02
Summer
2022

NEWS
RESIST – Resolving Infection Susceptibility

RESIST

General Assembly

FROM COMPUTER-AIDED BIOLOGISTS "FOR HIRE" TO NEW FACES ON THE COMMITTEES – THE GENERAL MEETING REVOLVED AROUND NUMEROUS TOPICS

From computer-aided biologists "for hire" to new faces on the committees – the general meeting revolved around numerous topics. For example, on 13 June in the MHH lecture theatre Q, the topic was the virtual visit of the Deutsche Forschungsgemeinschaft in May. "Overall, the DFG is satisfied with the development of our cluster. It highlighted the recruitment of new professors as particularly successful," Prof. Schulz summarised. However, it also made recommendations for improvement, which are already being worked on. Topics in this regard include, for example, the integration of researchers from abroad, communication between the members and the continuation of the new professorships.

RESIST teams are generating more and more data and increasingly using bioinformatics. Therefore, there is a need for a general one-stop shop tailored to RESIST for the analysis of complex biomedical data. To address this issue and thus also to follow a recommendation of the Scientific Advisory Board in this regard, the RESIST Biomedical Data Analysis Group (BDAG) was founded. At the general meeting, Prof. Depledge presented the concept that he, Prof. Lauber and Prof. Galardini had developed. It includes, among other things, the proposal that two scientists support RESIST projects with their bioinformatics expertise as needed. The concept was discussed in detail and a survey conducted afterwards made clear the high demand: many teams would like to make use of the BDAG. In its meeting, which took place after the General Assembly, the research management board was in favour of an initial trial period for the BDAG. In the longer term, integrating it into the new SFB initiative "Exploiting Diversity in Infection for improved/tailored Prevention and Therapy" could be considered.

Prof. Schulz announced at the general meeting that the internal advisory board is to be enriched by a patient representative. This could already be implemented shortly after the general meeting: At the suggestion of Prof. Witte, Gabriele Gründl has been asked if she would like to be a patient representative and the head of the patient organisation for congenital immunodeficiencies "Deutsche Selbsthilfe für angeborene Immundefekte" (dsai) has agreed (see also page 3).

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For the first time

We are very pleased to present a guest article for the first time in this newsletter: Prof. Asisa Volz from the Institute of Virology at the University of Veterinary Medicine Hannover (TiHo) has written an article for you on the subject of monkeypox (page 5). We are also pleased to introduce Gabriele Gründl on page 3. From now on the internal advisory board of RESIST will benefit from her contribution as a patients' representative.

For the first time, a group of RESIST scientists travelled to Glasgow, Scotland, as part of the HAGIS cooperation (page 4) and the students of the Biomedical Data Science Master's programme also travelled abroad together (page 9).

RESIST scientists are constantly discovering new territory in various areas. For example, on pages 6 and 7 you can explore research results on herpes viruses as well as research projects on SARS-CoV-2, and also learn more about how food supplements can be used to prevent infections.

Communicating knowledge to the general public – that is the goal of the MHH's Patient University. This year, four RESIST experts successfully participated in it; feel free to read more about it on page 10. We hope you enjoy reading!

Your RESIST speaker team

The RESIST speaker Team: Prof. Schulz (left) and the two co-speakers Prof. Förster (in the middle) and Prof. Hansen (right).

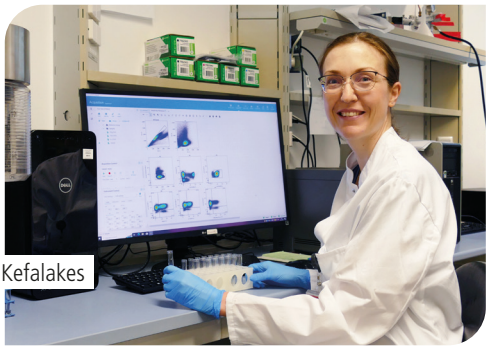
» Two new members were also elected to the research management board during the meeting: Prof. Witte is now a deputy member of Research Group A and Prof. Wedemeyer is a deputy member of Research Group B. In addition, there is a new collaboration partner: the University of Lübeck, where RESIST member Prof. Krey works.

Prof. Schulz also pointed out that protocols are no longer sent by e-mail, but are stored under "Important Links" in the password-protected internal area at the end of the RESIST website. Further general information can also be found there, for example the correct wording for naming the Cluster of Excellence in RESIST-relevant publications.

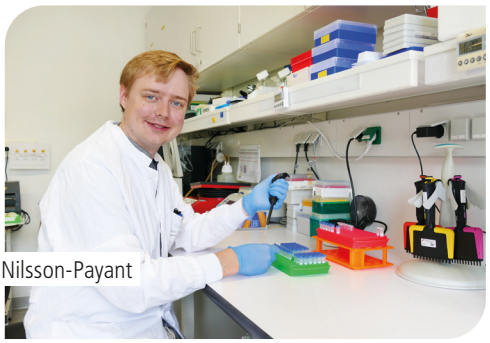
New RESIST cooperation partner: The University of Lübeck

New members of the research management board: Prof. Witte (top) and Prof. Wedemeyer.

