

Significant Changes

ARTIFICIAL INTELLIGENCE IN SCIENTIFIC RESEARCH: DEVELOPMENTS, CHALLENGES, FUTURE

Artificial Intelligence (AI) is transforming scientific research: AI systems like AlphaFold, RoseTTAFold and ESMfold have revolutionized protein structure prediction. Now large Language Models (LLMs) like ChatGPT are democratizing scientific writing and coding. However, AI use might raise ethical concerns, including potential misuse and authorship issues.

The use of AI in the life sciences recently got into public focus with neuronal networks such as AlphaFold and RoseTTAFold which are able to predict a protein's three-dimensional structure from its amino acid sequence, a longstanding challenge in molecular biology. They are now accelerating many areas of science by expediting and simplifying hypothesis generation and verification in the wet lab. However challenges remain, such as predicting protein interactions with RNA, DNA or small molecules as well as disorder and conformational states. With publication of LLMs like ChatGPT, GPT code interpreter and Github's Copilot now the next wave of AI systems is rolling towards us. LLMs are democratizing access to coding by providing an intuitive,

language-based interface for interacting with code and data. They generate code snippets, explain complex coding concepts in plain language, assist with debugging and help optimize code. However they can make mistakes, especially with complex or unfamiliar coding tasks, requiring scientists to verify the generated code.

LLMs can also overcome language barriers and assist researchers less proficient in English by effectively conveying their findings, methods and conclusions, facilitating better global scientific communication. For native speakers, LLMs can increase efficiency by generating »

The future

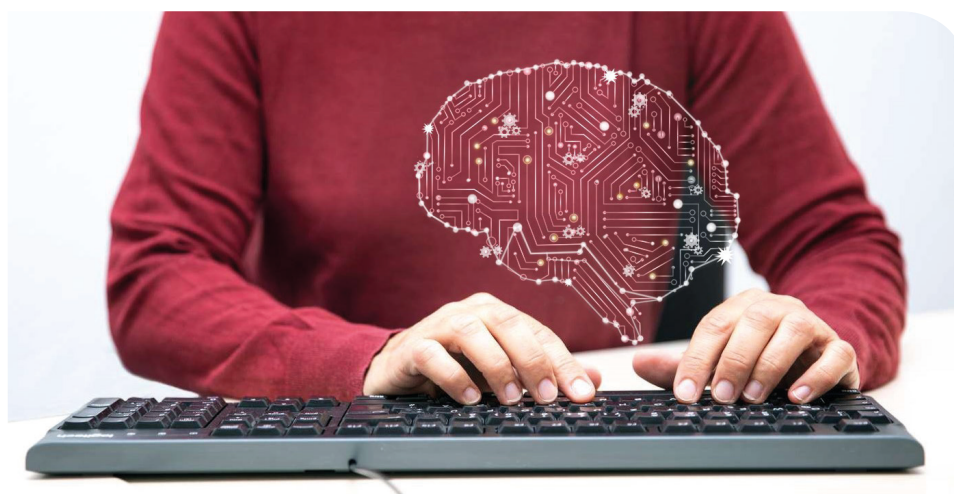
is very much on our minds in this newsletter: right here on the left you can read a text on artificial intelligence - a topic that will certainly occupy us more often in the months to come. On the next two pages we inform you about the future of our cluster and on pages 4 and 5 we have some topics that are especially interesting for young scientists.

We are also pleased to present examples of our exciting research topics aimed at future therapies on pages 6 and 7. We are particularly pleased to introduce you to dedicated scientists from the MHH Institute of Virology who are committed to sustainable research and have come up with something special for the photo accompanying the article (page 9).

We wish you a wonderful summer with this newsletter and if you would like to know what others are doing to keep their research running smoothly after the vacations, feel free to take a look at page 10.

We hope you enjoy reading our newsletter.

Your RESIST speaker team



The RESIST speaker team: Prof. Schulz, Prof. Hansen and Prof. Förster (from the left).

» coherent and contextually relevant text, reducing the time and effort required to produce a research paper.

It is often cited that using AI for generating scientific texts brings ethical concerns, including potential misuse and authorship issues. However, future rulemaking should consider that LLMs are tools used by human researchers. Therefore, the user should be ultimately responsible for the text generated with the help of an AI. This includes ensuring the text is accurate, meaningful and not plagiarized.

Future AI tools will have access to the world's scientific literature. It is likely that at some point these models will be capable of hypothesis generation and experimental design. Such systems could potentially reduce cognitive biases that can influence human-driven research. But such a development will likely also lead to a shift in the role of scientists

from hypothesis generators to primarily focusing on falsifying machine generated hypotheses. Moreover, review articles will likely be of less value as they can be generated instantly and on demand.

