Friedrich-Alexander-Universität
Medizinische Fakultät

Uniklinikum
Erlangen

IZKF Erlangen 2024








interdisciplinary
Center for
Clinical Research

www.med.fau.de

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EDITORIAL

Dear Friends and Members of the IZKF,
Dear Readers,

Please find the Annual Report 2024 on the following pages, which provides an overview of the activities, recent developments, and funded projects of the IZKF Erlangen. All information is also available on our website: www.izkf.med.fau.de.

In 2024, the Jochen-Kalden funding programme saw the successful end of its initial projects but also start of a new exciting project headed by Prof. Dr. Christiane Krystelle Nganou Makamdop from the Department of Medicine 3. We wish her great success in her upcoming project. (Next application deadline is September 1, 2025).

We are also pleased to announce two new grants for Synergy projects, a funding scheme that intends to provide pilot financing for collaborative research. These are:

- AstroFINDER, Speaker Prof. Dr. V. Rothhammer
- DISCOVER, Speaker Prof. Dr. C. Günther

We wish much success in the realization of the projects and look forward to thrilling results. (Next application deadline is July 15th, 2025).

Following the retirement of Prof. Tanja Kuhlmann (University Hospital Münster) from the Scientific Advisory Board, the IZKF has appointed two new members for the neurosciences/neurology to the IZKF Advisory Board. We warmly welcome Prof. Dorothea Schulte (University Hospital Frankfurt a.M.) and Prof. Susanne Wegener (University Hospital Zurich).

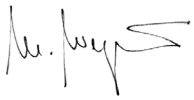
During the 2024 retreat of the clinician scientist programme, Dr. Eva Maier was farewelled as spokeswoman of the clinician scientists. We would like to thank Dr. Maier for her great work. Dr. Ella Ohlsson (like Dr. Maier from the Department of Dentistry) was elected as her successor.

On June 20 and 21, around 160 participants gathered at Kloster Banz for the 9th IZKF Symposium. We extend our heartfelt thanks to the speakers for their inspiring presentations, which, along with the enthusiastic engagement of our IZKF members, contributed to an enriching experience. We hope that everyone found value in the discussions and exchanges. In addition to a captivating lecture programme, the symposium featured a poster exhibition showcasing around 80 presentations. The next Symposium will take place on June 25 and 26, 2026. Save the date!

In 2024, a PostDoc programme was established to support PhDs and other scientists with similar doctorates in the early phase of their career. The programme furthers professional development by providing mentoring, networking opportunities and strategic career support to promote scientific independence. The aim is to create a platform that prepares PostDocs for academic challenges and facilitates the exchange of contacts in the scientific environment of the Faculty of Medicine. The first cohort of the new programme started in January 2025. Application for the next cohort ends on May 31, 2025.

On the administrative side, the IZKF has introduced a new, more flexible application system. In the future, all IZKF calls for proposals and the follow-up of projects will be handled via this “FlexAP”. Current projects as well as projects in follow-up status were already transferred from the previous IZKF and ELAN application systems to the new FlexAP in 2024.

In closing, I would like to express my sincere appreciation for your ongoing interest in and support of the IZKF. I would also like to extend my thanks to all the members of the Administrative Office who have once again played a vital role in the overall success of the IZKF and in the preparation of this annual report.



Prof. Dr. Michael Wegner
Chairman

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25 Advanced Projects

12 Immunology and Infection
7 Oncology
6 Neurosciences

8 tandem projects between departments and institutes
33 project leaders

7 Jochen-Kalden-Funding Programme

25 Junior Projects

8 Immunology and Infection
7 Neurosciences
8 Oncology
1 Medical Engineering
1 Renal and Vascular Research
thereof **6** projects completed in 2024
thereof **9** newly started projects

3 Appointment of IZKF project leaders to W2/ W3 - positions

42 Institutions with running projects 2024

6,896 K€ total expenditures in 2024

2 Synergy Grants running in 2024, 2 will start in 2025

60 Pilot Projects

25 Newly granted in 2024
30 Projects completed in 2024

5 Do I(I)T rotation positions running in 2024

71 Ongoing Scientific Theses in 2024

14 Master theses
51 Doctoral theses
6 Habilitations

518 Members of Life@FAU 2024

3 GRK 1660
7 GRK 1962
39 GRK 2162
37 GRK 2504
40 GRK 2599
17 GRK 2740
8 KFO 5024
32 SFB 1181
1 SFB 1350
10 TRR 221
17 TRR 225
26 TRR 241
8 TRR 305
5 TRR 369
62 participants outside RTG

206 IZKF
100 Dr. med.
106 Dr. rer. nat./Dr. rer. biol.hum.

29 Publications

Cumulative Impact Factor **373.500**
Average Impact Factor per publication **12.879**
Average publications per project **0,6***
13 publications with an IF more than 10

*Based on advanced projects, junior research groups and junior projects

118* Employees of the IZKF

74 Doctoral fellows, Post-Docs and laboratory rotations
44 Non-scientific employees

*Based on advanced projects, junior research groups, junior projects, pilot projects and laboratory rotations

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* Project leaders, clinician scientist programme, postdoc programme, laboratory rotations and committee members
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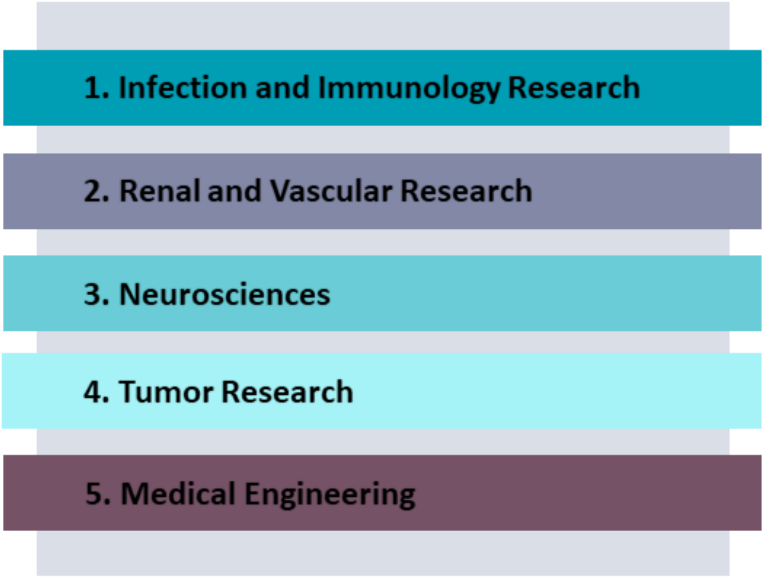
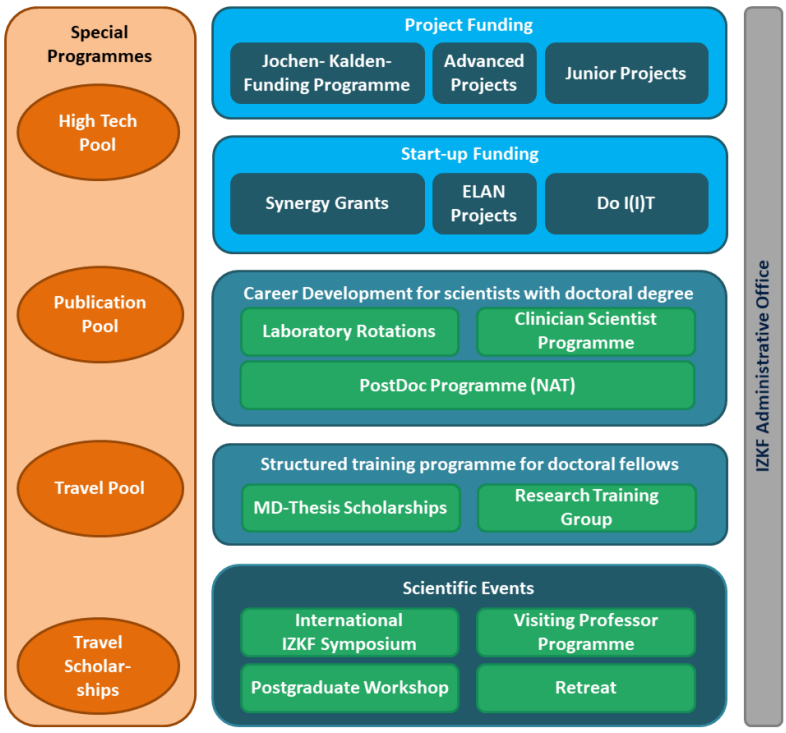
PROGRAMMES