Welcome to RESIST



Dr. Kefalakes



Dr. Nilsson-Payant

AS NEW MEMBERS IN RESIST WE WELCOME DR. KEFALAKES AND DR. NILSSON-PAYANT

Hepatitis D virus infection is rare, but it often becomes chronic and can lead to cirrhosis and liver cancer. But why does this infection not clear up? This has not yet been sufficiently researched. It is suspected that the immune system plays an important role, but so far we have too little data. That is why within the framework of RESIST Dr. Helenie Kefalakes is researching what role certain immune cells, so-called CD4+ T cells, play in controlling the virus. "We want to find out why they fail and how their immune response could be changed to eliminate the viruses," says Dr. Kefalakes.

She is building on many years of experience with CD8+ T-cell responses, as it has already been shown why these cells fail to eliminate viral hepatitis and even contribute to viral persistence in the liver: "The function of these responses depends on viral evolution. This underlines how important it is to consider immune responses in the context of the pathogen," the researcher explains.

Dr. Kefalakes has been working at the Department of Gastroenterology, Hepatology and Endocrinology at MHH since 2021. She is a specialist in internal medicine and conducted research on adaptive immunity in chronic hepatitis D virus infection in the Immunology Division of the National Institute of Diabetes and Digestive and Kidney Diseases at the National.

Dr. Benjamin Nilsson-Payant is a scientist in Prof Pietschmann's team at TWINCORE and he is particularly interested in how the influenza A virus and other respiratory RNA viruses replicate their genomes.

"RNA viruses use RNA polymerases, which are error-prone by nature, for their replication. This is why faulty viral genomes are produced. I am interested in how these faulty genomes trigger the innate immune response," Dr. Nilsson-Payant says. In order to understand the molecular mechanisms of viral replication and the effects of virus-host interactions on viral replication and the innate immune response in detail, he uses a combined approach of molecular biology tools, state-of-the-art transcriptomics and virus engineering. In the long term, the researcher hopes to contribute to the development of new, effective options to combat these viruses.

Dr. Nilsson-Payant studied biology at Imperial College London and completed his PhD in infection, immunology and translational medicine at the University of Oxford. From 2018 to 2021, he worked as a postdoctoral fellow in New York, first at the Icahn School of Medicine at Mount Sinai, and then at NYU Grossman School of Medicine.

Valuable **advocate**

GABRIELE GRÜNDL REPRESENTS PATIENTS ON THE RESIST INTERNAL ADVISORY BOARD

We are very pleased that Gabriele Gründl has taken on the task of representing patients on RESIST's internal advisory board. She is the national chairperson of the patient organisation Deutsche Selbsthilfe für angeborene Immundefekte (dsai).

Ms Gründl, you have been advocating for people with congenital immunodeficiencies for more than three decades. What has changed for those affected by the Corona pandemic?

Plasma donations, on which many affected people depend, have decreased – because fewer people are donating and because there have been supply difficulties, for example from the USA, from where about 30 per cent of the plasma is obtained. In addition, a lot of discussions revolved around the question of whether or not to get vaccinated. With more than 480 different disease patterns within the congenital immunodeficiencies, it is unfortunately not possible to give a general recommendation. In addition, many affected people isolate themselves for fear of infection, and some hardly ever go outside.

What should be researched with particular priority in relation to congenital immunodeficiencies?

In my view, research in the field of gene therapy is particularly promising for the future. However, these therapies are very cost-intensive.

You yourself founded the dsai in 1991. The reason was that your son had been diagnosed with a congenital immunodeficiency. How is he doing today?

Mario is now 33 years old and doing relatively well. When he was seven months old, he kept getting infections in his bladder. He was in hospital for months and his kidneys were already not working properly. When he needed a blood transfusion after a cystoscopy, he was running a high fever and an immunologist was called in. It turned out that he doesn't have any antibodies and since then he has been treated with immunoglobulins.

The dsai conducts medical training on immunodeficiencies and does a lot of public relations work. How informed are the medical profession and the public about immunodeficiencies at the moment?

The diagnosis rate has improved. But doctors in private practice are still far too under informed. They still think too rarely about congenital immunodeficiencies when it comes to frequent infections that can be briefly suppressed by antibiotics, but then come back. Yet these are the clear warning signs.

The dsai has been instrumental in getting the German Medical Association to offer "additional training in immunology", and is currently campaigning for the introduction of the "specialist in immunology" qualification. Another achievement is that newborns are screened for severe congenital immunodeficiencies. Is there a next big goal?

We need more treatment centres for immunodeficiencies in adults; up to now, waiting times of months have to be accepted in some cases. There is also a lack of centres where plasma can be donated – so that there are enough immunoglobulins available for patients.

Dear Ms Gründl, thank you very much for the interview.

Gabriele Gründl: She received the Federal Cross of Merit on ribbon in 2017 for her commitment.