In summary, the benefits of AI-driven research will be significant. However, they will likely also transform the scientific process substantially. As science is always at the forefront of innovation, we cannot ignore these advancements. Now is the time to embrace AI technology and establish guidelines that maintain the integrity of science without obstructing the potential benefits.

The text was written by Jens Bosse with the support of ChatGPT 4. [Here you can read the conversation he had with ChatGPT.](#) However, the opinions and conclusions expressed in this text are his alone.

Shaping the future of infectiology

MEETING OF THREE CLUSTERS OF EXCELLENCE: NETWORKING PROMISES ADDED VALUE AND MORE VISIBILITY



In front of the Kloster Ebersbach: Board members of the three clusters of excellence

In beautiful surroundings between sunlit mountains, streams and vineyards, RESIST board members met with board members of two Clusters of Excellence; Balance of the Microverse from Jena and Controlling Microbes to Fight Infections from Tübingen, on 22 and 23 June at Kloster Ebersbach, Eltville am Rhein, to network.

At the beginning, the Clusters of Excellence were presented: Prof. Schulz summarised what RESIST researchers are working on. Prof. Küsel and Prof. Bauer explained that the team of the Balance of the Microverse cluster is researching the formation, balance and interac-

tive networks of microbial communities. They are concerned with microbial communities that live together with plants, animals and humans as well as those in the environment, for example in groundwater. The aim is to find innovative solutions to combat diseases and disturbances of the ecological balance.

Prof. Peschel presented Controlling Microbes to Fight Infections, whose members are dedicated to the microbiomes of the human body. The researchers want to develop new strategies to control microbial mechanisms – far away from conventional antibiotic therapy, which is associated with side effects – and to fight infections. Their goal is to elucidate the mechanisms of interaction between both beneficial and harmful bacteria and humans in order to develop novel treatment methods.

It turned out that the research programmes of the three clusters have many complementarities and thus offer great potential for synergy.

A joint scientific symposium has therefore emerged as a central goal of the group, which is now planned for 2024. In addition, the participants have talked about short- and longer-term possibilities for cooperation in the area of promoting young scientists; for example, laboratory courses for learning new methods are to be opened up to doctoral students from the three clusters of excellence. And perhaps in a few years there will even be joint retreats of young scientists from the three clusters of excellence.

"We have found that we complement each other wonderfully with our different infectiology research topics. If we join forces, we can create synergies and added value and thus shape our research fields together to a certain extent," says Prof. Schulz.



The participants of the RESIST retreat in the courtyard of Burg Warberg.

Kick-off in the castle

THE RESIST RETREAT WAS A CONSTRUCTIVE START TO THE WORK ON THE FOLLOW-UP APPLICATION

RESIST should continue to exist after the end of the first funding period. With this goal in mind, the heads of the research groups and other RESIST scientists met for a retreat at Burg Warberg near Helmstedt on 20 and 21 April 2023. This is because the task now is to prepare the proposal for the continuation of the cluster from January 2026, which must be submitted to the DFG next year. For this application, the existing research topics must be realigned and structured. In addition, new topics could be added with which RESIST plans to enter the race. This meeting also represented this year's general meeting of the cluster.

Shortly after the arrival of the approximately 50 participants, Prof. Schulz warmly welcomed those present before 14 members presented the total of around 30 ongoing projects as well as the RESIST-SI cohort in their talks. The focus was on what has been achieved so far in these projects, as well as the respective strengths, weaknesses, opportunities and risks of the projects and the priority further perspectives for the follow-up application.

In various workshops that followed on the following day, as well as during the general discussions, all those pres-

ent were able to exchange ideas about the possible future thematic orientation of the respective research unit and the cluster as a whole and develop new ideas. For example, they discussed the following questions: What is the current status of RESIST-relevant cohorts? Which new methods and techniques could still be integrated? How should research on SARS-CoV-2 be pursued? But it was also about the involvement of new researchers, entering into new collaborations and the development of the important area of data management. "The retreat was a successful, constructive start to our work on the follow-up proposal," says Prof. Schulz.

And although the networking in RESIST is already great – most projects are led by researchers from different institutes, clinics or institutions and many members collaborate on several projects – this meeting was also an additional welcome opportunity for making and deepening contacts, especially for the new members.