The IZKF is the central structure of research development of the Faculty of Medicine. Its mission is to improve the overall quality of clinical research, to stimulate interdisciplinary research, to advance the careers of young scientists and to foster the acquisition of extramural funds. In order to achieve these goals, the IZKF supports projects in all research areas of the Faculty of Medicine on a strictly time-limited basis. The selection of projects is based exclusively on quality aspects. The various programmes are aimed at physicians and scientists at different stages of their scientific careers. Equipped with its own budget and own management structures, the IZKF continuously develops its own funding programmes in line with the needs of the Faculty of Medicine. In addition, the Faculty of Medicine also uses the structures established in the IZKF for the allocation and management of funds and avoids the creation of parallel structures.

The IZKF has created more transparency about research activities in the various areas and strengthened cooperation between clinics and institutes, but also between different clinics. The IZKF enables research funding beyond budget boundaries and also supports risk projects.



Main research areas of the Faculty of Medicine



Programmes and supporting activities of the IZKF for scientists at all career levels

The IZKF offers research grants in all main research areas of the Faculty of Medicine, i.e. immunology and infection research, renal and vascular research, neurosciences, tumor research and medical engineering. Advanced projects are assigned to one of the five main research areas of the Faculty, which is also encoded in the project number. Junior projects and pilot projects are also assigned to these five main research areas. However, there are some junior and pilot projects that cannot be directly allocated to one of the main research areas. These are grouped under “others”. The project reports in the hind part of this report are initially grouped by funding line, and additionally sorted by project numbers.

In all project lines with age restrictions childcare is taken into account. Periods of childcare are granted on a lump-sum basis without proof of actual periods of absence with two years per child for women and one year per child for men. Upon presentation of proof, additional periods of absence may be taken into account for both men and women. In junior projects the IZKF even offers extra funding under certain circumstances.

Advanced Projects

As already mentioned, the IZKF supports clinically relevant projects on all main research areas of the Faculty of Medicine. The project duration is 30 months.

After a single funding period projects should be transferred to extramural funding. If the application for extramural funding was filed (as listed below) within the duration of the IZKF project, the duration of the project will be extended for another six months. The successful participation of doctoral fellows funded in Advanced Projects will also be included as a further criterion for a project extension. In case of a two-stage review process for external funding proposals the full application is required for the extension of IZKF funding.

Project funding is allocated after a stringent peer-review process based solely on scientific criteria. Research grants are approved after a two-stage review process. In an initial step, draft proposals are subject to an internal review by an ad hoc committee consisting of members of the Management Board, the ELAN-Committee and the Junior Scientists Committee as well as other recognized scientists of the Faculty of Medicine based on a written proposal and public presentation. Decisions are reached after internal assessment and are communicated immediately afterwards. Successful proposals are presented in the second stage to the Scientific Advisory Board and peer-reviewed during on-site visits. Projects must start within six months. Over the years funding rates were about 30 - 40%.

Applicants are expected to have an active publication record and own external funding. Preliminary results should promise a successful transfer of the project into external funding after the 30-months term. Within this period an application for funding should be submitted to one of the listed funding institutions. Innovative and original ideas and concepts are especially valued as well as clinical relevance and interdisciplinary approaches. Applicants can be from all clinics, departments and institutes of the Faculty of Medicine and co-applicants from other faculties with no age limit.

Call for proposals	every 3 years
Eligibilty	active publication record and own external funding no age limit
Staff	Single projects: graduate student or technical assistant (one position) Tandem projects: graduate student(s) and/or technical assistant (two positions)
Consumables	Single projects: EUR 15,000 p.a. Tandem projects: EUR 35,000 p.a.
Others	Participation in Travel, Publication, High Tech Pool, and Travel Scholarships (only for graduate students)
Duration	30 + 6 months

LOM weighted 4-fold

- BMBF
- DFG
- EU
- NIH-Grants
- Other Federal and State Ministries

LOM weighted 2-fold

- Alexander von Humboldt-Stiftung
- Bayerisches Staatsministerium für Wissenschaft und Kunst
- Bayerische Forschungsstiftung/ Bayerische Landesstiftung
- Bill & Melinda Gates Foundation
- DAAD
- Deutsche Kinderkrebsstiftung/ HIT Deutsche Kinderkrebsstiftung
- Deutsche Stiftung für Herzforschung
- Dr. Mildred-Scheel-Stiftung/ Stiftung Deutsche Krebshilfe
- Else Kröner Fresenius Stiftung
- Fritz Thyssen Stiftung
- Gemeinnützige Hertie-Stiftung
- German-Israeli-Foundation (GIF)
- José Carreras Leukämie-Stiftung
- Volkswagen Stiftung
- Wilhelm Sander-Stiftung

Jochen-Kalden-Funding Programme

The junior research groups represent a central funding instrument of the IZKF. Every year, two new junior research groups have the possibility to benefit from this attractive career development programme.

The review takes place in a one-step process under the auspices of an ad hoc committee composed of members from the IZKF Management Board, members of the ELAN-Committee and the Junior Scientists Committee and the participation of the speakers of the Scientific Advisory Board.

Over a period of 2 years, each junior research group receives funding equivalent to one graduate student and one technical assistant and consumables in the amount of € 40,000 p.a. as flexible funding. If an application for extramural funding is submitted for external funding agency that is at least LOM-weighted 2-fold a further project year is granted.

