD Dr. Hannah Lorenz; Dr. Jenny Matthiesen; Dr. Christina Czajka* (DZIF); Dr. Tatiana Sulesco* (EU, COST)

**Doctoral and Graduate Students**

Tohiko Aiba* (Keio University); Hannah Bernin (Warner-Otto-Stiftung); Jannika Brandt* (NIH); Siew Ling Choy (LCI); Michael Dörpinghaus*; Ellen Drews*; Helena Fehling (DFG); Steve Giesler; Sven-Hendrik Hagen (LCI); Karolin Hildebrandt*; Mayke Leggewie (SAW); Corinna Lender*; Pedro Lubiana (DFG); Renke Lühken* (UBA); Nahla Metwally (DAAD); Martin Meyer (Jürgen-Manchot-Stiftung); Melina Mühlenpfordt; Toshiko Aiba* (Keio University); Nahla Metwally (DAAD), Suez Canal University, Ismaelia, Egypt; Dr. Tatiana Sulesco* (EU, COST), Institute of Zoology, Academy of Sciences, Chissinau, Moldova

**Technical Staff**

Monja Paasche

**B) Cellular Parasitology Department**

**Scientific Staff**

Prof. Dr. Tim Gilberger; Dr. S. Erkelens; Dr. Maia Konu*; Dr. J. Ransow

**Doctoral and Graduate Students**

Arne Acker; Michael Gagel; Dorothee Heincke (UHH)*; Viola Luderowski*; Daphne Saha (DAAD)*; Johanna Wenzel (McMaster); Louise Wikle (UHH); Bethny Windlformann; Tatsiana Weng (McMaster)

**Technical Staff**

Monja Paasche

**C) Leishmaniasis Group**

**Scientific Staff**

PD Dr. Joachim Clos; Eugenia Bifeld (EU); Ilhama Chalbi*; Dr. Anja Hombach-Barrigah* (DFG)

**Doctoral and Graduate Students**

Katharina Baruch (DFG); Jannika Baruch* (DFG); Julia Erić (EU); Paloma Téjera Narváez (EU); Victoria Sarda*; Hennaz Ziepold

**Technical Staff**

Marina Budaniche; Andrea Maudslay; Dominika Zander

**Student Trainees**

Michaela Beckmann; Linus Fohrmann; Laura Jade Last* (DFG); Kristina Riedler*

**Visiting Scientists**

Lucie Colineau*, MSc, University of British Columbia, Vancouver, Canada; Frank Dumetz*, MSc, Flemish Organization for Science, Institute of Tropical Medicine, Antwerp, Belgium; Prof. Elyes Zhioua*, (DFG), Pasteur Institute, Tunis, Tunisia

**Associated Scientists**

in the Molecular Parasite Department

**Scientific Staff**

Dr. Eric Boyer* (Re-entry); Prof. Dr. Rolf D. Garms; Dr. Thomas Kruppa; Dr. Susanne Wiest (Re-entry)

**Technical Staff**

Steff van Hoon
Appendix
LECTURES AND SEMINARS OF BNITM STAFF AT THE UNIVERSITY OF HAMBURG