Promoting young researchers

The photo shows
(from left):
Dr. Kefalakes,
Dr. Faber,
Dr. Bosnjak,
Prof. Hansen,
Dr. Strecker,
Prof. Schulz,
Prof. Gerold,
Prof. Falk and
Dr. Gripp on the
area in front of the
TWINCORE.



What funding opportunities are there for young researchers at the DFG? What is absolutely necessary for a good proposal? And what should I definitely refrain from doing? Dr. Andreas Strecker from the DFG Head Office answered all these and many

other questions for a group of around 100 interested people in the TWINCORE seminar room on 2 June. He presented funding programmes that can provide support at various points in a career and provided his explanations with numerous tips and examples based on his extensive experience.

In addition, the programme director of the Life Sciences 2: Microbiology, Immunology, Neurosciences group advised eleven researchers in one-on-one meetings. He came at the invitation of RESIST, and the talk was aimed at all interested parties from the MHH and TWINCORE. Dr. Strecker kindly made his talk available. We have linked the presentation on the RESIST homepage, you can find it under "[Career advancement](#)".

VISION combines virology with structural biology

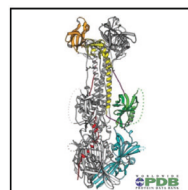
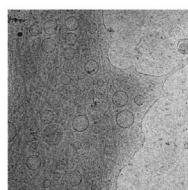
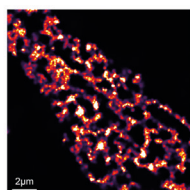
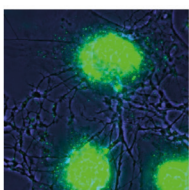
The DFG is funding the new Research Training Group VISION (VISualisation and Structure in Viral Infection), whose spokesperson is Prof. Krey and co-spokesperson is Prof. Grünewald. Thus, starting in autumn 2023, eleven doctoral students per cohort will have the opportunity to learn state-of-the-art structural analysis technologies and imaging techniques to explore the complex mechanisms and biology of viral infections. "Their new insights into the interaction of viruses with host cells and the

immune system can become starting points for novel antiviral drugs and thus contribute to the successful fight against viral infectious diseases," says Prof. Krey. The research centres on herpes, influenza, noro and hepatitis viruses, but also includes polyomaviruses and emerging viruses. VISION is funded with a total of about 7.5 million euros over a period of five years.

The training takes place in Lübeck and Hamburg, as Prof. Krey heads the Institute of Biochemistry at

the University of Lübeck and Prof. Grünewald is a research group leader of the Institute of Biochemistry and Molecular Biology at the University of Hamburg as well as scientific director of the CSSB, where Prof. Bosse also works and leads one of the eleven VISION subprojects. RESIST spokesperson Prof. Schulz, head of the MHH Institute of Virology, is involved in another sub-project. The network created by RESIST was used to set up the Research Training Group.

Other partners in this large consortium of internationally recognised experts are the University Medical Center Hamburg-Eppendorf, the European Molecular Biology Laboratory (EMBL) Hamburg, the Bernhard Nocht Institute for Tropical Medicine in Hamburg, the Leibniz Institute of Virology in Hamburg and the University of Siegen. More information can be found on the homepage of the University of Lübeck.



The achievable resolution increases (from left to right): From fluorescence microscopy to super-resolution microscopy and cellular cryo-electron tomography to electron tomography with subtomogram averaging. Finally, atomic resolution can be achieved with X-ray crystallography and single-particle cryo-electron microscopy.

Guests from Glasgow

THE HAGIS PROJECT IS MOVING FORWARD



Part of the HAGIS group in front of the Wilhelm Busch Museum.

As part of the German-Scottish project "Hanover-Glasgow Infection Strategy" (HAGIS), the RESIST team received a visit from five researchers from the Glasgow Centre for Virus Research (CVR) from 24 to 25 May; the director of the CVR, Prof. Palmarini, was also present. This was a return visit, as in April 2022 participants of the HAGIS project from Hanover had travelled to Glasgow for a first personal meeting.

Prof. Schulz warmly welcomed the guests in the seminar room of the MHH Institute of Virology and, together with Prof. Palmarini and Dr. Joe Grove, gave an overview of the joint activities and goals to date. Afterwards, four young scientists reported on their previous or planned research stays at the CVR: Franziska Hüters from the team of Prof. Sodeik,

MHH Institute of Virology, has been researching the herpes simplex virus in Dr. Boutell's team. Ju Eun Yoo from Prof. Gerold's team, TiHo Institute of Biochemistry, was able to advance her work on alphaviruses in Prof. Kohl's team at the CVR. Dr. Grodziecki from the group of Prof. Schreiner, MHH Institute of Virology, presented a planned project in the laboratory of Dr. Boutell involving human adenoviruses, and Nadine Brückner from the team of Prof. Viejo-Borbolla, also from the MHH Institute of Virology, who works on varicella-zoster viruses reported on a planned project in the laboratory of Prof. Castello.