Call for proposals	annually (1st September)
Eligibility	Newly appointed W1/ integrated W2 or W3 professors from external with tenure track or a comparable option of tenure at the Faculty of Medicine doctorate no longer than 10 years ago (medical doctorate) or no longer than 8 years ago (other doctorates, e.g. life sciences, engineering), based on the application deadline for professorship no significant other funding for a junior research group
Staff	Graduate student Technical assistant
Consumables	EUR 40,000 p.a.
Others	Participation in Travel, Publication, High Tech Pool and Travel Scholarships (only for graduate students) Possibility of providing laboratory space for shared use
Duration	24 + 12 months

Junior Projects

For scientists starting their independent career, obtaining their first extramural research funding is an important step. To aid in this process, the IZKF offers starting grants to young postdoctoral physicians and scientists up to 35 years of age without previous significant external funding. Candidates should have a visible publication record and projects should be based on an original idea with first tangible results.

After this time it is expected that successful candidates submit an external grant application. If the application is filed within duration of the junior project, the spending period will be extended by another 6 months. The successful participation of doctoral fellows funded in junior projects will also be included as a further criterion for the extension period.

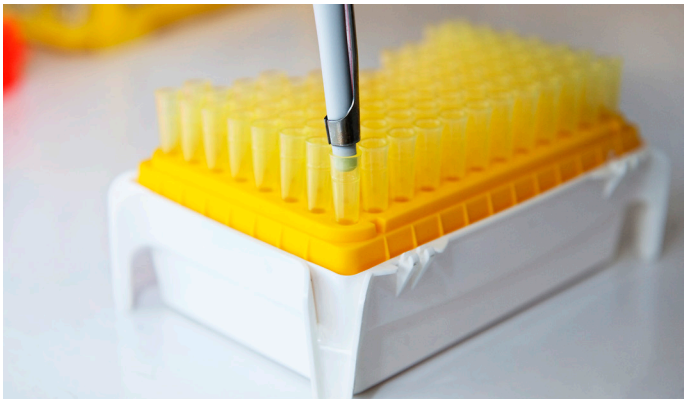
Junior projects are subject to a one-stage internal review only. Full proposals are reviewed by an ad hoc committee composed of members of the Management Board, members of the ELAN-Committee and Junior Scientists Committee based on a written proposal and public presentation. Decisions are reached after internal deliberation and are then communicated immediately afterwards to the proponents. The IZKF expects that at least 25% of the position of the applicant is financed from the budget of the applying institution. The contract should last at least as long as the project runs.

Call for proposals	annually
Eligibilty	for postdoctoral physicians/ scientists up to 35 years of age without previous external funding
Staff	Technical assistant or graduate student
Consumables	EUR 15,000 p.a.
Others	Participation in Travel, Publication, High Tech Pool and Travel Scholarships IZKF laboratory rotations for physicians
Duration	30 months

PILOT PROJECTS

The aim of the ELAN programme is to support scientific projects at a very early stage or under special circumstances and help project leaders to prepare for successful applications for external funding (start-up projects), to support newly established working groups, to develop new innovative ideas (pilot projects) or act as interim funding if temporary gaps arise between individual extramural funding periods. Funding for a period of up to 12 months is primary available to young scientists until the age of 38 (i.e. before the 39th birthday) at the time of application. This does not apply to newly appointed professors who can submit their application regardless of age. In addition, a portion of funds is also available for applicants of all age limits under special conditions such as temporary gaps of funding.

Call for proposals	continuously
Eligibilty	for young scientists until the age of 38 (i.e. before the 39th birthday) at the time of application with a doctoral degree, subordinately also for applicants beyond the age limit newly appointed (W2)-Professors can submit their application regardless of age position of the applicant is financed partly from the budget of the institution
Staff	sum up to one position
Consumables	max. EUR 15,000
Others	Participation in Travel, Publication Pool and Travel Scholarships IZKF laboratory rotations for physicians
Duration	max. 12 months



If a funding application is submitted to an external funding agency within the project period, a bonus (amounting to one third of the approved funds, maximally € 20,000, to be spent within six months of the end of the project) will be granted.

A total of two ELAN projects can be applied for over the course of a scientific career, provided that a publication or a third- party funded project has arisen from the first funding. The IZKF expects that at least 10% of the position of the applicant is financed from the budget of the applying institution.

SYNERGY PROJECTS

In addition to the ELAN-projects, 3-6 applicants from at least three different institutions can jointly apply for synergy projects. The funding line was established as pilot financing for planned group funding initiatives with a maximum volume of € 300,000 per project. Funding can be spent flexibly over a maximum of two years for staff and consumables. The allocation of funds among the applicants can be chosen freely and must be specified in the application. There is no age limit for applicants in synergy projects. Simultaneous funding in another IZKF funding line is possible. An extension of synergy projects is excluded.

Call for proposals	annually (15th July)
Eligibilty	for scientists with a doctoral degree and at least one first author publication no age limit
Funding	max. EUR 300,000
Others	Participation in Travel and Publication Pool
Duration	max. 24 months

DO I(I)T

In addition to the laboratory rotation the IZKF established rotation positions for up to 3 months Ä1/ Ä2 full-time, which can be applied for in preparation for IITs (focus on drawing up the protocol/obtaining an ethics vote). As a rule, they can be divided into up to 6 months, or up to 9 months on justified application.

Applications can be submitted to the IZKF administrative office up to 3 weeks before the respective Management Board meeting. Applications may be submitted by advanced physicians in further training and specialists of all disciplines without age limit.

Call for proposals	twice a year
Eligibilty	advanced physicians in further training and specialists of all disciplines no age limit
Funding	Ä1/Ä2 for 3 months fulltime equivalent
Others	-
Duration	3 to 6 (9) months

Career development for Clinician Scientists

Leave from clinical work for research

Access to protected research time is essential for young clinicians developing their projects. The laboratory rotation positions enable young scientists, who completed their doctorate, to fully devote themselves to a research project.

In the IZKF eight rotation positions are financed continuously and are available as follows. Physicians, who apply for a rotation position as part of a Junior Project, have the opportunity to apply for a rotation position for 12 months full-time or 24 months part-time directly as part of the project application. Within the Clinician Scientist Programme physicians can apply for the Module Step 2 that offers rotation positions for 12 months full-time or 24 months part-time.

In addition to these two programmes, there are rotation positions for flexible use. The positions are available for a period of six months full-time or 12 months part-time, an extension is not possible. Support of up to four rotation projects per year is possible.

Applications may be submitted at any time. There is no age limit, but the planned rotation position must make a suitable contribution to the scientific development of the applicant.

Clinician Scientist Programme

The Clinician Scientist Programme (CSP) is aimed at physicians who are in their specialist training, would like to conduct their own research project and to continue their scientific education within the frame-work of a structured training programme.

The aim of the CSP is to establish a new career path and promotion for Clinician Scientists and to create a structured scientific qualification programme for physicians performing clinical research. The focus is also on strengthening translational research by creating time for scientific work and the preparation for habilitation. The CSP includes professional as well as interdisciplinary further education, mentoring, retreats and regular meetings. At the same time, the physicians conduct their own research project.

The programme at the IZKF has a two-stage structure and is divided into a Step 1 and a Step 2. The Step 1 module lasts two years and requires a proof of the completed doctorate and enrolment in specialist training (already started at the time of joining the CSP).