Faculty of Medicine

<table>
<thead>
<tr>
<th>Course</th>
<th>WS</th>
<th>SS</th>
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<tbody>
<tr>
<td>Elective course: Tropical and travel medicine, 12 weeks</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Egbert Tannich, Gerd Burchard / Jakob Cramer</td>
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<tr>
<td>Introduction to tropical medicine / Basic knowledge on tropical medicine; seminar, 1 hour</td>
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<tr>
<td>Rolf Hermann, Christian Timmann, Jürgen May</td>
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<tr>
<td>Human genetics of infections and other common diseases, seminar, 2 hours</td>
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<tr>
<td>Rolf Hermann, Christian Mayer, Thorsten Thye, Christian Timmann</td>
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<tr>
<td>Epidemiology and control of tropical diseases, 2 hours</td>
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<tr>
<td>Jürgen May, Norbert Schmuck, Rolf Krumkamp, Daniel Eibach, Christian Timmann, Rolf Hermann</td>
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<tr>
<td>Introduction into molecular parasitology, 2 hours</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Egbert Tannich, Anne Bachmann, Jörn Bruchhaus, Jacob Cramer, Stefanie Becker, Tobias Spielmann</td>
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<tr>
<td>Current results of basic research in parasitology; seminar, 2 hours</td>
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<tr>
<td>Egbert Tannich and co-workers</td>
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<tr>
<td>Current problems in parasitology, seminar, 1 hour</td>
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<tr>
<td>Egbert Tannich, Anne Bachmann, Jörn Bruchhaus, Jacob Cramer, Stefanie Becker, Tobias Spielmann</td>
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<tr>
<td>Introduction into immunology for medical students, lecture, 1 hour</td>
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<tr>
<td>Bernhard Fleischer and co-workers</td>
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<tr>
<td>Introduction into immunology and on-studytrack molecular biology, seminar, 2 hours</td>
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<tr>
<td>Bernhard Fleischer and co-workers</td>
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<tr>
<td>Immunological literature, seminar, 1 hour</td>
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<tr>
<td>Bernhard Fleischer and co-workers</td>
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<tr>
<td>Immunological aspects of host-pathogen interactions in infectious diseases, 2 hours</td>
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<tr>
<td>Paul Racz, Klara Tenner-Racz</td>
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<tr>
<td>Cross-disciplinary subject immunology / infectious diseases, seminar</td>
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<tr>
<td>Bernhard Fleischer and co-workers</td>
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<tr>
<td>Practical vaccination and travel medicine, course, 2 hours</td>
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<tr>
<td>Jakob Cramer</td>
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Faculty of Biology and Chemistry

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<th>Course</th>
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<td>Molecular parasitology, lecture, 3 LP</td>
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<tr>
<td>Jörn Bruchhaus, Hannes Luette, Jacob Cramer</td>
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<td>Molecular parasitology, practical course, 9 LP</td>
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<td>Jörn Bruchhaus, Hannes Luette, Jacob Cramer</td>
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<td>Special evening, 2 hours</td>
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<td>Stephan Gschender</td>
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<tr>
<td>Immunological course and literature seminar, block seminar, 6 hours, 4 weeks</td>
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<tr>
<td>Mirka Broich, Thomas Jacob, Bernhard Fleischer and Matthias Schnitzlein</td>
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<tr>
<td>Immunological literature seminar, 1 hour</td>
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<tr>
<td>Bernhard Fleischer and co-workers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cellular and molecular immunology, lecture, 2 hours</td>
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</tr>
<tr>
<td>Mirka Broich, Bernhard Fleischer, Thomas Jacob</td>
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<td></td>
</tr>
<tr>
<td>Current results in immunology, seminar, 1 hour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bernhard Fleischer and co-workers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Elective course: Tropical and travel medicine for medical students at the University of Hamburg

Tutors

Prof. Dr. Gerd-Dir. Herzog (DS 2014, WS 2014/2015) and Dr. Jakob Cramer (DS 2015) (course for clinical tropical medicine)

Prof. Dr. Egbert Tannich (course for theoretical tropical medicine)

Elective course: Tropical and travel medicine

This course provides students who show a special interest in tropical and travel medicine the opportunity to focus their course work. Therefore, this option has been offered for several years in cooperation with the University Medical Center for a maximum of six selected medical students. The subject of tropical and travel medicine is particularly suited for an interdisciplinary lesson because:

- it is not related to one organ, tropical diseases generally affect many organ systems;
- tropical medicine is a typical cross-disciplinary subject, which includes not only internal medicine training but also theoretical, diagnostic, surgical and microbiological aspects;
- it addresses not only aspects of curative medicine but also public health.

The course runs over 12 weeks and takes place twice a year starting in October and January.

Announcement and registration via websites of the Faculty of Medicine:

www.uke.uni-hamburg.de/studierende
PD Dr. Norbert Schwarz
Clinical Research & Epidemiology Section
Research Unit: High (Infectious Demar Section)

Offices and Posts
Secretary, DWG Lawyers (June 2015)
Director, German Export Promotion for Geothinex in Biological and Health Security (BADM)

Teaching
Establishment of a computer study platform on BMG (together with Heike Muth)
Institut Medizinische Klinik Hamburg-Eppendorf (IMK) (2014)
Introduction to Epidemiology for the online program Public Health, University of Applied Sciences Hamburg (BtW)
BMHI, Diploma Course on Tropical Medicine
BMHI, Medicine in the Tropics – Care for Medical Support Staff (since 2004)