Afterwards, the total of around 25 HAGIS group members present exchanged views, discussing further joint research projects, the future funding of HAGIS and, in particular, the currently planned

establishment of a joint graduate college. The meeting confirmed the interest of both sides in further elaborating this project. A guided tour of the Wilhelm Busch Museum and a joint dinner successfully rounded off this visit with a convivial conclusion.

HAGIS was founded by RESIST and CVR in 2021 as part of the programme "Promotion of European and International Cooperation in Science and Research", funded by the Lower Saxony Ministry of Science and Culture, in order to conduct joint and complementary research on a permanent basis to advance the development of new therapies for infectious diseases and to give doctoral students the opportunity to benefit from the combined research strengths of the two sites.

A warm welcome

Dr. Berislav Bošnjak, research associate at the Institute of Immunology of the MHH, is now a member of our Cluster of Excellence. A warm welcome!

The research focus of the 44-year-old researcher is on the initiation of the T-cell immune response and its function in infections and allergies. At the

moment, he is mainly using cytomegalovirus infections as a model system. "My interest is to find out more about T-cell immune responses and the differences in dendritic cell migration patterns during homeostasis and infection," says the immunologist. Dr. Bošnjak studied molecular biology at the University of Zagreb, Croatia. He received his PhD in 2015 from the

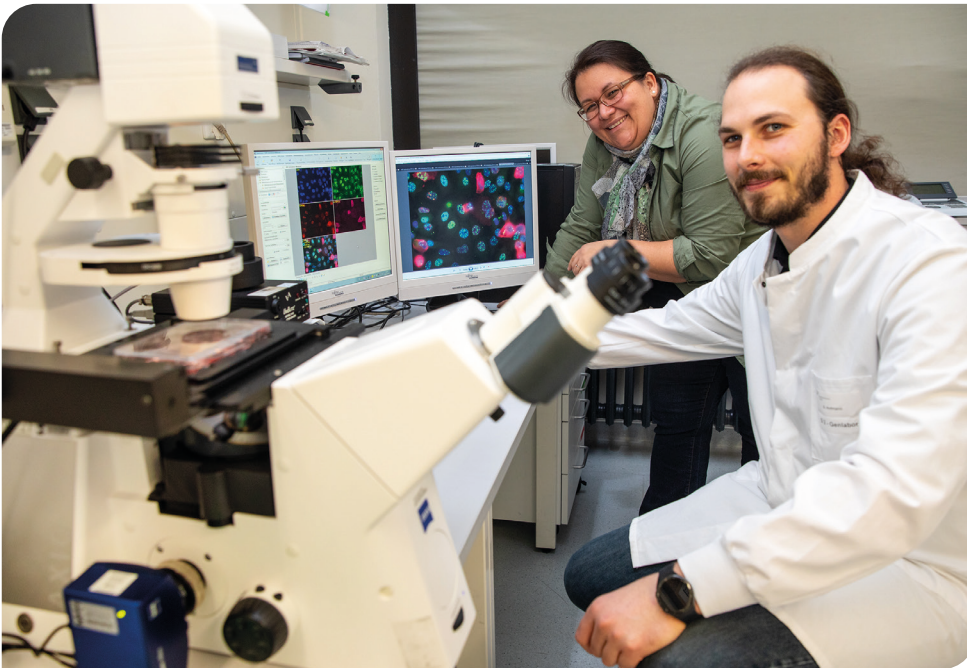
University of Vienna, Austria, and has been working at the Institute of Immunology at MHH since 2016. He will now enrich RESIST with his expertise in T-cell immunology and CRISPR/Cas9 technology, among other things. His goal is to one day be able to apply this technology to develop more effective and safer T-cell immunotherapies against viral infections.



Dr. Berislav Bošnjak

ADENOVIRUSES: HOW CELLS DEFEND THEMSELVES

TEAM RESEARCHES CELL MECHANISM THAT FORMS
THE BASIS FOR NEW THERAPIES



Prof. Schreiner (left)
and Dr. Hofmann

How do human cells defend themselves against adenoviruses? The team of Prof. Schreiner, MHH Institute of Virology, has come a good deal closer to answering this question. The group has elucidated an important defence mechanism and thus laid the foundation for the development of new treatment options. The research results, which were made possible through RESIST, were published in [the scientific journal mBio](#). The two first authors are Lilian Göttig and Dr. Weiß from the Institute of Virology at the Technical University of Munich from Prof. Schreiner's research group there. The team of authors also includes Dr. Hofmann from the MHH Institute of Virology.