The Step 2 module (duration three years) is aimed at physicians who have already successfully acquired a funding from the IZKF or a third party or the enrolments in the NOTICE Programme. The admission requirement for the Step 2 module is also fulfilled with a postdoctoral stay abroad of at least two years, at least two years of specialist training or with a successfully completed Step 1 module. The leave of absence is 12 months full-time or equivalent part-time via rotation positions. In order to obtain the certificate for the Step 2 module, a leave of absence of a total of 18 months is mandatory, even if the Step 2 was started directly. The department must agree to an additional six months of leave, unless the IZKF (laboratory rotation or Step 1) or other funders have provided funding. The maximum laboratory rotations financed by the IZKF over the entire scientific career is limited to 18 months.

A fast-track change from Step 1 to Step 2 is possible by application, if at least two years of specialist training have been completed and project funding has been personally obtained. Candidates who have been in the habilitation process for more than two years or who have already undergone an interim evaluation by the Fachmentorat cannot be accepted.

Applications for admission to the CSP may be submitted any time. Additionally, the IZKF regularly advertises direct admission to the CSP Step 2 by providing a rotation position.

Clinician Scientist programs financed by third-party agencies can be integrated into the CSP of the IZKF. This means that the participants in the externally funded Clinician Scientist Program have the same rights and obligations as other participants in the IZKF-CSP.

Successful completion of the CSP Step 2 allows admission to the doctoral programme for a doctorate in human biology at the Erlangen Faculty of Medicine.

Overview of career programmes for clinician scientists

Postdoc programme

The IZKF established a PostDoc programme for natural scientists with a doctorate who are in an early but pioneering phase of their career. It is specifically designed to support and promote academic careers immediately after the doctorate.

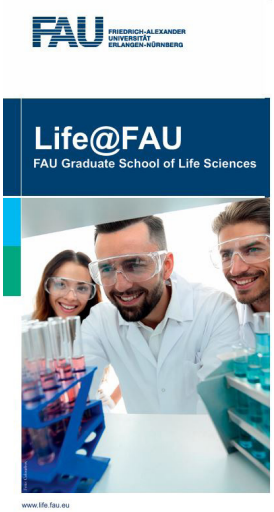
This programme not only focuses on specialist training, but also offers a package of mentoring, coaching, targeted networking opportunities and strategic career development. With its focus on career-promoting measures towards academic independence, it clearly distinguishes itself from existing initiatives such as Life@FAU.

Structured Training Programmes For Doctoral Fellows At The Izkf

Life@FAU

The Graduate School for Life Sciences (Life@FAU) was launched following an initiative of the IZKF to offer an interdisciplinary structured training programme for doctoral students at the Faculty of Medicine and the Department of Biology. The Faculty of Medicine and the Department of Biology at the Faculty of Sciences are involved on equal footing.

All research training groups of both faculties are members of Life@FAU including the IZKF Research Training Group. The objectives of Life@FAU are to promote and support structured training programmes for doctoral candidates at FAU, to create uniform standards in postgraduate education in the field of life sciences and to ensure the provision of structured training programmes.



MD-Thesis Scholarships

This programme was initiated to arouse interest for science in motivated medical students early on in their career. Medical students are supported in performing an experimental thesis.

Now 32 grants for eight months each are available for medical students with outstanding performance and commitment in studies. The participants have to work full-time in the laboratory and a scholarship is offered during their research activity. Furthermore, the doctoral fellows have to complete defined training modules during the 12 months after start of the fellowship. Training modules include guest speaker seminars, soft skills courses and the continuous supervision by a mentoring committee.

Every participant of the MD-Thesis Scholarship Programme automatically becomes a member of the IZKF Research Training Group and the Graduate School of Life Sciences at FAU (Life@FAU). Thus, the doctoral students can benefit from a structured, interdisciplinary training programme.

Research Training Group

The IZKF runs a research training group for all doctoral fellows and MD-students of the IZKF. Participation is mandatory for all IZKF-funded doctoral candidates in sciences and medicine who are not involved in an alternative structured training programme of the Faculty/ University. Other students may also associate with the research training group.

Aims of the IZKF Research Training Group include fostering networking and scientific self-organisation, methodological competence and soft skills as well as offering insights into other scientific fields and career opportunities. A structured seminar programme, courses in basic methods, in scientific writing and presentation are organised by the IZKF. In addition, the participants of the research training group have to attend guest speaker seminars and participate in the annual internal retreat. Participation in external congresses and in seminars organised by the doctoral fellows are mandatory.

The research training group also offers a mentoring programme for all doctoral fellows. Each doctoral fellow selects three mentors. At least one annual meeting of the doctoral student and the mentoring committee is expected.

The IZKF Research Training Group is divided into five research areas: Jour Fixe Ink (Immunology/infection/renal and vascular research), Jour Fixe Neuro (Neuroscience), Jour Fixe Onco (Oncology), Jour Fixe DigIT (Digital information technology) and the Jour Fixe MedTech (Medical and healthcare technology).

Postgraduate Workshop 2024: Winners of Poster Prizes: Lili Bao and Zubeir El Ahmad, Prof. Voskens

Special Programmes

The following special programmes provide additional funding for IZKF projects:

High Tech Pool

The IZKF actively encourages the use of modern “omics” technologies in the projects, such as those provided by the Core Unit Next Generation Sequencing. Since these experiments are generally expensive and consumables within IZKF advanced and junior projects are restricted, additional support is necessary. Costs for consumables can therefore be supported upon request with up to € 10,000 per project, provided that the project itself contributes at least 30% of the total sum. Exceptions are services provided by OICE, PIPE and FACS. Services from core units NGS, METAB, MACE and CUBiDA can be covered. The High Tech Pool is primarily for analyses/services of the mentioned core units at the site and not for in-house implementation in the laboratory (e.g. KITs).

The High Tech Pool is also available to junior research groups and active participants of the CSP Step 2 Module.

Travel Funding

To enable IZKF members to present their results to the academic community, the IZKF supports their participation in international conferences. All applicants are expected to give a lecture or present a poster. The subject matter of the event must be related to the IZKF project in order to receive funding.

The financial contribution of the IZKF is limited to € 500 for conferences in Germany, € 1,000 in Europe, and up to € 1,500 for conferences outside Europe.

A project-related active participation is required and an application in advance is necessary.

Publication Funding

The publication of results obtained in IZKF projects in scientific journals is actively supported. It is expected that the IZKF funding of the project is acknowledged and the affiliation is Erlangen. IZKF also supports open access publications.

If the IZKF is the only sponsor and the total costs of the publication are below € 3,000, IZKF can cover up to € 1,500. If the total costs exceed € 3,000 a financial contribution of € 2,000 is given by the IZKF. For publications in which the IZKF as well as other sponsors are mentioned, the IZKF contribution is € 500 less.

Travel Scholarships

Travel scholarships allow IZKF's young researchers to spend time in other laboratories in Germany or abroad to conduct important experiments or learn the latest techniques and methods. The programme also allows young scientists to intensify existing collaborations or establish new ones. Travel grants include transportation and accommodation for up to three months. An extension of the travel scholarship for another three months is possible.

