

InFact

The Magazine of the Helmholtz Centre for Infection Research | Winter 2021/2022

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**LEARNING
FROM
THE CRISIS**

EDITORIAL



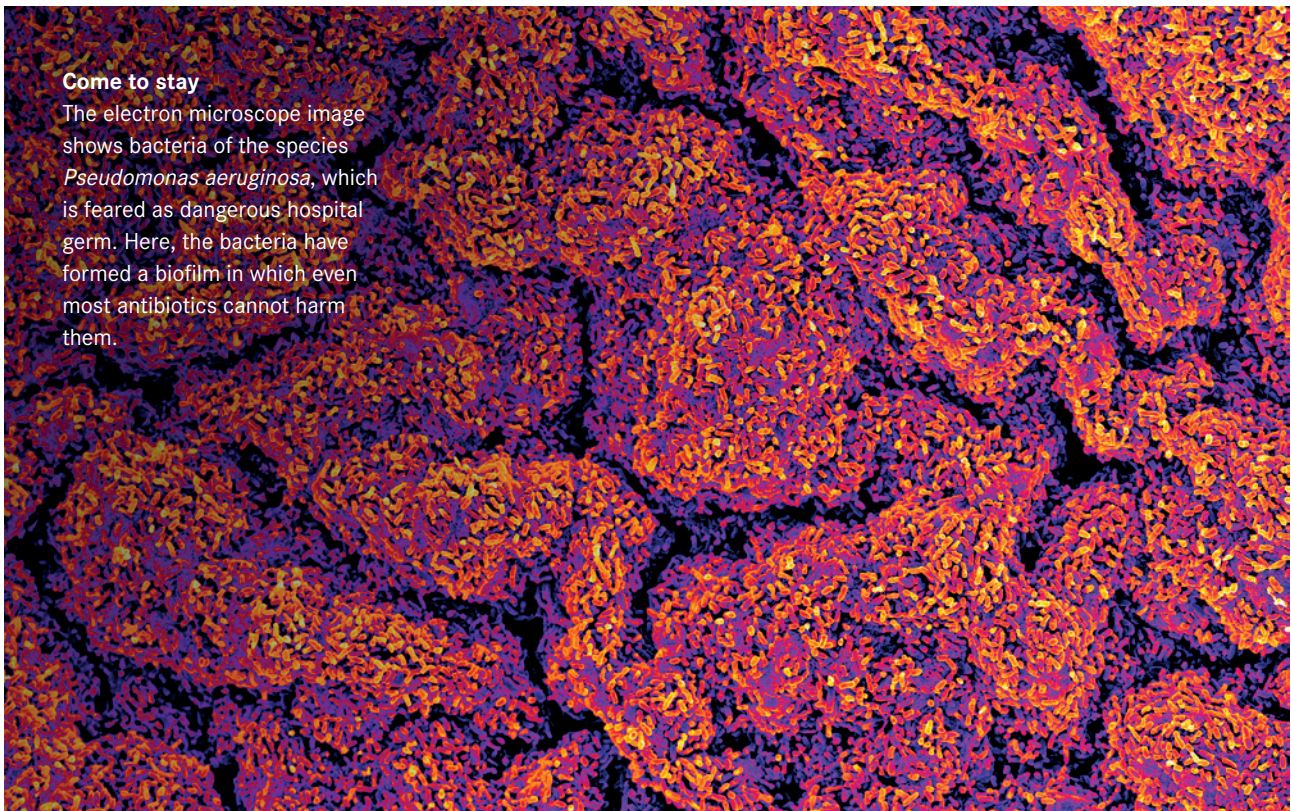
Dear readers,

Although we have succeeded in developing safe and very effective vaccines against Covid-19 in record time, the pandemic is far from being beaten. Initially, we were knocked cold by the force of the emerging SARS-CoV-2 virus. Meanwhile, sections of society - fuelled, among other things, by populist misrepresentations on the front pages of a major newspaper - and too low a vaccination rate are standing in the way of easing the pandemic situation. Thanks to the tireless efforts of researchers around the world, our knowledge of SARS-CoV-2 and its pitfalls is growing daily - and so is the range of options we have to fight the virus. What lessons we are learning from the current pandemic and what we need to improve in order to respond more effectively to future infectious outbreaks is the subject of our cover story. Already in summer 2020, the HZI Department of Epidemiology launched a nationwide study on antibody status in the population, which ran in seven districts until August 2021. You will find a summary of the most important results in this issue, as well as an in-depth interview on vaccination against Covid-19 and influenza.

I wish you an informative read and continued resilience!

Andreas Fischer, Editor-in-chief

EYE-CATCHER



Come to stay

The electron microscope image shows bacteria of the species *Pseudomonas aeruginosa*, which is feared as dangerous hospital germ. Here, the bacteria have formed a biofilm in which even most antibiotics cannot harm them.