New treatment options against human adenoviruses are needed, as there are neither specific therapies against these viruses nor a vaccination for the general population. Adenoviruses can cause inflammations—for example of the gastrointestinal tract, the conjunctiva, the liver and the brain. These are usually harmless in otherwise healthy people, but life-threatening pneumonia can occur with certain types of adenovirus. Adenoviruses can persist in the body and can also reactivate in certain situations. An adenovirus infection is particularly serious in people with a weakened immune system, for example, and they can also die from such an infection.

Prof. Schreiner's team has now found that human cells defend themselves against adenovirus infection with Apobec3A. "We found a significant upregulation of Apobec3A during HAdV infection," she says. The protein was already known to play a central role in defence against chronic hepatitis B virus infection. The researchers were also able to elucidate the defence mechanism: "Apobec3A changes the molecular labelling with the SUMO protein at important viral factors." As a result, the replication centres necessary for virus replication become non-functional and the viruses can then no longer reproduce.

In addition, the team was able to find out that some of the currently 95 known different adenovirus types are more vulnerable than others: "A comparative sequence analysis revealed that some adenovirus types may have developed a strategy to evade Apobec3A-mediated defence," says Prof. Schreiner. The results provide new insights into the interaction of the viruses and the host cell and expand the current view of how a host cell can limit infection. For the researchers, this is an important finding and a prerequisite for new therapeutic strategies and drugs against these viruses.

Prof. Wedemeyer (left)
and Prof. Cornberg



New weapon against hepatitis D

THE REQUIREMENTS FOR
FULL APPROVAL OF THE DRUG
HAVE BEEN MET

Hepatitis D virus infection causes the most severe form of chronic viral hepatitis disease. About ten to 20 million people worldwide are affected. There is currently no cure for the disease, and in the end the only treatment option is often a liver transplant.

However, an international team led by Prof. Wedemeyer and Prof. Cornberg has now been able to prove in a multicentre phase 3 study with 150 participants that the active substance Bulevirtide prevents hepatitis D viruses (HDV) from entering the liver. "This means that the prerequisites for full approval of the drug have been fulfilled and we can finally give all treating physicians an effective weapon against hepatitis D," says Prof. Wedemeyer, head of the study. The results were published in the internationally renowned medical journal [New England Journal of Medicine](#).

Based on the positive results of an earlier study, the European Medicines Agency (EMA) had already provisionally approved the drug. "This is extremely unusual because the requirements for full approval are only met with the phase 3 clinical trial. This shows how urgently an effective drug is needed for this severe liver disease," emphasizes

Prof. Wedemeyer. In the current study, the drug was tested on a larger number of patients to see if efficacy and safety could be confirmed, and possible interactions with other drugs were investigated.

Bulevirtide was developed at Heidelberg University Hospital and the German Center for Infection Research (DZIF). It blocks the docking point for the envelopes of the viruses on the liver cell so that the viruses can no longer enter the cell. Patients who are already infected also benefit: the drug protects newly formed liver cells from HDV infection, while at the same time cells that are already infected are destroyed by the immune system. The virus is thus deprived of its means of existence, because in order to continue to exist in the body it must always infect new liver cells. "Bulevirtide is a real game changer. We now expect that full approval will also be granted by the European Medicines Agency in the near future," says Prof. Wedemeyer.

The text is based on an MHH press release by Kirsten Pötzke.

RESIST mourns the death of Egbert Trowe

The RESIST team mourns the death of Egbert Trowe, who died on 31 May 2023 at the age of 78. Mr. Trowe himself received a liver transplant in 2002 and has since been an advocate for the issue of organ donation and for patients before and after organ transplantation. In November 2022, he became a patient representative on RESIST's internal advisory board.

Egbert Trowe was very active in numerous committees for several decades. He was involved as a board member of the Lebertransplantierte Deutschland e.V. association, a member of the board of trustees of the German Foundation for Organ Transplantation, a member of the board of trustees and foundation board of the German Liver Foundation, as well as a topic-related patient representative on the Federal Joint Committee. In addition, he was a member of the patient advisory board of the MHH Transplant Center, a member of the Hanover Admissions Committee at the Lower Saxony KV and a member of the Lower Saxony Organ Donation Network.

He took up his activities for RESIST in addition to these numerous activities in the various committees. "We are grateful to Egbert Trowe for his commitment to RESIST. Our sympathies go out to his relatives," says RESIST spokesperson Prof. Schulz.