IZKF Visiting Professor Programme

To encourage cooperation and to foster the exchange of ideas, IZKF promotes visits of external scientists. Every year approx. 5 scientists from abroad but also from other places in Germany can be invited for a stay of two days - four months. The programme covers an amount of up to € 3,000 for travel and accommodation costs for visiting researchers. Application is restricted to IZKF members and the invited researcher's subject must be related to the IZKF.

Availability of the special programmes in the various funding lines is summarized below.

	High Tech Pool	Travel Pool	Publication Pool	Travel Scholarships
Advanced Projects (Project leaders and scientific staff financed by project)	✓	✓	✓	✓ (only for doctoral students)
Junior Projects (Project leaders and scientific staff financed by project)	✓	✓	✓	✓
Pilot Projects (Project leaders and scientific staff financed by project)	✗	✓	✓	✓ (only for scientists of pilot projects under the age limit)
Syngery Projects (Project leaders and scientific staff financed by project)	✓	✓	✓	✓ (only for doctoral students)
Jochen-Kalden Funding Programm **(former Junior Research Groups)** (Project leaders and scientific staff financed by project)	✓	✓	✓	✓ (only for doctoral students)
Clinician Scientists Programme (active members)	✓ (only for Step 2)	✓	✓	✓
Other IZKF laboratory rotations	✗	✓	✓	✓
MD-Thesis Scholarships	✗	✓	✓	✓
Time frame	only within project period	6 months after the end of the project (MD: 12 months after the end of the scholarship)	12 months after the end of the project	only within project period

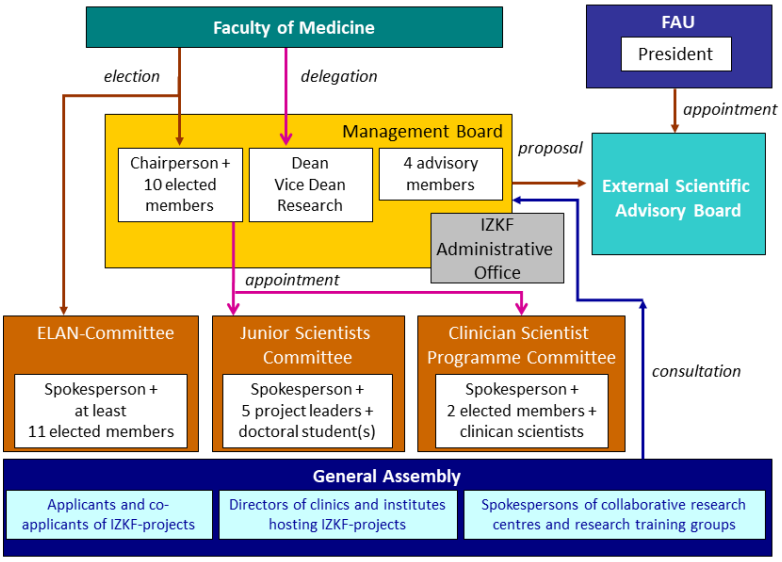
Participants in the PostDoc programme and Do I(I)T programme do not have access to the special programmes.

The table shows which programmes of IZKF are eligible for using special programmes.

GOVERNANCE

The IZKF is a self-organised structure within the Faculty of Medicine. The IZKF has a set of written rules and regulations approved by the Faculty of Medicine. All rules and regulations are continuously reviewed and revised, if necessary. The Statutes of the IZKF regulate the status, tasks and objectives of the IZKF as well as the responsibilities and composition of the committees. The Rules of Procedure specify the application procedure, the funding and duration of the projects as well as the decision-making process among Chairman, Management Board and the External Scientific Advisory Board. Finally, the Advisory Board regulations regulate the IZKF's cooperation with the Advisory Board in detail. All regulations are available on the IZKF Homepage.

Governing bodies include the Management Board, the External Scientific Advisory Board, the ELAN-Committee, the Junior Scientists Committee, the Clinician Scientist Programme Committee and the General Assembly.



Governance of the IZKF

The Management Board is the general steering committee of the IZKF. It is responsible for developing the scientific programme, controlling the financial framework and allocating resources to projects and ensures that results are reported. Five annual meetings are held and decisions are taken by simple qualified majority. Elected members include the Chairman who is responsible for daily operations with the support of the Administrative Office. Re-election is possible for all members of the Board.

Programmes and the financial framework are reviewed and approved by the External Scientific Advisory Board. This body meets on site every two or three years to oversee the general development of the IZKF and the proposed projects. The Board consists of at least 10 internationally recognized scientists from universities and research institutes led by an elected chairperson.

The ELAN-Committee is responsible for reviewing pilot and synergy projects and its members assist in the selection of advanced and junior projects. It consists of the spokesman for pilot projects (ELAN) and at least 11 further members all elected by the Faculty of Medicine for a period of three years.

The Junior Scientists Committee supports the Management Board in establishing and supervising career development programmes for young scientists. It selects the recipients of the MD-Thesis scholarships and organizes the IZKF Research Training Group. In addition, its members participate in the internal review process for project funding.

The Clinician Scientist Programme Committee (CSP-Committee) accompanies the Clinician Scientist Programme of the IZKF in terms of organisation and content and makes recommendations regarding the admission of new applicants to the Clinician Scientist Programme.

The General Assembly convenes once a year to discuss the annual report of the chairman and the further development of the IZKF. Its members are all project leaders, the directors of clinics and institutes receiving funding, and the speakers of all local collaborative research centers and research training groups.

External Advisory Board (from left to right): Prof. Moch, Prof. Busch, Prof. Mertens, Prof. Kuhlmann, Prof. Tiegs, Prof. Prinz, Prof. Seufferlein, Prof. Kalinke, Prof. Siebert, Prof. Schulz

Management Board

Chairperson

Prof. Dr. Michael Wegner, Institute of Biochemistry - Chair of Biochemistry and Pathobiochemistry

Deputy Chairperson

Prof. Dr. Aline Bozec, Department of Medicine 3


Prof. Dr. Wegner


Prof. Dr. Bozec

Members

Prof. Dr. Christoph Becker, Department of Medicine 1
Prof. Dr. Carola Berking, Department of Dermatology
Prof. Dr. Christian Bogdan, Institute of Clinical Microbiology, Immunology and Hygiene
Prof. Dr. Thomas Brabletz, Chair of Experimental Medicine I (until 04/2024)
Prof. Dr. Johann Helmut Brandstätter, Department of Animal Physiology
Prof. Dr. Dr. Raymund Horch, Department of Plastic and Hand Surgery
Prof. Dr. Dieter Chichung Lie, Institute of Biochemistry
Prof. Dr. Markus Neurath, Department of Medicine 1
Prof. Dr. André Reis, Institute of Human Genetics
Prof. Dr. Mario Schiffer, Department of Medicine 4
Prof. Dr. Friederike Zunke, Department of Molecular Neurology

Consultative Members

Prof. Dr. Joachim Hornegger, President of the FAU
Christian Zens, Head of Administration of the FAU
Prof. Dr. Dr. Heinrich Iro, Medical Director of the University Hospital Erlangen
Dr. Albrecht Bender, Head of Administration of the University Hospital Erlangen