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“THERE WILL BE FURTHER, PERHAPS EVEN MORE DANGEROUS PANDEMICS”

by Nicole Silbermann

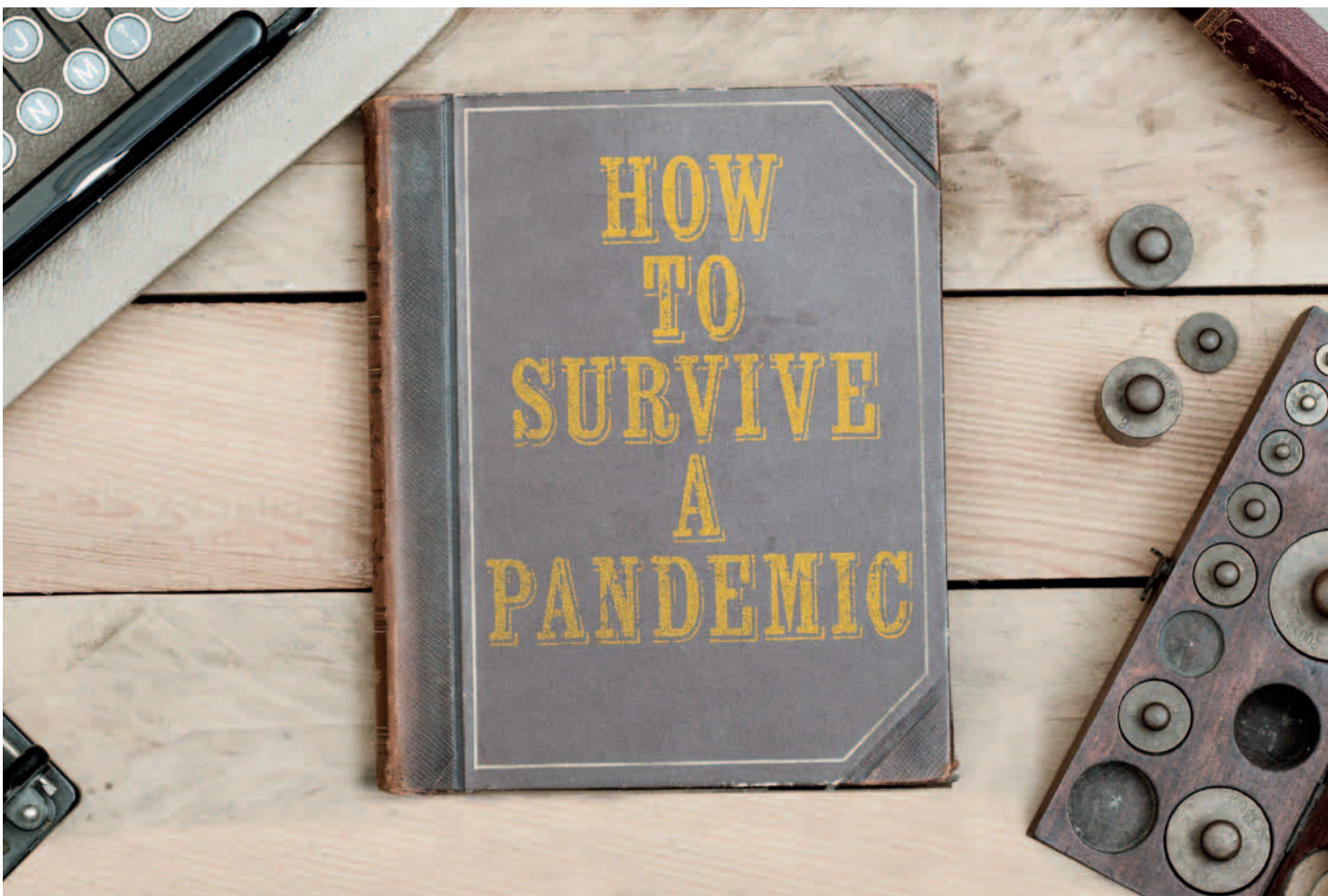
Though the Corona pandemic is not over yet, we should already start preparing for future pandemics. A look at what infection research can contribute

Early in the pandemic, there was a lack of masks and protective equipment for medical staff. Only insufficient capacities for contact tracing were available to the health authorities. There were bottlenecks in hospitals, lockdowns, school closures followed by the initial vaccine shortage - much did not go well. While the consequences and collateral damage need to be analysed, we also need to focus on precautions for the future. “The Corona pandemic showed us clearly, and often painfully, where things are stuck,” says Prof Dirk

Heinz, who is the Scientific Director of the Helmholtz Centre for Infection Research (HZI). “All sectors of our society need to learn from this and get better organised: Developing emergency plans, guidelines, improved infrastructures. And research and development should continue to be supported strongly - to make sure that we are much better prepared for the next pandemic.”

Because one thing is certain: There will be another pandemic. We do not know when this will be or which pathogen to deal with at the time. “We

need to keep a close focus on potentially hazardous candidates and monitor if and how these change in their behaviour,” says Heinz. “And we need to intensify our research on the pathways along which pathogens come to us. This includes particularly the conditions under which these zoonotic pathogens jump from animals to humans.” This is a key question to be investigated by the new Helmholtz Institute for One Health (HIOH; see p. 13) in Greifswald, which is another site of the HZI currently being set up.



FAST AND TARGETED ACTION

“It is also important that we take infection events in foreign countries more seriously in the future and react more quickly,” says Dr Berit Lange, head of Clinical Epidemiology at the HZI. “We used to think, mistakenly, that infectious diseases pose no real hazard to us in Germany or Europe. Regrettably, this is not the case. We need to be aware: There will be further, possibly even more dangerous pandemics in the future.” When a new pathogen emerges and another pandemic looms, speed is essential. “The wait-and-see approach will only result in more infections, more severe courses of disease and more deaths,” says Lange. “Of course, we must take the proper actions that are specifically aimed at the pathogen in question to protect the most vulnerable population groups.” This means: The more we know about the pathogen early on in the pandemic - i.e. about its transmission and the incubation time - the better and more specifically we can react.

For this to be successful where it is needed, key sectors of society need to have effective pandemic plans in place. “The Corona pandemic showed that the educational and labour sectors were not prepared properly,” says Lange. “Now is the time to make improvements, to develop pandemic plans and guidelines for businesses and schools to provide effective infection protection in the event of the next pandemic, to avoid lockdowns if at all possible and to better mitigate its impacts.”