The dsai: a voice for people with rare diseases

Congenital immunodeficiencies are rare diseases; there are currently almost 500 known primary immunodeficiencies. The patient organisation for congenital immunodeficiencies "Deutsche Selbsthilfe für angeborene Immundefekte" (dsai) campaigns for early diagnosis, appropriate therapy and comprehensive care, but also for public education, training of doctors and immunological research. The exchange of ideas with those affected is particularly important to it – there are 15 regional groups nationwide – and the advice provided by the federal office. The association has almost 1,000 members and is financed by donations and membership fees. More information is available on the homepage www.dsai.de.

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Meeting **on site**

A HAGIS WORKSHOP TOOK PLACE IN GLASGOW

The RESIST team from Hannover brought gingerbread hearts for all participants.

Researchers from the German-Scottish project "Hannover-Glasgow Infection Strategy" (HAGIS) have met in person for the first time: For a workshop, ten RESIST scientists travelled to Glasgow for two days on 28 April, to the "Glasgow Centre for Virus Research" (CVR).

RESIST spokesperson Prof. Schulz and Dr. Grove, who is responsible for HAGIS in Glasgow, gave an introduction and an overview of the project, and reported on the current status. The group then delved into discussions already underway, for example on strategies for further funding of the project, and shared ideas on arrangements for exchange visits. In terms of content, the participants discussed possible collaborations on the topics of RNA biology, intrinsic immunity and the biology of arboviruses.

"The meeting was extremely useful to grasp the various synergies between our groups and define the next steps. We really enjoyed the trip and I think it increased people's motivation to continue with HAGIS," says Prof. Schulz. Next, more student exchanges are planned as well as a visit of the CVR team to Hannover. In addition to Prof. Schulz and Dr. Grove, Prof. Schreiner, Dr. Mai, Ilka Simons, Prof. Gerold, Ju-Eun Yoo, Prof. Viejo-Borbolla, Nadine Brückner, Prof. Sodeik, Dr. Eugenia Gripp from Hanover as well as Prof. Kohl, Dr. Pondeville, Dr. McDonald, Prof. Robertson, Dr. Kuchi, Dr. Castello, Dr. Boutell and Prof. Palmarini from Glasgow participated in this meeting.

HAGIS was established in 2021 by RESIST and CVR to conduct long-term research together, complementing each other to advance the development of new therapies for infectious diseases and to allow PhD students to benefit from the combined research strengths of the two sites. The Lower Saxony Ministry of Science and Culture is providing financial support for HAGIS in 2021 and 2022.

RESIST-Dates

Seminar Series

From the end of August, the RESIST seminar series will take place on Thursdays from 5 to 6 p.m. in lecture hall Q – in person with a video broadcast for external members. Projects B7 to B12 and C1 to C3 will be presented by the end of the year. New developments are that new (post)doctoral students can introduce themselves before the relevant presentations and that the seminars will now each be supervised by a member of the RESIST board. Further information on the presentations can be found on the website www.RESIST-cluster.de.

25.8.:	Project B7
15.9.:	Project B8
22.9.:	Project B9
29.9.:	Project B10
10.11.:	Project B11
17.11.:	Project B12
24.11.:	Project C1
8.12.:	Project C2
15.12.:	Project C3

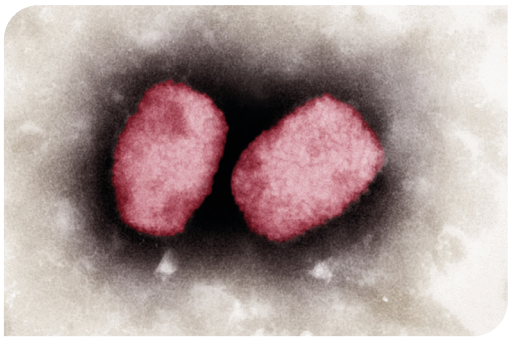
Consultation Hours

Since August, RESIST speaker Prof. Schulz and the two co-speakers Prof. Förster and Prof. Hansen have been taking turns to answer questions from RESIST members every last Wednesday of the month from 5 to 6 pm. You can find the dates and contact persons as well as a list in which you can register on the intranet via www.RESIST-cluster.de.

Satellite Symposium

On 7 September 2022, a "RESIST-Satellite Symposium" will take place in lecture hall H of the MHH (Building J01) from 9.30 a.m. to 1.30 p.m. – as part of the joint annual meeting of the German Society of Immunology (DGfI) and the Austrian Society of Allergology and Immunology (ÖGAI). Further information and the programme can be found on the RESIST homepage: www.RESIST-cluster.de.

Prof. Asisa Volz works at the Institute of Virology of the University of Veterinary Medicine Hannover



Electron micrograph of monkeypox viruses, coloured.

Suddenly somewhere else

THE CURRENT OUTBREAK OF MONKEYPOX SHOWS: WE NEED INNOVATIVE VACCINATION PRINCIPLES AND IMPROVED THERAPEUTICS – A GUEST CONTRIBUTION

Newly emerging and re-emerging pathogens represent a global public health risk as they can appear suddenly – in most cases from an animal reservoir. During the past 20 years, public health systems have been confronted with a multitude of new pathogens, particularly importantly by the appearance of SARS-CoV-2 in December 2019: more than 560 million human infections and over six million deaths have been confirmed by the WHO.