Prof. Dr. Becker


Prof. Dr. Berking


Prof. Dr. Bogdan


Prof. Dr. Brandstätter


Prof. Dr. Dr. Horch


Prof. Dr. Dr. Lie


Prof. Dr. Dr. Neurath


Prof. Dr. Reis


Prof. Dr. Schiffer


Prof. Dr. Zunke


Prof. Dr. Hornegger


Zens


Prof. Dr. Dr. Iro


Dr. Bender

Members of the Management Board (as of 31st December 2024)

External Scientific Advisory Board

Chairperson

Prof. Dr. Thomas Seufferlein,
University Hospital Ulm, Internal Medicine I

Deputy Chairperson

Prof. Dr. Tanja Kuhlmann,
University Hospital Münster, Institute of Neuropathology (until 07/2024)

Members

Prof. Dr. Dirk Busch, Technical University of Munich, Institute for Medical Microbiology, Immunology and Hygiene

Prof. Dr. Ulf Dittmer, University Hospital Essen, Institute of Virology

Prof. Dr. Anka Dorhoi, Friedrich-Löffler-Institut, Institute of Immunology (since 03/2024)

Prof. Dr. Renate Kain, Medical University of Vienna, Department of Pathology (since 03/2024)

Prof. Dr. Ulrich Kalinke, TWINCORE, Centre for Experimental and Clinical Infection Research

Prof. Dr. Thomas Kamradt, Jena University Hospital, Institute of Immunology

Prof. Dr. Peter R. Mertens, University Hospital Magdeburg, Clinic for Renal and Hypertension Diseases, Diabetology and Endocrinology

Prof. Dr. Jörg Prinz, LMU München, Department of Dermatology and Allergology

Prof. Dr. Doroteha Schulte, University Hospital Frankfurt, Institute of Neurology (Edinger Institute) (since 12/2024)

Prof. Dr. Jörg B. Schulz, University Hospital Aachen, Department of Neurology

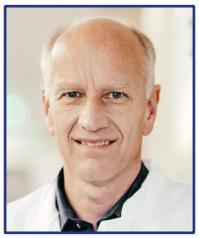
Prof. Dr. Reiner Siebert, University Hospital Ulm, Institute of Human Genetics

Prof. Dr. Sibylle von Vietinghoff, University Hospital Bonn, Internal Medicine I, Nephrology (since 03/2024)

Prof. Dr. Susanne Wegener, University Hospital Zürich, Department of Neurology (since 12/2024)

Prof. Dr. Konstanze F. Winklhofer, Ruhr-University Bochum, Institute of Biochemistry and Pathobiochemistry


Prof. Dr. Busch


Prof. Dr. Dittmer


Prof. Dr. Dorhoi


Prof. Dr. Kain


Prof. Dr. Kalinke


Prof. Dr. Kamradt


Prof. Dr. Mertens


Prof. Dr. Prinz


Prof. Dr. Schulte


Prof. Dr. Schulz


Prof. Dr. Seufferlein


Prof. Dr. Siebert


Prof. Dr. von Vietinghoff


Prof. Dr. Wegener


Prof. Dr. Winklhofer

External Scientific Advisory Board (as of 31st December 2024)

ELAN-Committee

Spokesperson for pilot projects (ELAN)

Prof. Dr. André Reis, Institute of Human Genetics

Members

Prof. Dr. Tobias Bäuerle, Institute of Radiology (until 07/2024)
PD Dr. Simone Brabletz, Chair of Experimental Medicine I
Prof. Dr. Anna Fejtova, Department Psychiatry and Psychotherapy
Prof. Dr. Kristian Franze, Institute of Medical Physics and Microtissue Engineering
Prof. Dr. Claus Hellerbrand, Institute of Biochemistry
Prof. Dr. Thomas Kinfe, Department of Neurosurgery (until 09/2024)
Prof. Dr. Andreas Ramming, Department of Medicine 3
Prof. Dr. Heiko Reutter, Department of Paediatrics and Adolescent Medicine
Prof. Dr. Veit Rothhammer, Department of Neurology
Prof. Dr. Peter Soba, Institute of Physiology and Pathophysiology
Prof. Dr. David Vöhringer, Department of Infection Biology
Prof. Dr. Caroline Voskens, Department of Dermatology
Prof. Dr. Maximilian Waldner, Department of Medicine 1

Members of the ELAN-Committee (as of 31st December 2024)

Junior Scientists Committee

Spokesperson for career development programmes
Prof. Dr. Christoph Becker, Department of Medicine 1

Members
Daniel Firmbach, Institute of Pathology (Representative of doctoral students)
Prof. Dr. Thomas Gramberg, Institute of Clinical and Molecular Virology
Prof. Dr. Claudia Günther, Department of Medicine 1 (until 10/2024)
Prof. Dr. Ricardo Grieshaber-Bouyer, Department of Medicine 3 (since 10/2024)
Dr. Kerstin Hübner, Institute of Pathology (since 10/2024)
Sabrina Kojic, Institute of Biochemistry (Representative of doctoral students)
Prof. Dr. Chichung Lie, Institute of Biochemistry
PD Dr. Adrian Regensburger, Department of Paediatrics and Adolescent Medicine (until 10/2024)
PD Dr. Ulrike Steffen, Department of Medicine 3


Prof. Dr. Becker


Firmbach


Prof. Dr. Gramberg


Prof. Dr. Grieshaber-Bouyer


Dr. Hübner


Kojic


Prof. Dr. Lie


PD Dr. Steffen

Members of the Junior Scientists Committee (as of 31st December 2024)

Clinician Scientist Programme Committee

Spokesperson for Clinician Scientist Programme
Prof. Dr. Carola Berking, Department of Dermatology

Members
Dr. Eva Maier*, Department of Oral and Cranio-Maxillofacial Surgery (until 10/2024) (Representative of clinician scientists)
Dr. Ella Ohlsson*, Department of Oral and Cranio-Maxillofacial Surgery (since 10/2024) (Representative of clinician scientists)
Prof. Dr. Veit Rothhammer, Department of Neurology
Dr. Alexander Schnell*, Department of Paediatrics and Adolescent Medicine (Representative of clinician scientists)
Prof. Dr. Maximilian Waldner, Department of Medicine 1


Prof. Dr. Berking


Dr. Ohlsson


Prof. Dr. Rothhammer


Dr. Schnell


Prof. Dr. Waldner

Members of the CSP-Committee (as of 31st December 2024)

Finances

Since 2004, the IZKF has been fully supported by intramural funds. The main financial contribution is given by the Faculty of Medicine. Additional contributions are received from the FAU.

Part of the expenditures of 2024 were financed from residual funds of the previous years.

Unspent funds can be carried over to the next year. The IZKF has a carryover amount of 4,562 K€ as of January 1, 2024.