△ Dirk Heinz heads the HZI as Scientific Director since 2011



◁ Berit Lange is a medical doctor and epidemiologist at the HZI

Where do most of the infections take place? How many other people does an infected person infect on average? Does the pathogen become more contagious, deadlier? “These are important epidemiological questions that can be answered through detailed contact tracing and timely analysis of the data,” says Lange. Especially contact tracing is one of the key instruments for containing a pandemic. “For the future, we urgently need to expand the administrative capacities and infrastructures in order to detect hotspots of infection early and to be able to contain them on a regional level through targeted actions.” During the Corona pandemic, the digital system SORMAS, developed by the HZI and partners, is helping to improve the management of contacts and infection chains as well as the digital exchange between the health authorities. SORMAS, developed in 2014 in the light of the large Ebola epidemic in West Africa, was adapted to SARS-CoV-2 in 2020.

GETTING AHEAD THROUGH POPULATION STUDIES

Rather than just chase after the actual infection events, broadly designed epidemiological population studies can give us a head start: Regular blood tests and tests on study subjects provide insights into past and current infections. Additional contact surveys can identify where the hotspots of infection are, for example in the workplace, in schools or in the private sphere, and which age groups are affected. A recently published major population-based study (MuSPAD; see pp. 8-9) directed by Prof Gérard Krause and Berit Lange maps the infection scenario and unreported cases in several regions of Germany between July 2020 and August 2021. “The data are important to be able to apply measures in a meaningful and targeted way and be able to map the infection scenario over this period of

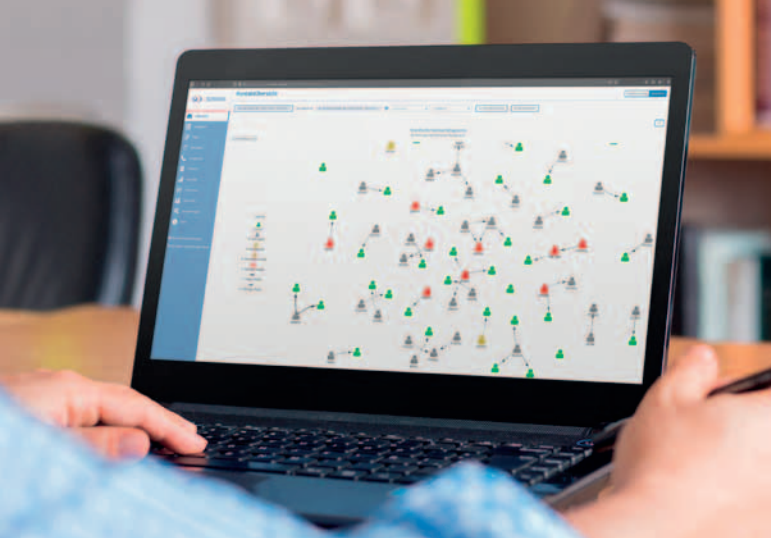
time,” Lange says. “There is still room for improvement on how we conduct such studies more quickly and parallel to the ongoing infection events. By learning, for example, from the Office of National Statistics in the UK, which introduced and successfully implemented a periodical, national and very large population panel during the Corona pandemic.”

VACCINE RESEARCH AND INFORMATION

Targeted and effective actions during a pandemic threat are key. Yet the best protection from infection and disease is still afforded by vaccinations. “We are very fortunate to have effective vaccines available after such a short time,” says Dirk Heinz.

“Without vaccines, we probably would be in an extremely difficult global emergency situation considering the highly contagious Delta variant, which currently predominates.”

“The close collaboration between government, science, administration and manufacturers worked well from very early in the pandemic and paved the way for the rapid vaccine development,” says Dr Peggy Riese, a scientist in the HZI Department of Vaccinology and Applied Microbiology. But the rapid approval especially of the novel mRNA vaccines also caused scepticism and uncertainty in the general public. “In terms of information policy and public relations, we truly need to become better for the next pandemic,” Riese says. “Since



◀ The digital tool SORMAS facilitates the management of contacts and infection chains

everything happened so quickly, many thought the vaccines were developed out of the blue - which is far from the truth. The mRNA platform has been in place for decades and has been used in cancer research for more than 20 years. It just has not achieved ground-breaking successes in the fight against malignant tumours yet. When the Corona pandemic hit, it was fairly obvious to check whether or not the mRNA technology might be suitable for development of a vaccine against SARS-CoV-2.”

UNIVERSAL AND TAILOR-MADE VACCINES

Advantages of mRNA vaccines: They can be produced and adapted to new virus variants comparatively quickly. It also makes sense to develop universal vaccines that are effective against a wide range of dangerous variants of the pathogen. “This is where bioinformatics and so-called reverse vaccinology come into play as they will advance vaccine research by leaps and bounds,” says Peggy Riese. “With computer-based approaches, we can search for gene sequences that are present in many viral variants and thus identify a piece of mRNA for a vaccine that affords good protection against all known variants - and perhaps those yet to come as well.”

However, not every vaccination leads to the development of an efficient and long-lasting immune response. That is why we currently see a rise in the number of breakthrough infections. “We see especially in older people that the immune protection afforded by the Corona vaccines is not quite as good as in younger people and also that it decreases over time,” says Riese. Immune systems sometimes tick very differently. Riese’s research focusses on the underlying reasons and the processes that are involved: “Once we understand the mechanisms better, tailor-made vaccines

could be developed that are adapted to the specific features of the immune system of certain groups of patients and protect these patients better.”