The COVID-19 pandemic is still active and another threat has appeared: the global monkeypox (MPX) outbreak. However, monkeypoxvirus (MPXV) is not an unknown: it was identified in 1958 in research monkeys in Copenhagen, Denmark. In humans the virus was first diagnosed in 1970 in the Democratic Republic of Congo and causes fever, headaches and a pathological swelling of the lymph nodes, followed by skin lesions resembling those of human smallpox.

MPXV is closely related to both variola virus, the causative agent of human smallpox, and vaccinia virus, which has been used to eradicate smallpox. It is endemic in Central and West African countries where it regularly causes outbreaks in humans. The virus is transmitted from infected animals to humans, which can be followed by human-to-human transmission.

From classical textbook knowledge, the person-to-person transmission rate is believed to be low. Based on this hypothesis, repeated zoonotic reintroductions of the virus from the wild are required to maintain monkeypox in the human population. However, this global MPX outbreak in 2022 looks different. Since May 2022, more than 15,000 human MPX cases and three deaths have been reported in 68 countries outside Africa (status: Juli 27rd). On July 23rd, the WHO declared the rapidly spreading outbreak of monkeypox a global health emergency. Most cases have been diagnosed in men self-identifying as men who have sex with men (MSM), already indicating that viral transmission is facilitated through very close contacts. Traditionally, MPXV spreads through direct contact and also through large respiratory droplets. Sexual transmission was already described in 2017 in Nigeria. Close contact with the specific skin lesions in the perigenital and perianal regions is probably also the key driver of the very efficient human-to-human transmission in this ongoing outbreak.

Consequently, one way to quickly contain the virus is to identify and isolate MPXV positive patients including contacts very early. Smallpox vaccines are considered to be also highly effective against MPXV. In Europe, the licensed smallpox vaccine Imvanex causes fewer side effects compared to traditional smallpox vaccines and is currently in use as pre- and postexposure prophylaxis for contacts of MPX patients and for persons at high risk of exposure. Tecovirimat is used as a drug against smallpox. A combined approach of these measures will contribute to rapidly controlling this outbreak.

The current monkeypox outbreak demonstrates how quickly a pathogen can suddenly arise in a new ecological niche in this global world. This increasingly necessitates the development of innovative vaccination principles and improved therapeutics that also confer rapid protection.

Prof. Asisa Volz

WHERE TO ATTACK?

TEAM RESEARCHES APPROACHES FOR NEW DR.UGS THAT ACT AGAINST MANY DIFFERENT CORONAVIRUSES

In a laboratory of the Institute of Virology: Dr. Amelie Wachs (left) and Talia Schneider evaluate so-called plaque assays, for which cell culture plates were infected with coronaviruses.

Finding active agents against SARS-CoV-2 and, if possible, against other coronaviruses – this is the goal that a team led by RESIST speaker Prof. Schulz has been pursuing since the virus first appeared. Together with a team led by Prof. Ziebuhr, at the Justus Liebig University Giessen, it is being funded by the German Centre for Infection Research (DZIF) with around 440,000 euros.

So far, the researchers have already succeeded in selecting 300 substances from a collection of around 60,000 low-molecular weight compounds that can inhibit the human coronavirus HCoV-229E, which is related to SARS-CoV-2 but more harmless. They carried out this work with Prof. Pietschmann's team from TWINCORE, among others. So far, they have been able to show that eight of these substances can also inhibit SARS-CoV-2 particularly effectively.

The special path to the goal

Now they are exploring where exactly and, above all, how the best five of these promising molecules work. "For example, we are researching what exactly their target structure is – i.e. whether they act in the virus or in the cell – and what they change there. For example, do they inhibit a viral enzyme or do they change structures that are essential for the reproduction of coronaviruses?" explains Dr. Amelie Wachs from Prof. Schulz's research group. "By identifying possible new target structures, we hope to learn previously unknown details about the virus. Building on this knowledge – possibly after further optimisation of this substance – new effective drugs could be created," adds her colleague Talia Schneider.

This group's path is a special one, because many other teams are looking for substances that can bind to an already known target structure of the SARS-CoV-2 virus and thus inhibit it. If they do so using compounds that are already approved as drugs, or compounds for which there is already extensive safety data with regard to human use, the results will be able to be applied in the clinic relatively quickly. However, they are less productive in terms of new insights into SARS-CoV-2 and other coronaviruses. In contrast, the approach of the project now funded by the DZIF to screen previously uncharacterised substances and subsequently identify their targets offers new possibilities: Previously unknown starting points for drugs can be found that act against as many different coronaviruses as possible.

Nutrients instead **of antibiotics**

CAN NUTRITIONAL SUPPLEMENTS PREVENT SERIOUS DISEASES IN NEWBORNS?

Blood poisoning (sepsis) is life-threatening – especially for premature babies, as they can die from it within a few hours. In these babies, blood poisoning can also be the cause of years of increased susceptibility to other diseases. Since it is currently difficult to estimate which baby will actually develop sepsis, most of the premature babies (up to 85 percent) receive antibiotics as a precaution. These drugs can thus save lives, but they also have disadvantages such as the spread of antibiotic resistance or a disturbance of the intestinal flora. The latter can lead to chronic inflammatory diseases, allergies, obesity and diabetes in the long term.