Revenues	
Support of the Faculty of Medicine	5,087 K€
Support of the University	368 K€
Other revenues	25 K€
Total revenues 2024	**5,480 K€**

Expenditures	
Advanced projects	2,085 K€
Start up funding	1,417 K€
thereof Pilot projects (below age limit)	959 K€
thereof Pilot projects (above age limit)	326 K€
thereof Synergy projects	132 K€
Career development	2,916 K€
thereof junior research groups	670 K€
thereof junior projects	1,066 K€
thereof laboratory rotations	738 K€
thereof Do IIT	117 K€
thereof Topecs	30 K€
thereof clinician scientist programme	12 K€
thereof MD-thesis scholarships	237 K€
thereof research training group	46 K€
Central projects	139 K€
Administration	339 K€
Total expenditures 2024	**6,896 K€**

Revenues and expenditures 2024

Output and Evaluation

Various parameters are used to assess compliance with the mission of the IZKF in advancing clinically oriented research at the Faculty. Scientific publications and academic success of young scientists are the most obvious and straightforward ones. Additionally, the acquisition of extramural funding is an explicit objective of the IZKF. Other important parameters for the IZKF are the number of different institutions and scientists, who are involved in the IZKF, the number of interdisciplinary projects as well as the number of joint publications.

In the reporting period 105 scientific projects were actively running: 25 advanced projects, 25 junior projects (six of them started their work in 2024), 46 pilot projects, seven junior research groups and two synergy grants. In addition, one junior research group and two synergy grants will start in the beginning of 2025.

25 advanced, 19 junior projects and seven junior research groups published 29 original articles in 2024 resulting in an average of 0,6 publications per project. The cumulative impact factor (IF) was 373.500, averaging 12.879 per publication. 13 publications have an IF of more than 10. Additional articles of finalised projects are in preparation, submitted or accepted. Publications that have already been accepted are listed in the corresponding final reports.

Intense academic activity within the IZKF advanced and junior projects is reflected in 14 master theses, 51 doctoral theses and six habilitations that were in progress or finalised in 2024. Three professorships to IZKF project leaders were offered. A total of 88 project leaders and 57 employed scientists (PhDs and Post-Docs) are involved in 105 scientific projects (running advanced projects, junior research groups, junior projects and pilot projects 2024) funded by the IZKF.

In many instances funding by the IZKF starts at an early phase of the project, thus it must be considered as a high risk funding programme. It is nevertheless reassuring that most of the projects are successful and many of them are continued after the termination of intramural funding. On the following pages the output of the IZKF-projects is given, supported by figures and results of a detailed.

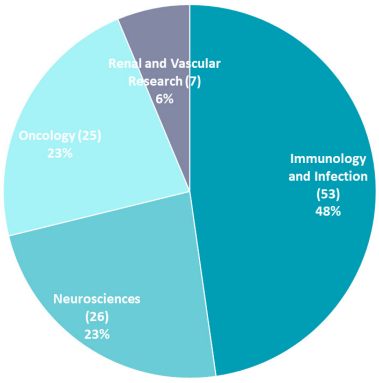
The following table shows all institutions with a running Advanced, Junior or Pilot Project in 2024 and their association to the main research areas of the Faculty. In addition, it can be seen which institution was funded with rotation positions (without assignment to a research area):

Institute	Advanced Projects	Junior Projects	Pilot Projects	Laboratory Rotation
Chair of Experimental Medicine I	O		O	
Chair of Pharmacology and Toxicology			O, N	
Department of Dermatology	O		O, N	X
Department of Immune Modulation	I			
Department of Infection Biology			I	
Department of Medicine 1	I, O	O, N, I	S, I, O	X
Department of Medicine 3	I	I	I	X
Department of Medicine 4		O	R	X
Department of Medicine 5	O	O	O	X
Department of Molecular Immunology		I		
Department of Molecular Neurology		N	N, M	
Department of Nephropathology	O			
Department of Neurosurgery			N	
Department of Nuclear Medicine				X
Department of Obstetrics and Gynecology			S	
Department of Operative Dentistry and Periodontology		M	I, S	X
Department of Ophtalmology			I	
Department of Orthodontics and Orofacial Orthopedics			S, N	
Department of Orthopaedic and Trauma Surgery				X
Department of Paediatric Cardiac Surgery			R, M	
Department of Paediatrics and Adolescent Medicine		R, I	S, O	X
Department of Plastic and Hand Surgery			O, M	
Department of Psychiatry and Psychotherapy	N	N	I, N	
Department of Physics – Chair of Biological Optomechanics	I			
Department of Prosthodontics			M	
Department of Radiology				X
Department of Radiation Oncology		O		
Department of Stem Cell Biology		N	N	
Department of Surgery			O	X
Department of Urology			S	
Harald zur Hausen Institute of Virology	I	O	I	
Institute of Anatomy – Chair of Microscopic Anatomy and Molecular Imaging	N			
Institute of Biochemistry - Chair of Biochemistry and Molecular Medicine	O, N		O, N	
Institute of Biochemistry - Chair of Biochemistry and Pathobiochemistry	N	N		
Institute of Clinical and Molecular Virology	I	O	I	
Institute of Clinical Microbiology, Immunology and Hygiene	I			
Institute of Experimental and Clinical Pharmacology and Toxicology		O		
Institute of General Practice				X
Institute of Human Genetics	N			X
Institute of Medical Physics	N		N	
Institute of Pathology	O	O	O, I	X
Institute of Physiology and Pathophysiology	N	N		
Institute of Radiology	N	N		X

I - Infection and Immunology, N - Neurosciences, O - Oncology, R - Renal and Vascular Research, M - Medical Engineering, S - Others, X - Funding of a rotation position, without assignment to a research area

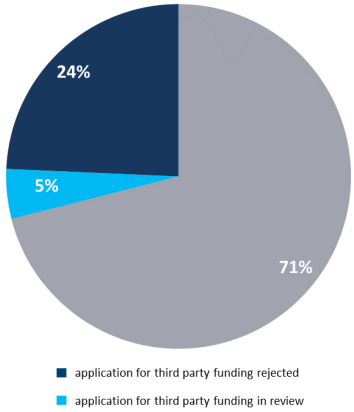
Advanced Projects

The 41 project leaders of the funding period 2020 - 2023 come from 23 different institutions. 11 (27%) of the project managers are women, 30 (73%) men. Project leaders include 19 (46%) natural scientists and 22 (54%) clinician scientists. In 2022, 25 new projects were approved. Of the 34 project leaders, 6 (18%) are female and 28 (82%) male. 15 (44%) of them are clinician scientists and 19 (56%) are natural scientists.



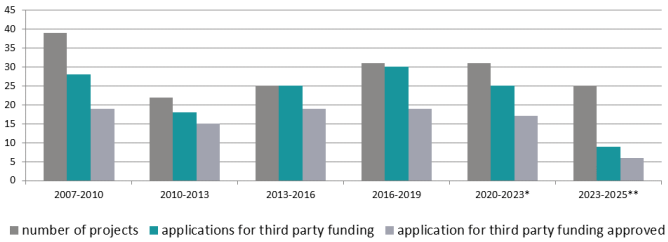
Distribution of advanced projects as per main research area between 2013 and 2022 incl. advanced projects 2022 - 2025

The projects started with the filling of the approved positions or with the first disposition. Tandem projects have the option of filling their positions time shifted and thus do not lose any approved funds for personel. Beginning with the funding period of 2010-2013, grants were awarded for a period of 30 months with an extension by 6 months, if these projects are submitted for external funding. Within the funding period of 2013-2016 all projects submitted external funding applications and therefore received the 6 months funding extension. Of the 31 projects from the 2016-2019 funding period, 30 (97%) have applied for project extensions. From the cohort 2020-2023, 25 (80%) of the 31 projects have successfully applied for an extension.
When considering the funding periods 2010-2019, 78 projects were funded by the IZKF of which 73 (94%) submitted external funding applications. 53 of these projects (73%) were granted extramural funding, 20 (27%) were not funded.