Egbert Trowe

Master's programme: Start of the third year



Prof. Eils

To welcome the students who will start the Biomedical Data Analysis Master's programme in October, there will be a kick-off event on 12 October from 5 pm in lecture theatre Q, open to all interested parties. This is part of the orientation week for new students and

takes place within the RESIST seminar series. Please come in large numbers to this event and join us in welcoming the new students!

The highlight of the event will be the keynote speech by Prof. Dr. Roland Eils, founding director of the [Berlin Institute of Health of the Charité \(BIH\)](#), Centre for Digital Health, and head of the Hub for Innovations in Digital Health, which is a merger of his BIH department and the Health Data Science Unit of the Medical Faculty of Heidelberg University. Prof. Eils is also a member of the Medical Informatics Initiative, within which he coordinates the [HiGHmed consortium](#). HiGHmed brings together eleven university medical centres working together to make patient data accessible for clinical research and teaching, thus contributing to better care.

Excursion to Denmark

Comprehensive data storage, a sandbox and different paths into data science – all this could be experienced by the 25 students who took part in the excursion to Copenhagen organised by Dr. Melina Celik in April. In addition to students from the two current years of the MHH Biomedical Data Analysis Master's programme, doctoral students from the Add-on Fellowship for Interdisciplinary Life Science of the Joachim Herz Foundation, which supported this excursion as well as the trip to Luxembourg last year, were also present.

At the Diagnostic Centre of Rigshospitalet, the participants learned, for example, that every Dane receives an individual "Central Person Register" (CPR) number, which is also used to store and record all health-related data. This topic caused extensive discussions, as such comprehensive data storage would be unthinkable in Germany. At

the Center for Health Data Science (HeaDS) at the University of Copenhagen, among other things, the "sandbox" was presented. This is a safe "play area" for working with data, in which – based on real data sets – so-called synthetic data sets are created with the help of artificial intelligence, which do not allow any conclusions to be drawn about personal data.

"The excursion was a complete success. The insights into the everyday work of data scientists and their versatile tasks in bioscientific and clinical research were particularly impressive" says Katharina Wendt, a second-semester student. "We've seen how – starting from different fields of study and at different points within your scientific career – you can find your way into data science."



The happy participants of the Copenhagen excursion

Teaching prize awarded



Dr. Jan Wolff, Mareike Schulze holding the certificate and Dr. Dominik Wolff (from left).

Third-semester students were able to vote for the Biomedical Data Analysis Masters program's teaching award for the first time. And they were quite certain, because they decided unanimously. Thus, Dr. Dominik Wolff from the Peter L. Reichertz Institute for Medical Informatics (PLRI) as the person responsible for the module "Statistical Machine Learning – AI and Data Analysis" together with the other lecturers of the module, Mareike Schulze, Dr. Jan Wolff and Sarah Nee received an award sum of 20,000 euros. "We are very pleased to receive this award and will use the prize money to further enhance the quality of our teaching," says Dr. Wolff.

The students were particularly enthusiastic about the commitment of the lecturers. They liked the structure and concept of the module as well as the learning materials, especially the step-by-step programming tutorials. The knowledge was conveyed to them in a concise and understandable manner, and they found the practice exercises appropriate in terms of time and difficulty. They also rated the balance between theory and practice positively. They had a lot of fun while learning, as there were many moments of success and they received continuous feedback.

Green Lab

COMMITMENT TO SUSTAINABLE SCIENTIFIC RESEARCH



That's a lot of plastic: Franziska Hüters (bottom) and Birgit Ritter (top) amid the plastic boxes, media and PBS bottles that are now being recycled.

Lights off, refrigerator closed, fume hood sash down - these are simple but very effective measures that can save a lot of energy in a laboratory. Many people are aware of this. And yet the issue of sustainability in research needs momentum so that laboratory work does not consume ten times as much energy and four times as much water as office work – as is currently the case.

A nudge in the direction of sustainable research was given by Kristine Oevel of the Leibniz Research Institute for Molecular Pharmacology (FMB), who gave a talk entitled "What can we do and where can we start?" on May 4, 2023, as part of the RESIST seminar

series. Another impulse comes from Franziska Hüters. The doctoral student at the MHH Institute of Virology has since been meeting once a month with around ten colleagues to bring more sustainability into the lab.

They have already ensured that bacteria for plasmid production are no longer cultivated in disposable plastic tubes, but in rinsable glass tubes. They also have plastic boxes for pipette tips recycled by the manufacturer, as well as media and PBS bottles. Another idea is to autoclave only 20 percent of newly inserted pipette tips, rather than all of them.