A team led by scientist Prof. Viemann and PD Dr. Sabine Pirr in the PROSPER research project is now investigating whether a specific nutritional supplement can protect premature babies from blood poisoning. The Federal Ministry of Education and Research (BMBF) is supporting this project with around 1.9 million euros.

Alarmins could be the key

Prof. Viemann and PD Dr. Sabine Pirr had previously discovered that so-called alarmins positively influence the development of the intestinal flora and the immune system after birth. These proteins are found in high quantities in breast milk. "The risk of sepsis increases significantly if premature babies lack alarmin S100A8/A9," says Prof. Viemann. The PROSPER project (Prevention of Sepsis by personalised nutritional S100A8/A9 supplementation to vulnerable neonates) now aims to show that nutritional supplementation with S100A8/A9 protects premature babies who have low levels of this alarmin from sepsis.

In PROSPER, experts from the MHH, the University Hospital Würzburg, the Institute of Immunology at the University of Münster and the Experimental and Clinical Research Center (ECRC), a joint institution of the Max Delbrück Center for Molecular Medicine and the Charité – Universitätsmedizin Berlin, are working together. It is intended to create the conditions for conducting a subsequent clinical trial and is thus an example of the step-by-step translation of basic research into clinical application.

Prof. Viemann (left) and PD Dr. Sabine Pirr at the bedside of a premature baby in the ward for newborns and premature babies at MHH.

How to resist viruses

TOWARDS THE DEVELOPMENT OF NEW TREATMENTS AGAINST HERPES VIRUSES

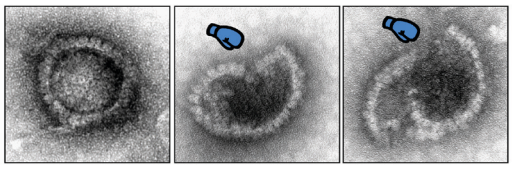
Most body cells can defend themselves against viruses after being activated by the body's own messenger substances (interferons). This happens with the help of proteins that recognise invading virus components and disrupt virus replication. One of these proteins is the myxovirus resistance protein B (MxB). It can inhibit many viruses, for example HIV and herpes viruses. But until now it was not clear how it does this.

An interdisciplinary team led by Dr. Serrero and Prof. Sodeik has researched new findings on the interactions between MxB and herpes viruses as part of a RESIST project and published them in the journal eLife. The team, which includes researchers from the Technical University of Munich, the University Hospital Freiburg, Princeton University (USA) and the University of Oxford (UK), has possibly made the beginning of a success story on the way to new active substances against herpes viruses with its work.

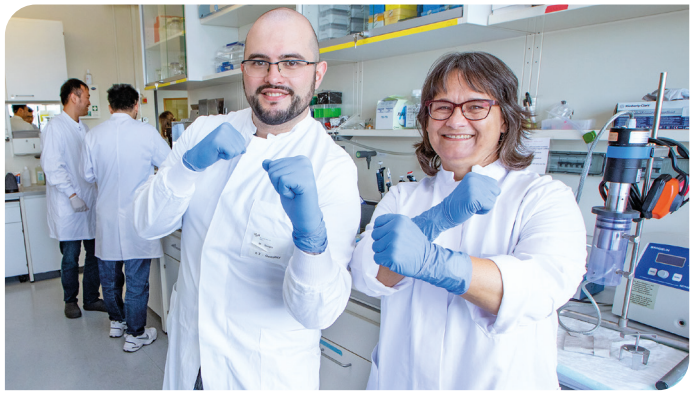
MxB can destroy the protection of the viruses

"Using biochemical experiments, we were able to show for the first time that MxB has the amazing ability to attack and disassemble the highly stable protective capsids of herpes viruses. The capsids enclose the genome of the viruses and thus protect it from the cell's own defence," says Prof. Sodeik. The work was done with herpes simplex viruses, which trigger lip and genital herpes, among other things, and with varicella zoster viruses, which cause chickenpox and shingles. In further studies, the effect of MxB on the capsids of other herpes viruses is now being investigated, for example on the cytomegalovirus and the Epstein-Barr virus.

So far, the team has been working with cell-free methods and with protein mixtures that are formed after the cell membranes are dissolved and that contain active or mutated, inactive MxB proteins. "Now we are investigating whether MxB can also dissect the capsids in intact, infected cells and in which cell types this mechanism is activated by the interferons," explains Prof. Sodeik. To this end, the group is developing methods to produce virus particles in which both the capsids and the viral genomes are labelled. MxB-containing cells are then infected with these viruses and the stages in the infection cycle at which the cell protein MxB attacks the labelled capsids are investigated and whether the labelled genomes are released from the disassembled capsids. "A better molecular understanding of this interferon-induced defence mechanism against herpes viruses can perhaps be used to develop new treatments against herpes viruses that attack capsids," says the researcher.



Electron microscope image: how the protein MxB (blue glove) attacks the herpes virus is illustrated



Prof. Sodeik and Dr. Serrero show that MxB attacks the capsids of herpes viruses.