Dr. Tobias Spielmann
Pharmacology Section
Head, Respiratory Drug Group (BtW)

Offices and Posts
Editor, Euros 2015 (2013)
Editor, Medicinal and Biological Pharmacology (June 2015)
Editor, Charitè (June 2015)
Editor, Clinical Research & Epidemiology (since 2013)

Invited Speaker
Bundeswehrkrankenhaus Hamburg (02/2014, 06/2014, 09/2014)

Parasitology Section
Dr. Tobias Spielmann

BNITM, Medicine in the Tropics – Course for Medical Support Staff

PD Dr. Dennis Tappe
Infectious & Medical Section

Offices and Posts
Head, Tuberculosis and Mycobacterial Infections (BtW)
Senior Consultant, Germany (2013)

Invited Speaker
Bundeswehrkrankenhaus Hamburg (08/2014)

Dr. Christian Timm
Clinical Research in Parasitology Section

Media Response 2014
Overall >1802 Reports Print, Radio, TV
>4250 Reports Online

Report

Reports

Television

Print, Radio, TV

Newspapers & Magazines

Radio

TV

News Agencies

Journals

BNITM in the Media

116
In the historic lecture hall of the Institute, 150 international scientists meet for the annual LC-Symposium, which this year has the topic “Pathogenesis of Infection.”

At the beginning of the Ebola outbreak, a European team headed by Prof. Stephan Günther departs on behalf of the WHO with “European Mobile Laboratories” to West Africa with a research group of the department of Prof. Gilberger. The spread of the Ebola epidemic in West Africa raises huge public interest. In order to meet the needs for information, the Institute organizes a press conference. The workshop Prof. Stephan Günther and Dr. Jonas Schmidt-Chanasit, as well as the physician Dr. Stefan Schwerdel from the Hamburg-Noth水晶 clinic of the ifh answer questions from approximately 30 media representatives.

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In the course “Medicine in the Tropics” for medical support staff, 25 participants receive training in tropical diseases, public health and health care management in low-income countries.

At the 6th LC-Symposium entitled “Emerging Infections”, 150 scientists discuss recent disease outbreaks, in particular the Ebola epidemic, the spread of amoebiasis, sleeping sickness and Chagas disease.

The first workshop of the international training program “EVIDENT”, which is funded with €665,580) contributions from science, donor organisations and industries discusses concepts to combat neglected tropical diseases.

The diary of a PhD student, published in the German newspaper “Süddeutsche Zeitung”, gains huge public interest. In her diary, Lisa Grombach describes her service in a “European Mobile Laboratory” during the peak of the Ebola epidemic in West Africa.

At the annual Diploma Course on Tropical Medicine is followed by the BNITM staff summer party.

At a meeting of the “Rwanda Research Network on Neglected Tropical Diseases (ARNTD)”, representatives from science, donor organisations and industries discuss concepts to combat neglected tropical diseases.

At the “Association of Friends of the Tropical Institute Hamburg” (HfV) awards Dr. Maria Helena Callejo Fernández from the Mary Group and Dr. Anja Hambach from the Class Group each with its annual Doctoral Award and €1,000 prize. Dr. Fernández’s doctorate addresses different forms of life-threatening malaria during childhood. Dr. Hambach analysed how targeted mutations affect the reproduction of Leishmania. The awards ceremony is followed by the BNITM staff summer party.

The “Institute of Tropical Medicine and Public Health” (Bundeswehr Medical Service) starts Transmission Control of Infections.

The “Association of Friends of the Tropical Institute Hamburg” (HfV) awards Dr. Maria Helena Callejo Fernández from the Mary Group and Dr. Anja Hambach from the Class Group each with its annual Doctoral Award and €1,000 prize. Dr. Fernández’s doctorate addresses different forms of life-threatening malaria during childhood. Dr. Hambach analysed how targeted mutations affect the reproduction of Leishmania. The awards ceremony is followed by the BNITM staff summer party.