"Our next goal is good waste separation, and a solution must also be found for the energy-guzzling cold rooms and cabinets, as well as gloves can be used more than once if they are not con-

taminated, and documents can be printed out less frequently," says Franziska Hüters. Many other employees at the institute are now also thinking about the issue of sustainability, so that the hallway and laboratory lights are switched off more consistently than before after work and on weekends, as are devices and computers that are no longer needed. Once these and other measures have become established, a reward awaits the dedicated team: then the Institute of Virology can adorn itself with the "My green lab certification" certificate from the non-profit organization My green lab – perhaps as a model for others?

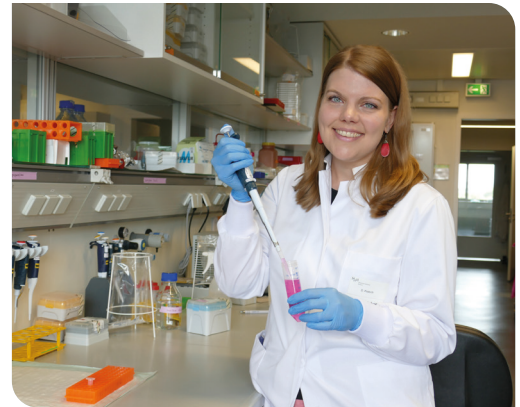
Research never sleeps

The "cell-sitting" list is something like a ticket for a vacation. Because when [Dr. Daniela Paasch](#) wants to take a vacation, she uses it to record exactly how her colleagues can preserve the life of the cells with which the postdoc is conducting research at the MHH Clinic for Pediatric Pneumology, Allergology and Neonatology. Dr. Paasch is using these immune cells, or more precisely macrophages, to develop cell therapies against bacteria as an alternative to antibiotics. She works in the team of Prof. Lachmann. "We are testing how effectively different macrophages can fight bacteria, for example tuberculosis bacteria," she says. In doing so, the researchers are comparing macrophages derived from blood cells with macrophages derived from so-called induced pluripotent stem cells (iPS cells) – that is, derived from cells produced in the laboratory from adult somatic cells using a technique called "reprogramming." The goal is to develop therapies against antibiotic-resistant bacteria.

To achieve this goal, the lab team sticks together: In fixed teams, the lab tasks are divided among themselves and everything is well prepared beforehand to make it as easy as possible for the others to take care of the experiments. And afterwards, they bring sweets to the office as a thank you for everyone.

[Hannes Neubauer](#) also cares about the important issue of antibiotic resistance in bacteria. "If I want to take a vacation, I have to have my work done beforehand. It doesn't happen that I let something overrun," says the doctoral student in the team of Prof. Galardini, research group Systems Biology of Microbial Communities of the TWINCORE Institute for Molecular Bacteriology. He is particularly interested in the reason for antibiotic resistance, and is working exclusively on computers to find out. "Bacterial strains of a species can differ greatly in their genetic makeup and thus in their properties. In particular, I am interested in the extent to which changes in the genes of *E. coli* bacterial strains obtained from patient samples are responsible for antibiotic resistance," he says.

Genetic variations of bacterial genomes are analyzed with genome-wide association studies (GWAS). The team he is part of is developing bioinformatics methods that make it easier to interpret the results of the analysis. To do this, it has developed a simple computational method (panfeed). The results have already been published as a [preprint](#), so the team can now go on their well-deserved vacation.



Dr. Daniela Paasch pipettes macrophages into a nutrient medium.



Hannes Neubauer is happy when he can put away his laptop after work and trade it in for a vacation in nature.



Marie Schulze (left) and Dr. Carina Jürgens ensure with the regulars' meetups that young researchers can get to know each other.

RESIST regulars' meetup

To enable young RESIST researchers to network with each other, the RESIST regulars' meetup for (post-) doctoral students has been in place since the beginning of the year. It takes place every two months, and on March 23, a group of about 15 young researchers met at Piccoli's Roadhouse bar in the city center to play billiards. On May 25, about ten participants had delicious pizza at the Institute of Virology and watched the movie *Contagion* - a thriller from 2011 by director Steven Soderbergh, which deals with a pandemic of a deadly virus. The film was then followed by a conversation about the past (Corona) years.