Well integrated

ON THE RESIST HOMEPAGE YOU WILL NOW FIND THE DESCRIPTIONS OF EIGHT MORE PROJECTS

What influences the strength of the immune system? How can it be supported? How can infections be inhibited? The central questions of the seven RESIST professorship projects established in 2020 and the new project B14 complement the four RESIST project areas. You can read detailed information on this on the homepage www.RESIST-cluster.de.

"We want to understand which genetic changes lead to the immune system of some people not being able to fight infections or control inflammation," Prof. Proietti summarises the goals of his project A5. His long-term goal is to ensure that all patients with congenital immunodeficiency around the world have the same chances of a genetic diagnosis.

Project A6 addresses the issue of how viruses associated with humans influence susceptibility to infections and other diseases such as primary immunodeficiencies. "We want to explore individual differences in the composition of these viruses in order to gain new insights into the susceptibility to or course of diseases," says project leader Prof. Lauber.

Premature babies are very susceptible to infections – and probiotics administered in the first weeks of life can probably help with the maturation of immune cells and thus positively influence susceptibility to infections. "In the B3 project, we are particularly investigating the maturation of T cells and B cells," explains project leader Prof. Ravens.

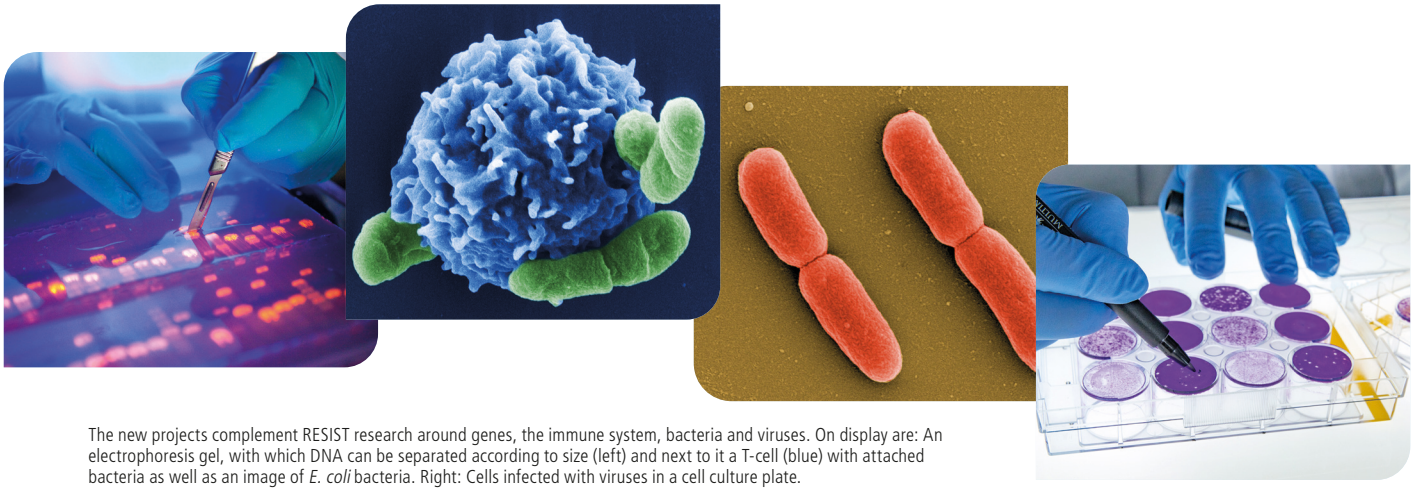
How do infections of the lower respiratory tract develop and how can new cell-based immunotherapeutic approaches be developed? This is the central question of the B13 project. "Here, we are particularly investigating the role of macrophages in the development and fight against infections. One of our approaches is to replace these phagocytes, when they are weakened, with healthy ones from the laboratory, which then provide protection against bacteria or viruses," says project leader Prof. Lachmann.

A chronic hepatitis D virus infection can progress very differently: Some patients can control such an infection well during its course, whereas in others it is particularly severe. But why is this so? This is the question addressed by the B14 project. "The immune system probably plays a major role, but so far there is not enough data to prove this," says project leader Prof. Wedemeyer. He hopes to gain new insights that will form the foundation for the development of personalised therapies and prevention strategies.

Each bacterial species has not only a single genome, but also a diverse ensemble of gene combinations. "We want to investigate the influence of this great genetic diversity on bacterial phenotypes and thus the characteristics of these bacteria," says the leader of the project C4 Prof. Galardini. He assumes that the differences can also influence the ability to adapt to a selection pressure, for example the use of antimicrobial agents.

Project D3 aims to shed light on the regulation of human cytomegalovirus (HCMV) morphogenesis at the single-particle level. "We want to use these tools to define new targets for inhibiting HCMV," says project leader Prof. Bosse. For despite ongoing efforts, there is no approved vaccine against HCMV so far and viral resistance is a major problem in antiviral therapy.

Which paths lead to new inhibitors against human adenoviruses – widespread pathogens of the respiratory tract, the digestive tract and the urinary tract that can be fatal for the immunocompromised? This is the topic of the D5 project. "We want to contribute to finding new therapeutic targets," says project leader Prof. Schreiner.