VACCINATION THROUGH THE NOSE

Vaccines are usually injected into a muscle. There is a problem, though: At the port of entry through which the pathogens normally enter our bodies - this would usually be the nasal mucosa in the case of respiratory infections - no local immune protection is evoked. “Conventional vaccinations do not confer immunity to the mucosa. This is one of the reasons why viruses can still be transmitted by vaccinated individuals,” explains Peggy Riese. In contrast, so-called nasal spray vaccinations act directly at the site of action. They stimulate the production of effective antibodies in the mucosa and thus prevent large amounts of virus from entering the body in the first place. In addition, a nasal spray vaccination is much more pleasant for the vaccinated person than an injection. Why isn’t it standard procedure then? “The nasal mucosa works like a barrier and makes every attempt to repel everything that comes from outside. Unfortunately, that also includes vaccines,” says Riese. “We are therefore searching for appropriate adjuvants that render a nasal spray vaccination both effective and safe. At the HZI, we are pursuing various approaches with immune adjuvants for this purpose that have already shown promising results in some preclinical studies.”

EFFECTIVE ANTIVIRAL DRUGS

Vaccinations can prevent most infections and severe courses of disease. But what if a person gets ill anyway? In this case the last straw are drugs, which do not only attenuate overshooting immune responses, but, ideally, also prevent further spread of the virus in the body.

Great hope is being placed currently in two new effective anti-viral drugs that can even be administered orally, though general approval is still pending. “But the administration of antiviral drugs makes sense only early-on in the infection. If you miss the early stages, and this easily happens with Covid-19, which shows no symptoms early on, other drugs like immunosuppressive drugs have to step in to dampen the overshooting immune reaction,” explains Dirk Heinz. “The Corona pandemic has shown us very clearly: In addition to the extensive use of vaccines, effective therapeutic agents are also needed to control the pandemic.”

To be able to counter future pandemics with drugs as well, the HZI joined forces with the German Center for Infection Research (DZIF) and recently developed a concept for the foundation of a National Alliance for Pandemic Therapeutics (NA-PATH). “We want NA-PATH to advance drug research aimed at dangerous and potentially dangerous pathogens - this includes, in particular, RNA viruses such as influenza viruses, Corona viruses or flaviviruses, which include Zika and dengue viruses - in a targeted manner,” says Heinz. “We need to be much better prepared for future pandemics due to novel pathogens, also with suitable medications. This is where infection research in Germany can and will make its contribution - by joining forces and pooling expertise.”



△ Peggy Riese investigates the special features of the immune system in interaction with vaccines



◁ Thomas Pietschmann is the HZI programme spokesperson for the Helmholtz “Infection Research” programme

“THE PANDEMIC SHOWS US HOW EFFECTIVE COOPERATIVE RESEARCH CAN BE”

by Andreas Fischer

A conversation about the direction of research at the HZI with Prof Thomas Pietschmann, who is the head of the “Experimental Virology” department at the HZI and director of the Experimental Virology Institute at the TWINCORE - Centre for Experimental and Clinical Infection Research

The Helmholtz Association conducts its research in the form of programmes that provide the framework for the activities of the individual Helmholtz Centres. The HZI is committed to the “Infection Research” programme. What are the priorities and strategic goals of the HZI?

Our primary mission is to conduct research into solutions for major issues in our society. In order to be effective in our efforts, there are, in my view, three strategic goals that we strive to achieve. The first of these

is digitalisation: Applying the new technologies, we are collecting data volumes on unprecedented scales. One key to success is to make optimal use of this data and apply it to understand infection processes on a holistic level. Cooperation - internally, externally as well as internationally - is the second of my strategic goals. Clever networking allows us to be more effective. The third topic in my sight is development. Building on strong and deep-rooted basic research, we can achieve a greater impact in applications and value creation by strengthening our competence in the area of development.

Which research topics specifically is the HZI tackling?

We are pursuing questions of antimicrobial resistance at full tilt; this includes basic research, drug discovery and development, and new diagnostic methods for relevant resistant bacteria, for example pseudomonads. We are also investigating how microbiota affect our health and what factors cause severe courses of infection. In the long-term, we aim to demonstrate new ways of prevention and therapy and take steps toward an individualised infection medicine. Working jointly with several HZI groups, I am working on a candidate vaccine against hepatitis C, which we are profiling on

a preclinical level for the transition to clinical studies. Working innovatively at the HIRI, we aim to develop a novel understanding of how RNA molecules control infections. Our epidemiologists are developing innovative systems for surveillance and management of infection outbreaks. This makes them important partners for the experts at the newly founded HIOH, where the influencing factors that promote the emergence of new or resistant pathogens will be researched on a holistic level. The pandemic has shown us the great significance of this research and has also led many HZI teams to work intensively on SARS-CoV-2 and other respiratory viruses.

What are the advantages of programmatic research in this regard?

The biggest advantage of programmatic research is that you do your research collaboratively. The research groups do not just act as individual players, but combine their expertise to find solutions for major and complex issues. This allows us to garner much more critical mass behind important projects. It also makes it easier to bring together many disciplines, which is often required to be able to do research effectively due to the complexity of projects and today's technologies.

The HZI is the only Helmholtz Centre that is actively involved in the Infection Research programme. Does that make it more difficult to build up critical mass?

We have been fortunate in that we have been able to grow in a targeted manner and establish new institutes in recent years. This makes us more powerful in the topics we have sought out: for example, anti-infectives research, molecular diagnostics, epidemiology, vaccine research on selected pathogens - and always starting from strong basic research. But there are also limitations in programmatic research: You are not quite as independent because you are committed to the contents of a programme. In addition, management becomes more complex, because many people have to approach each other cooperatively and work together. Nevertheless, I am certain that strong and cleverly networked collaborative research is an essential key to solving the major challenges in the field of infections.