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The diary of a PhD student, published in the German newspaper “Süddeutsche Zeitung”, gains huge public interest. In her diary, Lisa Grombach describes her service in a “European Mobile Laboratory” during the peak of the Ebola epidemic in West Africa.
30.05. – 26.06.2015 During the Diploma Course on tropical medicine, 50 physicians and other scientists obtain a diploma in tropical medicine. Behind a one-year service at a tropical institute and a course in the tropics, this diploma is a prerequisite for the additional title "tropical medicine" on behalf of the German Medical Association.

09. – 13.04.2015 The kick-off symposium "From Molecules to Organisms" of the CSSB takes place in the historic lecture hall of the BNITM. More than 130 international scientists exchange their latest results in systems biology and their role in infection research. Senator Dr. Dorothee Stapelfeldt, Petra Herz from the Joa- chim Herz Foundation and CSSB director Dr. Matthi- us Willmanns open the symposium.

01.05.2015 Head of Arbovirology, Dr. Jonas Schmidt-Chanasit, receives €437,310 from the Federal Ministry of Food and Agriculture for a subproject called "Gulf- Kid". His team will monitor the geographical and seasonal occurrence of mosquito species in Germany and the diseases they can transmit. The data will be incorporated in the German mosquito database, EUABASE, to facilitate risk assessments.

27.06.2015 The "Association of Friends of the Tropical Institute Hamburg" (VdF) organizes for the first time a summer party in the institute’s garden and invites current and former graduates of the Diploma Course to recruit alumni members.

27.08.2015 The "Association of Friends of the Tropical Institute Hamburg" (VdF) organizes for the first time a summer party in the institute’s garden and invites current and former graduates of the Diploma Course to recruit alumni members.

26.09.2015 The "Association of Friends of the Tropical Institute Hamburg" (VdF) organizes for the first time a summer party in the institute’s garden and invites current and former graduates of the Diploma Course to recruit alumni members.

23.09.2015 During the general meeting of the "Association of Friends of the Tropical Institute Hamburg" (VdF), the annual Doctoral Awards are handed over to Dr. Inna Hohen (Bremer Group) for her thesis "Influence of a chronic warm infection on the vaccinologi- cal response in mice." and Dr. Maria Lehmann (Virology Department) for her thesis "Structure and function of the aerosolized L protein."

14.09.2015 A delegation of representatives of all parliamenta- ry parties of the Legislative Assembly of Saint-Petersburg visits Hamburg and expands its sightsee- ing to the BNITM. The Hamburg City Parliament has maintained a parliamentary partnership for almost 25 years.

27.06.2015 The "Association of Friends of the Tropical Institute Hamburg" (VdF) organizes for the first time a summer party in the institute’s garden and invites current and former graduates of the Diploma Course to recruit alumni members.

17. – 18.09.2015 The "German-African Cooperations on Infection Research Search" workshop takes place. The kick-off meet- ing for the national research platform for zoonoses in association with the German Center for Infection Research (DZIF) takes place at the Institute. Around 80 African and German scientists discuss infectious diseases such as Ebola and avian flu.

19.09.2015 NAO Centre of Excellence for Military Medicine

19.10.2015 Dr. Jonas Schmidt-Chanasit accepts appointment as a W2 professor for "Arbovirology" at the University of Hamburg and establishes his own research group at the Institute.

07.11.2015 At the Night of Science (Nacht des Wissens), 1,700 visitors attend a programme of short lectures and experiments. "There was a lot to learn and see. There must have been a lot of effort to turn our visit into an exciting experience," writes 12-year-old Paul from Illenhagen in the programme.

13. – 14.11.2015 The German Society for Parasitology (DGfP), the German Society for Tropical Medicine and Interna- tional Health (DGfT) and the Paul-British Society for Chemotherapy (PBG) hold the 13th Malawian Meet- ing with more than 90 international participants. The programme comprises keynote lectures, over 80 short talks and posters about the epidemiology, molecular biology, immunology, diagnostics and treatment of malaria.

28. – 29.11, 8. – 13.12.2015 In view of the growing number of refugees and asylum seekers in Germany, the BNITM offers two weekend courses on "Refugee Health". The inter- est was unexpectedly high with 120 participants.

December 2015 Visegrad Development Officer team building

27.08.2015 The "Association of Friends of the Tropical Institute Hamburg" (VdF) organizes for the first time a summer party in the institute’s garden and invites current and former graduates of the Diploma Course to recruit alumni members.

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