The new projects complement RESIST research around genes, the immune system, bacteria and viruses. On display are: An electrophoresis gel, with which DNA can be separated according to size (left) and next to it a T-cell (blue) with attached bacteria as well as an image of *E. coli* bacteria. Right: Cells infected with viruses in a cell culture plate.

On the campus in Belval: students of the Master's programme "Biomedical Data Science".

Excursion to **Luxembourg**

The Master's programme "Biomedical Data Science" visited the Luxembourg Centre for Systems Biomedicine (LCSB) on the campus of the University of Luxembourg in Belval, just outside Luxembourg City, from 27 to 29 April.

A varied programme was prepared for them, which included, for example, data science pipelines and their implementation, the programming language "Julia" for high performance computing and the data visualisation tool "Ada". A central motif of the events was the implementation of the R3 and FAIR principles. These are principles of sustainable and transparent handling of research data, which are intended to counter the reproducibility crisis in the life sciences. There was also the opportunity to gain their own experience with various applications.

The students of the online-based Master's programme, who usually only meet in person during the short attendance phases at the MHH, also used this excursion, which was sponsored by the Joachim Herz Foundation, to get to know each other better. All participants concluded that the excursion was a complete success.

New module successfully established

The interdisciplinary module "Biostatistics, Omics Techniques and Big Data", in which students of the Biomedical Data Science Master's programme have been participating since the summer semester 2022, has been successfully established.

The module was offered for the first time in 2020 for the MHH Master's degree programmes in Biochemistry and Biomedicine as an elective module to teach methods needed for the correct scientific evaluation and assessment of omics datasets. The Lower Saxony Ministry of Science and Culture funded the three-year establishment phase of this module with 340,000 euros. On 17 June, students, lecturers and interested guests were able to celebrate the successful establishment at a mini-symposium at the MHH.

In the module, the lecturers go into the special features of the various omics procedures: They refer to basic data of complete genomes (genomics), genetic information of read RNA products (transcriptomics), formed proteins and carbohydrate compounds (proteomics and glycomics) as well as the observation of the complete metabolism (metabolomics).

The second round

In the winter semester, the second year of the Biomedical Data Science Master's programme will start, which was developed within the framework of RESIST with significant participation of the Peter L. Reichertz Institute for Medical Informatics at the MHH. Twenty-four graduates with a bioscience bachelor's degree and eight with a medical degree applied. There are 15 women and 17 men aged between 21 and 42. This year, for the first time, the application and admission procedure was carried out via the new MHH OnlineCampus, the central application platform of the MHH. The second cohort will start the Master's programme on 4 October 2022.

More information can be found on the homepage at: www.mhh.de/master-biomeddat. The contact person is Dr. Melina Celik, telephone: (0511) 532-5700, e-mail: master.biomeddat@mh-hannover.de.

Medical know-how
for inquisitive minds

Mukoviszidose-Therapie: Durch Inhalieren löst sich der zähe Schleim in der Lunge, der dann leichter abgehustet werden kann.

RESIST RESEARCHERS ACTIVELY PARTICIPATE IN THE PATIENT UNIVERSITY OF THE MHH

The good thing about online lectures is that they can usually be seen on the internet for a long time. This is the case with the videos that revolve around the topic of infectious diseases and were produced as part of the MHH's Patient University. Four of these half-hour videos were made by RESIST researchers. They can be seen in the media library of the RESIST homepage via the link www.RESIST-cluster.de. These lectures by the professors were a great success: some of the videos have been viewed over 1,500 times. Some viewers asked questions, which the Patient University team published together with the answers on their website https://patienten-universitaet.de – as well as a lot of other interesting information.

Patienten UNIVERSITÄT

Successes of cystic fibrosis therapy

Prof. Tümmler explained in his lecture "Cystic Fibrosis – New Therapies Take the Scare Out of the Disease" that there has been the greatest progress in the diagnosis and treatment of cystic fibrosis, a congenital disease of all glands, since World War 2. "In 1980, the average life expectancy of those affected was only nine years. Today we assume that the patients living now have a life expectancy of at least 50 years. We hope for a normal life expectancy in the near future," he says.

Eyes open when choosing a partner

Prof. Witte's lecture is primarily about rheumatism and the question of what can trigger rheumatic diseases and how it is possible to influence them. In doing so, he explains above all the role of intestinal bacteria. "Intestinal bacteria are capable of learning and influence us – for example, also our body weight," he explains. In this context, he also addresses the extent to which gut bacteria play a role in our social relationships. Don't miss these interesting findings!

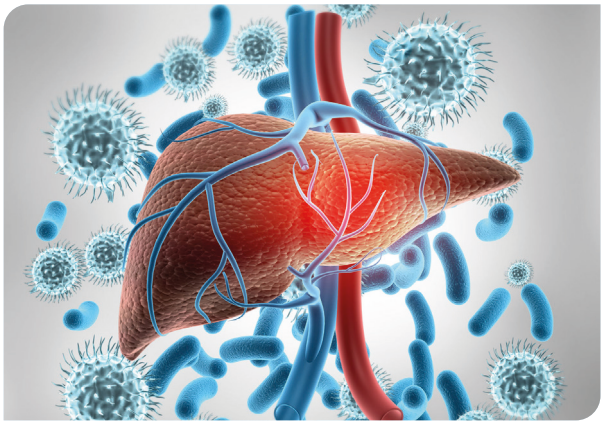
Has the Corona vaccination failed?