How quickly and successfully the HZI can respond was demonstrated nicely by the Covid-19 pandemic. That was very impressive for me and, in my view, it is because the HZI has a good spectrum of expertise resident. Not to forget the tremendous will to make a difference on the part of everyone involved.

Especially in these times of the pandemic accusations have been voiced that science is doing only what politicians tell it to do. What is your view on this criticism?

I do not share this opinion at all. In Germany, we have a great deal of freedom in the sciences, in particular at the universities, but also in-house. There are many funding instruments through which you can develop your own creative concept and ask for funding. This gives us many opportunities to do our research freely. Likewise, our research programme was developed by us - and evaluated by reviewers, of course. But we were able to select ourselves where we want to, and can be, strong.

Established in 2021, the Programme Board is a new body at the HZI that is chaired by you as the programme spokesperson. Was the founding of the Board necessary due to the refocus on SARS-CoV-2?

The founding of the Board is not directly related to the pandemic, but rather to the growth of our programme and of the HZI and all its bodies - the family members, as I like to call the institutes. Ultimately, our Scientific Director Dirk Heinz gave the impetus to reorganise our bodies and proposed the Programme Board as a new scientific body that takes care of the management of the research programme. Personally, I think this is a smart move. For all groups to work together optimally, there is a need for coordination and a regular flow of information. The Programme Board is tasked to provide this and accompany the process over the years to make sure the left leg does not go in one direction and the right leg in another. We look where we can give impulses, help with appointments and have an advisory function for the directorate. This transports the notions of the researchers in terms of how the programme is to develop.

What topics are you currently discussing?

The Programme Board is dedicated to the contents of research, strategic development, initiation of collaborations and also the development of instruments to promote research. For example, we chaperoned the Project Call "Creativity-Cooperativity-Fund", an in-house funding instrument of the HZI. We discussed, deliberated and voted on how this Call should be structured. Accordingly, we have now launched ten creative and innovative projects, which will be carried out as collaborations between research groups of the HZI and its sites in order to strengthen the HZI family. Next, we will discuss our research programme internally in a mini-symposium. On this occasion, we would like to present so-called flagship projects. These are projects in which different experts meet in an interdisciplinary scenario and achieve something that is bigger than its parts. One example is the collaboration for the elucidation of the principles underlying the different susceptibility of people to infections. By working together, we can understand the mechanisms more deeply and more comprehensively and, in the long term, help to develop new diagnostic and preventive measures. We aim to increase the visibility of these projects and discuss them to give other experts a forum to join in.

How do you see the future of infection research?

It is important to have a broad spectrum in research funding, ranging from programmatic research to research in touch with industry and funding for individualists across universities as well as university medicine, where doctors conduct research directly on patients. We need this portfolio, but we need to improve our networking. We can still grow in building more capacity for development, in generating more collaboration and transition points with industry partners, and in promoting international collaborations. Here, in particular, is where the Covid-19 pandemic has shown how effective and successful collaborative research can be - and in a very short time - when the right people come together to form larger units.

RESULTS OF THE NATIONWIDE ANTIBODY STUDY

by *Andreas Fischer*

From July 2020 to August 2021, a research team from the HZI, with external support, studied the antibody status of more than 26,000 people in seven county districts and thus collected important data on the pandemic event

One of the pitfalls of the SARS-CoV-2 coronavirus is its ability to cause only mild cold symptoms in many infected people or even to go completely unnoticed. This is precisely its great success: The virus causes the majority of its hosts to fall ill only mildly or not at all and is passed on unchecked. Nevertheless, a minority becomes seriously ill with Covid-19, mainly people with a weakened immune system due to their age or a pre-existing condition. The very high total number of infected people – there are now over six million registered cases in Germany – entails a large amount of severe courses of the disease despite the low percentage, which have cost the lives of more than 100,000 people. In order to be able to derive appropriate protective measures, it is important to know approximately how high the number of unreported infections is, in which areas of life most

infections occur and to how many people an infected person passes on the virus on average.

In July 2020, the Department of Epidemiology of the Helmholtz Centre for Infection Research (HZI) launched the nationwide study “MuSPAD” to gain insights into these aspects. MuSPAD stands for “Multilocal and Serial Prevalence Study on Antibodies to SARS-CoV-2 Coronavirus in Germany” and ran until August 2021. As part of the study, the research team used blood samples to determine the antibody status in the population in different counties that were affected to varying degrees by the pandemic.

“We set up a study centre at each study site, where nine millilitres of blood were taken from each participant,” says HZI scientist Manuela Harries. The blood samples were then tested for antibodies against SARS-CoV-2 to find out whether

the test person had already had contact with the virus. “In addition, the participants answered a questionnaire about their living conditions. From these data we can, for example, deduce risk factors for an infection,” says Harries. The selected study sites were Reutlingen, Freiburg, Aachen, Osnabrück, Magdeburg, Chemnitz and Vorpommern-Greifswald. In the first round, invitations for voluntary participation went out to more than 70,000 people, for the second round again to just under 50,000. The addresses for the invitations were drawn as random samples by the residents’ registration offices in order to reach a representative cross-section of the population.

“For a scientific study, the willingness to participate was extremely high,” says HZI scientist Daniela Gornyk. Many people had a great interest in finding out whether they had perhaps already been through an infection without realising it. In the study centres, the service providers BOS 112 and Johanniter in particular supported the HZI team, while the cities and districts called on their populations to participate via the media. Despite the help, the study remained an organisational challenge: It sometimes took a weekend to print and cut out thousands of barcodes. In addition, there were also negative reactions to the invitations, which in individual cases resulted in complaints and even insults. Much more often, however, the opposite occurred: Numerous people without invitations were eager to take part in the study. “We were pleased about that, but unfortunately we couldn’t take on any



◀ Blood draw at the study centre



△ Daniela Gornyk (2nd from right) welcomes representatives from politics and the press at the launch of MuSPAD in Reutlingen in July 2020

additional volunteers so as not to distort the representative cross-section,” says Gornyk.