"In the context of these regulars' meetups, a few first new bridges have already been built. We would be happy if even more RESISTers join us. To this end, we are planning further regulars' meetups," says Dr. Carina Jürgens, who, together with Marie Schulze, represents the interests of (post-) doctoral students in RESIST. As soon as the next dates are fixed, they will be announced by e-mail; they can also be requested from: juergens.carina@mh-hannover.de and schulze.marie-sophie@mh-hannover.de.

RESIST Seminars

The RESIST seminar series continues to take place on the first and third Thursday of each month from 5 to 6 p.m. in Lecture Hall Q, Building J6 at MHH.



- On August 3, the company Visiopharm will present AI software for image analysis; the topic will be the evaluation of tissues and cells.
- On August 24, Prof. Ravens will give a talk on new results in the field of postnatal adaptation of T cells in premature infants.
- A RESIST seminar will also be held on September 7, although the speaker has not yet been determined.
- On September 21, Dr. Olmer, Leibniz Research Laboratories for Biotechnology and Artificial Organs (LEBAO) at MHH, will address the seminar.
- On October 5, there will be - from 1 to 3:30 p.m.! - the "RESIST D-Solve Symposium: Pathophysiology" satellite symposium of the MHH Department of Gastroenterology, Hepatology, Infectiology and Endocrinology will take place. It is integrated into the 2nd Delta Cure meeting.
- On October 12, there will be a kick-off event of the Biomedical Data Science master's program together with RESIST. The speaker is Prof. Eils, Center for Digital Health, Berlin Institute of Health at Charité (BIH).

- On November 2, Prof. Jacobsen from the Leibniz Institute for Natural Product Research and Infection Biology in Jena will give a lecture.
- On November 16, Prof. Čičin-Šain, Viral Immunology Research Group at the HZI Braunschweig, will give a talk.
- On November 23, Prof. Dalpke, Department of Medical Microbiology and Hygiene, Heidelberg University Hospital, will be the speaker.

Feel free to join us or write to RESIST@mh-hannover.de if you are interested in participating via video (online). The latest information on our seminars is always available on the homepage www.RESIST-cluster.de and on twitter: [@RESIST_cluster](https://twitter.com/RESIST_cluster).

Impressum

Editor

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The illustration on page 4 (below) is modified from: Zeev-Ben-Mordehai et al. (2014)
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RESIST in the podcast



We are very happy to announce that RESIST is now available for listening (in German language): One episode of the podcast "Exzellent erklärt - Spitzenforschung für alle" is about the research topic of Prof. Viemann. In it, the RESIST scientist

explains what she is researching so that premature and newborn babies can be better protected than before against dangerous infections. "The immune system of premature babies not infrequently reacts far too strongly to invading bacteria or viruses, so that infections can occur, some of which are life-threatening. This calls for new concepts of prevention and therapy - also because the time after birth influences susceptibility to allergies and infections as well as chronic inflammatory bowel diseases later in life," says Prof. Viemann. She heads the Workgroup Experimental Neonatology at the MHH Clinic for Pediatric Pneumology, Allergology and Neonatology, as well as the Department of Translational Pediatrics, which is part of the University Hospital of Würzburg and the Center for Infection Research (ZINF) at the University of Würzburg.

The podcast "Exzellent erklärt" reports regularly from one of the 57 clusters of excellence (in German language). It can be listened to and subscribed to at various providers, for example here <https://exzellent-erklart.podigee.io>

Immunology Day



Students filling out the RESIST quiz.

Around 700 senior high school students visited the MHH on April 28 on the occasion of Immunology Day. Numerous employees had offered various activities for these young guests - and of course there was also a RESIST booth! There, visitors were able to disinfect their hands and then use black light to check which areas might not have been wetted with disinfectant. This activity was very popular with both students and teachers - as was the RESIST quiz.

At other booths, guests could also, for example, look at parasites, bacteria and viruses under the microscope, and look at macroscopic preparations that illustrate the immune system. There was

also information on the immune system, stem cell and bone marrow donation, and vaccination, among other things. Above all, the young guests were able to talk to numerous experts. In addition, short lectures were held in two lecture halls such as the basics of immunology, HIV, infection research and congenital immunodeficiencies.

The Immunology Day at MHH is organized by the Department of Rheumatology and Immunology, and will now be held annually.

RESIST Summer Party

We are holding a RESIST summer networking meeting again this year - on 8/25 starting at 4pm. We invite all RESIST members as well as other colleagues to come to the meadow of TWINCORE, Feodor-Lynen-Str. 7, on this Friday. There we can enjoy the barbecue buffet together in a cozy atmosphere and exchange ideas over delicious drinks, while there will be organized care for the children on site. Come in large numbers, we look forward to seeing you!



RESIST – About us



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)**.

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