Prof. Kalinke addresses the much-discussed question of why many people fall ill with COVID-19 even though they have been vaccinated against the SARS-CoV2 virus. He draws parallels to his research, which revolves around vaccination against the hepatitis B virus and the associated vaccination response. Prof. Kalinke explores these important and scientifically extremely exciting, but also not entirely simple questions, in a detailed manner. Among other things, he emphasises that older people benefit considerably from the fourth Corona vaccination, as it reduces the incidence of severe diseases in them.

Fatigue is the pain of the liver

"Hepatitis – One Name, Many Differences" is the title under which Prof. Wedemeyer describes the causes and therapies of liver inflammation. "The risk of dying from liver disease has increased in recent years," he emphasises. "Only when the liver has been damaged for many years and thus severely, do symptoms such as

jaundice and abdominal fluid appear. That's why it's important to recognise liver disease early, for example by the fatigue of those affected." He also explains that 20 to 30 million people in Germany have fatty livers, and that about ten per cent of them develop liver inflammation from it, which in 20 to 30 per cent of cases turns into liver cirrhosis. Beethoven, the Nanas and pork also play a role in his lecture – take a look for yourself.



Happiness through words

RESIST OFFERS FREE PARTICIPATION IN A "GERMAN AS A FOREIGN LANGUAGE" COURSE BY TEACHER ARTUR SIEG.

Artur Sieg: The historian and Slavicist has always been interested in languages and started teaching German for adults after his studies.

"Every new German word they learn makes their life in Germany easier and can make them happier as a result," says Artur Sieg. The teacher should know, as he already has more than 20 years of experience teaching German as a foreign language. By "them" he means his students, who since May 2020 have included a group of young people who have come to Hanover from Canada, Brazil, Spain, Serbia, China, Malaysia and other countries to work on their doctoral projects or do research as postdocs as part of RESIST.

Once a week, they take part in three lessons. "As soon as they have learned a little German, they can experience everyday life here in a more relaxed way," he describes. Books, apps, songs, pictures, games and stories to listen to – to keep his students motivated, the historian and Slavic scholar teaches general language skills as well as interesting facts about Hanover and Germany using varied methods. "His lessons are really interactive and very helpful," says one student participant: "I especially like that Artur has lots of different practice materials for us."

Initially, classes were held on the MHH campus, which brought social contact and direct influence opportunities for the teacher. Since the Corona pandemic, Artur Sieg has been teaching online, which saves distances and therefore time. "You can learn the same amount in both formats, even in terms of phonetics," he reports. Success comes when you are motivated and also do your homework. Then, after 100 lessons, you can have small conversations with good pronunciation. And that is certainly often associated with a happy feeling.

RESIST researchers who would like to take part in such a German course, which is free of charge for them, are welcome to contact the RESIST office: Phone: (0511) 532-4107, e-mail: RESIST@mh-hannover.de.

Impressum

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Healing with cells

Prof. Lachmann

This year, Prof. Nico Lachmann is giving the KinderUniHannover (KUH) lecture at the MHH. He will explain his research, which revolves around phagocytes (blood cells that protect the lungs from infections) to the girls and boys on 8 November from 5.15 to 6 p.m. The scientist will give the children insights into the medicine of tomorrow and show how good phagocytes can be produced in the laboratory today to heal patients.

The KUH is a series of lectures for eight- to twelve-year-old children from the five Hanover universities that has been taking place for almost 20 years. This KUH lecture will take place either on site, i.e. at the MHH, or online. Current information can be found at: www.kinderuni-hannover.de.

Summer RESIST network meeting

On Friday, 26 August, our summer RESIST network meeting will take place from 4 p.m. on the TWINCORE premises at Feodor-Lynen-Str. 7. All researchers from our Cluster of Excellence and their children are cordially invited. A barbecue and drinks will be provided and we also have some nice surprises especially for our younger guests.

We are looking forward to a convivial gathering, lots of exchange of ideas and getting to know each other. If you have any questions, would like to register or contribute, please contact the RESIST office at (0511) 532-4107 or by e-mail: RESIST@mh-hannover.de. We are looking forward to a colourful summer party with as many RESIST members as possible.

RESIST – About us

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The clinicians and scientists working in the Cluster of Excellence RESIST (Resolving Infection Susceptibility) aim to offer scientific excellence for the people most vulnerable to infections. RESIST researchers work at **Hannover Medical School** (MHH), **TWINCORE** Centre for Experimental and Clinical Infection Research, **Helmholtz Centre for Infection Research** (HZI) in Braunschweig, **Centre for Structural Systems Biology** (CSSB) Hamburg, **Centre for Chronic Immunodeficiency** Freiburg (CCI) and the **University of Veterinary Medicine Hannover**, Foundation (TiHo). The work of the Cluster of Excellence RESIST is funded by the **German Research Foundation** (DFG).