In the end, almost 17,000 people aged 18 to 99 took part in the first round. In the second round, almost 40 per cent of them participated again, while more than 9,000 unvaccinated people were newly added at six study sites. In order to obtain representative results for each of the county districts, the research team calculated a factor in each case to compensate for the difference in the age and gender distribution of the participants compared to the distribution in the entire county district population. The seroprevalence thus weighted by age and gender, i.e. the proportion of people with antibodies in their blood, was between 1.3 and 2.6 per cent in Freiburg, Reutlingen, Aachen and Osnabrück during the first sampling until October 2020.

In the study sites that only had their turn after the second or third wave until August 2021, another 2.4 to 19.9 per cent of the population that had not yet been vaccinated had experienced an infection. The last study site was Chemnitz in July 2021, where the weighted seroprevalence among participants who had not yet been vaccinated was 32.4 per cent. This may come from both a higher proportion of people with an already known SARS-

CoV-2 infection agreeing to participate upon invitation, or a larger proportion of the unvaccinated compared to the vaccinated having already undergone infection.

MuSPAD found that for every reported SARS-CoV-2 infection, there were two to five people actually infected, with infections detected more frequently in people over 80 years of age. The under-reporting – i.e. the number of unreported cases – was lower in the second and third waves than in the first. During the first survey, 2.7 per cent of the participants stated that they had already been in quarantine. During the second survey, the figure was 3.2 per cent. In addition, 7.6 and 4.6 per cent had voluntarily entered quarantine. Antibodies against SARS-CoV-2 were present in 14 per cent of all people who had been in quarantine. Rounded up, this means: On average, seven people had to go into quarantine so that one infected person could be secured among them. Incidentally, among the participants who had never been in quarantine, 2.1 per cent had antibodies against SARS-CoV-2 in their blood.

The survey on living conditions also yielded interesting results: For example, the proportion of people who smoke daily was 10.1 per cent in Freiburg, but 23.8 per cent in Greifswald. They fell ill less frequently, but often more severely. In

Freiburg, 70.2 per cent had a university degree, in Chemnitz 38 per cent. In this context, it is known that people with a higher socio-economic status fall ill less often, which may be due, for example, to the fact that they more often have the opportunity to transfer their work to their home office and thus reduce their daily contacts.

“The study gives us reliable figures on regional and age-specific undercoverage and on the incidence of infection in different phases of the pandemic,” says Manuela Harries. “It thus helps to better understand pandemic events and the effectiveness of protective measures in different regions and population groups in Germany.”

GETTING A FLU SHOT AND THE CORONA BOOSTER: DOES IT MAKE SENSE?

by Susanne Thiele

The cold season has arrived along with the question of whether a vaccination against influenza makes sense in times of the ongoing pandemic. And when is the right time for the third vaccination, i.e. the booster vaccination against Covid-19?

The Robert Koch Institute (RKI) already issued a recommendation for the Corona booster for everyone aged 18 and over. "Get both!" Prof Luka Cicin-Sain, a vaccination expert from the Helmholtz Centre for Infection Research in Braunschweig recommends. In his words, our immune system can be compared to a weary "football team in the second half-time" and both vaccinations are akin to "introducing substitute players with fresh legs to improve the defence squadron".

How much sense does a flu shot make in times of the Corona pandemic?

The flu shot continues to be important and is recommended. Especially for certain at-risk groups, the flu shot is essential - and this has not changed at all during the Corona pandemic. On the contrary: In these times the flu shot has become even more important because the threat of influenza is still here, but healthcare resources are tight because of Corona.

Do we really need protection from the flu? There were hardly any flu cases last year, after all.

You cannot assume that there is less of a risk of catching the flu this year. Especially the infection control measures that were taken, from spacing and mask-wearing to working at the home office, were the reasons why we had fewer flu cases. While this continues for the moment, the pathogen is still amongst us and it has a well-known seasonality. So we should continue to protect ourselves as well as we can.

If I haven't even been able to make up my mind on a first Corona shot, does it still make sense in the current situation?

Absolutely. It is never too late because you don't know when you're going to get infected. The longer you wait, the higher is the likelihood of encountering SARS-CoV-2 and doing so without protection from vaccination. It is important to note, though, that no vaccination protection is established in the first week and a half after the first dose, and it takes two weeks after the second dose for full protection.

In light of high Corona infection rates, experts emphasise the significance of the so-called booster shot. What exactly happens in the body?

Memory B-cells and plasma cells that generate antibodies initially receive signals for replication and survival and expand in number. As the signal from the antigen recedes, these molecular signals go down. The cells stop dividing and many of them die. This is useful to make room for other immune cells against other threats, but over time the amount of antibodies slowly goes down. The booster shot gives a new impulse to these cells to expand their numbers again.

What vaccines are available for the booster vaccination in Germany?

There are four vaccines approved in Germany to date, two mRNA-based ones from BioNTech and Moderna and two adenovirus-based ones from AstraZeneca and Janssen. In general, all of these vaccines provide effective

and sustained protection against Covid-19-related severe illness and death with the mRNA vaccines being a little better. Vaccination also protects against SARS-CoV-2 infection and thus also reduces the risk of transmission from vaccinated persons to their contacts. But it has been evident that the protection conferred by the vaccine declines over time. At older age, the overall immune response after vaccination is lower and declines more rapidly. This increases the risk of breakthrough infections, which can also lead to severe courses of disease more frequently. The booster vaccination is done with an mRNA vaccine no earlier than six months after completion of the basic immunisation. The RKI recommends an additional dose of mRNA vaccine especially if a person was originally vaccinated with the Covid-19 vaccine from Janssen because, relative to the number of vaccine doses given in Germany, most vaccine breakthroughs are observed in persons vaccinated with Janssen's vaccine.

Can at-risk groups receive the influenza and Corona vaccines at the same time?

From an immunological point of view, there is no reason to avoid this. Our immune system is exposed to many pathogens every day - that means many "enemy contacts" per day. The same happens to the body with the dual vaccinations which simulate two different pathogen infections. The immune responses may even reinforce each other. The dual vaccination is best done at two different sites, for example on the right and left upper arm, at the same time. Because the immune reaction



△ Luka Cicin-Sain heads the HZI Department of Viral Immunology

commences locally and matures in regional lymph nodes. Consequently, two groups of lymph nodes can be challenged independently of each other. Yet, the recipient may have two sore arms at the same time and be impaired on the day after the immunisation.

Do you get the same or more severe side effects with a booster shot than with the first two Corona vaccinations?

In essence, any vaccination is expected to trigger an immune response. Obviously, that may be accompanied by side effects. The side effects after vaccination include pain at the injection site and fatigue, more rarely fever and chills. These symptoms last a day or two, very rarely longer. Very rare - less than 1:10,000 - are immune reactions such as myocarditis, but these improve after a few days without late effects. Thrombosis (1:100,000) was even less frequent after vaccination with AstraZeneca or Janssen. Allergic reactions are extremely rare, with two to five cases per one million vaccinations. But known allergies to drugs or pollen do not pose an increased risk that there will be an allergic reaction

to the vaccine. Assuming that the consequences of Covid-19 infection are life-threatening in about one per cent of the cases, the risks are clearly associated with the infection rather than the vaccination. Overall, the data collected on the booster to date show that its side effect profile is equivalent or at least no worse. It's definitely not true that it gets worse the more often you get vaccinated.

When is the ideal time for the third vaccination?

The ideal time for the booster vaccination is six months after the second shot. I would recommend to get a booster in any case. If there is suspicion of possible allergy to components of the vaccine, you should talk to your family doctor, but that is just about the only significant group for which vaccination is not approved. Recipients of immunosuppressing drugs, such as autoimmune patients or organ recipients, absolutely need the third dose because their immune system does not defend them adequately and needs all the help it can get. To protect this group of people, it is important that family members as well as co-workers who they are exposed to

every day, get their vaccination done, thus providing a so-called "ring vaccination".

Does an antibody test make sense to decide whether a third vaccination is even needed?

Actually, the antibody test against Corona is only a guide that indicates the presence of antibody, but not a conclusive statement about actual protection. This is the case because antibody levels in the test do not necessarily reflect the antiviral performance of the tested person. Unfortunately, a quantitative test detecting the level of immune protection is not available yet. A lot more research is needed here.

A LITTLE “OUTBREAK” EVERY DAY

by Christine Bentz

Susanne Talay heads the HZI high security lab



You always meet twice in life, and this is certainly true for Susanne Talay and the HZI. When the biology graduate started her doctorate in Microbiology and Genetics at the then Gesellschaft für Biotechnologische Forschung (GBF) in 1988 and finally turned her back to the campus in 2004, she would not have expected to return as early as 2006. She has stayed ever since and has never regretted this decision. When she talks about the HZI, it is accompanied by her beaming smile: “It starts with this beautiful campus, then the collegial atmosphere. It’s something very special and we are grateful for it.”

Initially, Susanne Talay was employed in the “second round” as a research assistant in the department of “Microbial Pathogenicity” under Prof Singh Chhatwal and accompanied many doctoral and diploma students there. In her former research area in the field of Cellular Interactions, there is “still a lot to do”, as she says, but a new task was already waiting for her. As a Biosafety Professional, she has been in charge of the Security Level 3 (S3) facilities at the HZI since 2011. These are high-security laboratories where work is done with pathogens that can lead to serious diseases. At the HZI, these are mainly viruses with pandemic potential. To prevent infectious particles from escaping the labs, the safety precautions include, for example, a ventilation system with special filters, airlocks and pressure differences between individual areas. “Employees receive three months of training and are then valuable specialists. A high staff turnover rate is therefore a real challenge,” says Susanne Talay. She is responsible for the experiments taking place in the S3 laboratory and for ensuring that all safety standards are met, about which she must remain

constantly updated. Susanne Talay is also in demand when it comes to everyday troubleshooting. Mistakes in this area could have serious consequences. Therefore, the guidance of her staff is crucial, because everyone in the team shares some of the responsibility.

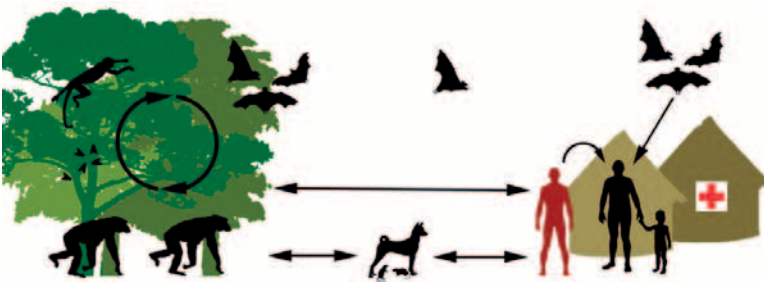
Since 2020, the S3 lab has been working almost exclusively on SARS-CoV-2. The number of users was increased from 20 to 45 people, half of them are established and prospective researchers, the other half are technical staff. The changeover was quick because flaviviruses had previously been researched using comparable, already established methodology. The S3 unit functions perfectly. Nevertheless, there were memorable moments. For example, when 300 litres of water mixed with red bubbling disinfectant briefly turned the lab into a foam party. Susanne Talay counters even such incidents with her beaming smile.

With work avoiders, on the other hand, she switches “into wolf brain”, as she says. Cold also puts her in a bad mood. “Soul food” such as red lentil soup and oriental spices, which are mood lifters for her, help against this. Regardless of the temperature, she is out and about several times a day in her native Harz region, because it not only keeps the body healthy, but above all the mind. Not everyone could bear the great responsibility in the S3 lab. Susanne Talay can, not least because of her very own way of “governing through and being sensitive at the same time”, as she herself describes her way of working. So this important unit at the HZI is known to be in safe hands.

EXPLORING HUMANS, ANIMALS AND THE ENVIRONMENT AS ONE

by Charlotte Wermser

The Helmholtz Institute for One Health is a new HZI location in Greifswald, linking research into human and animal health with environmental factors



In accordance with a decision made in November 2019, the Helmholtz Centre for Infection Research is establishing a new location in Greifswald: the Helmholtz Institute for One Health (HIOH). One Health research investigates the interface between human health, animal health and the environment. For this purpose, the HIOH combines the competences of the HZI with those of the University of Greifswald, the University Medical Centre Greifswald and the Friedrich-Loeffler-Institute in one interdisciplinary institution.

The coronavirus pandemic has shown just how promising the One Health approach is. Even though the exact origin of SARS-CoV-2 is still unknown, a spread from bats is considered the most likely source. Therefore, global human health cannot be viewed in isolation. It is a result of the interaction between humans, animals and the environment. Climate change and intrusion into undisturbed habitats also increase contact with myriad known and unknown pathogens. The result may be new infectious diseases, including some with pandemic potential. “However, the transmission of pathogens between humans and

animals is not a one-way street. Human pathogens also endanger wild animals and we need to protect them from these germs,” says Prof Fabian Leendertz. The veterinarian was appointed founding director of the new institute in May.

Fabian Leendertz, who previously conducted research at the Robert Koch Institute in Berlin, has years of experience in investigating disease outbreaks in jungles, especially in Africa. In addition to the search for the origin of the 2014 Ebola epidemic, he has also researched anthrax in chimpanzees and recently published a highly acclaimed study on leprosy in the great apes. The scientists at HIOH will also conduct field research in less exotic countries. “Mecklenburg-Vorpommern has a strong agricultural character. This offers us the opportunity, for example, to study the transmission of antibiotic resistance between animals and humans,” says Leendertz. In addition to new zoonotic pathogens and antibiotic resistance, the evolution of pathogens is the third research focus at HIOH. A total of three departments and three junior research groups are planned for this at the Greifswald site. A One Health Surveillance and a One Health Data Management and Analysis Platform

complete the research programme. They collect comprehensive long-term data on human and animal health as well as environmental factors.

External experts have already reviewed this scientific concept of the HIOH. After the positive vote of the international group of experts and representatives of the Helmholtz Senate, the HIOH will now be officially founded. In the future, it will be housed in an institute building on the campus of the University of Greifswald. Until the move, the staff will work in rooms at the University and the University Medical Centre. An opening ceremony for the HIOH will take place in Greifswald on 26 April 2022. Afterwards, the HIOH will present itself to the professional public in a two-day symposium.



△ Fabian Leendertz appointed founding director of HIOH

NEWS

FAREWELL AT THE TURN OF THE YEAR

Silke Tannapfel has been leading the Helmholtz Centre for Infection Research (HZI) as Administrative Director since October 2017 and will leave the centre at the end of December 2021. She will move to Wiesbaden on 1 January 2022 - with a new job as Ministerial Director in the Hessian Ministry of Science and the Arts with responsibility for the universities, university hospitals and infrastructures there.



“We would like to sincerely thank Silke Tannapfel for the good cooperation over the past four years,” says Prof Dirk Heinz, Scientific Director of the HZI. “She played a significant role in successfully mastering a difficult financial consolidation phase. This included, in particular, reforming the administration, avoiding an investment backlog and fundamentally stabilising the research centre’s finances. We wish Silke Tannapfel all the best for her new exciting job in Wiesbaden.” Tannapfel studied Law at the University of Göttingen and Science Management at the German University of Administrative Sciences Speyer. A successor for the Administrative Director is currently still being found. In the interim, the position will be held on an acting basis by **Elisabeth Gerndt**, authorised signatory and head of the Finance and Controlling Department at the HZI.

SECRET PLACES

The photo competition at the HZI Summer Party 2021, which was again held virtually, was themed “Secret Places”. All HZI employees were called upon to capture a hidden corner or unusual perspective at their site that not everyone knows about. In the end, the staff voted these photos into the top three places:

1ST PLACE: “The view from a window that will surprise others” by Mareike Harms (EPID)



2ND PLACE: “Morning swarm of starlings” by Dr Ulfert Rand (VIRI)



3RD PLACE: “Once upon a time...” by Stephanie Schulz (MISG)



NEW REPRESENTATION 2022

HZI PhD students will be represented by **Laura Menke** (NIBI), **Janyn Heisig** (VAC) and **Christopher Lambert** (MZBI) in 2022. Menke succeeds Marco Kirchenwitz, who was active for two years as spokesperson for the doctoral initiative DO IT. Heisig and Lambert have agreed to keep their posts for another year. DO IT works together with the HZI Graduate School to ensure that quality standards are maintained and that the working conditions for doctoral researchers are constantly improved. (afi)



Laura Menke



Janyn Heisig



Christopher Lambert