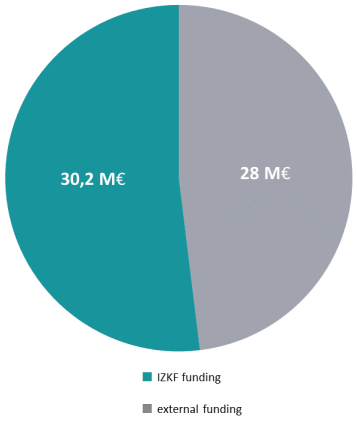
Approved applications for external funding of advanced projects between 2024 (cohorts starting between 2010 and 2023)

Regarding the projects of the period 2020-2023, 17 (68%) of the 25 projects, which applied for external grants, received funding approvals. Two further applications are still under review. Of the 25 projects in the current cohort (2023-2025), 9 (36%) projects have already submitted at least one application for external funding. 6 (24%) of the cohorts projects applications have already been approved. Further project applications are currently in preparation. Three of the projects have already received a project extension based on the external funding applications or approvals.

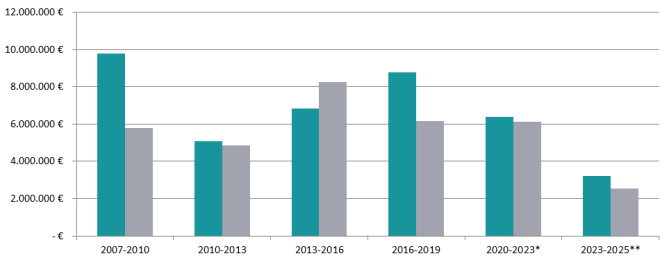


This column graph compares the number of advanced projects with the number of the submitted and approved applications for external funding in each funding period.

* Few applications are still under review.
** Further applications for external funding agencies are planned.



External funding received from advanced projects between 2010 and 2024 (cohorts starting between 2010 and 2023)



External funding received from advanced projects between 2007 and 2024

* Few applications are still under review.
** Further applications for external funding agencies are planned.

Jochen-Kalden-Funding Programme

In 2024 there were seven running junior research groups.

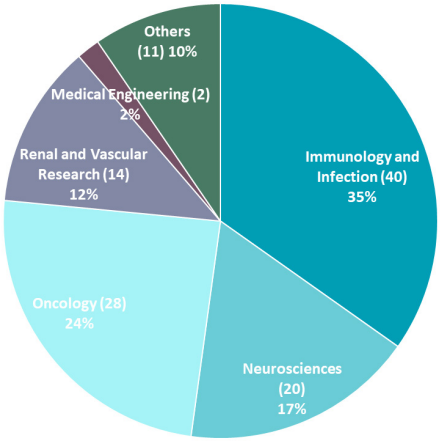
In the first round of applications, Prof. Claudia Günther (Department of Medicine 1), Prof. Janina Müller-Deile (Department of Medicine 4), Prof. Marisa Karow-Falk (Institute of Biochemistry) and Prof. Friederike Zunke (Department of Molecular Neurology) were selected as group leaders. All four groups were able to apply for an extension due to applications for extramural funding. Following the call in 2022, Prof. Caroline Voskens (Department of Dermatology) was accepted and started her project in 2024. Prof. Ricardo Grieshaber-Bouyer (Department of Medicine 3) and Prof. Lydia Meder (Department of Experimental Medicine I) were successful in the 2023 call and also started their projects in 2024. Prof. Dr. Christiane Krystelle Nganou Makamdop from the Department of Medicine 3 received funding from the last round of calls for proposals. The next application deadline is September 1st, 2025.

Junior Projects

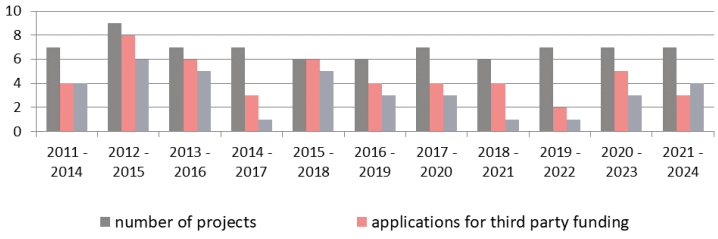
The first call for junior projects was in 2009. Proposals are accepted every year. Overall 115 junior projects were selected for funding between 2009 and 2024. In this period, 47 (41%) physicians received funding and 68 (59%) scientists. 32 (68%) of the physicians requested a laboratory rotation. Of them, 11 (34%) were women and 21 (66%) men. In general, men and women were almost equally supported when assessed over the entire funding period.

57 successful applicants were women and 58 men. The median age was 32 at the time of application, for both women and men. All main research areas of the Faculty are represented with immunology and infection (35%) and oncology (24%) being the most successful over the years. Overall candidates from 28 different institutions within the Faculty of Medicine were selected.

In 2024, eleven proposals were reviewed and six (55%) of them received funding. The approved projects cover the main research areas oncology (3, 50%), neurosciences (2, 33%) and immunology and infection (1, 17%). The successful applicants work in six different institutions within the Faculty of Medicine.



Distribution of junior projects as per main research area of the Faculty of Medicine between 2009 and 2024

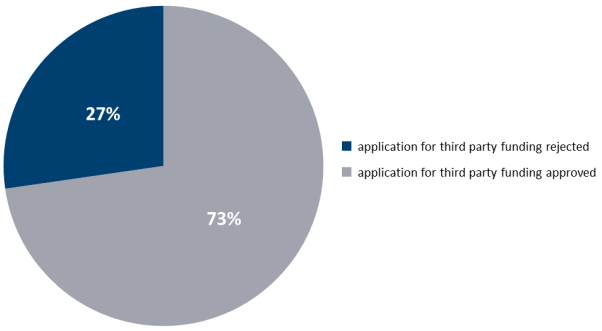


Success-rate of junior projects initiated between 2011-2021

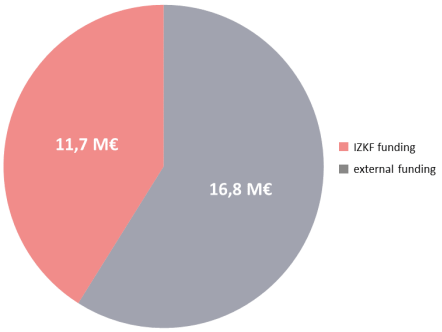
Two (33%) physicians and four (67%) other scientists were funded in this year's call for applications.

Four (67%) women received funding and two (33%) men. The median age was 33 years.

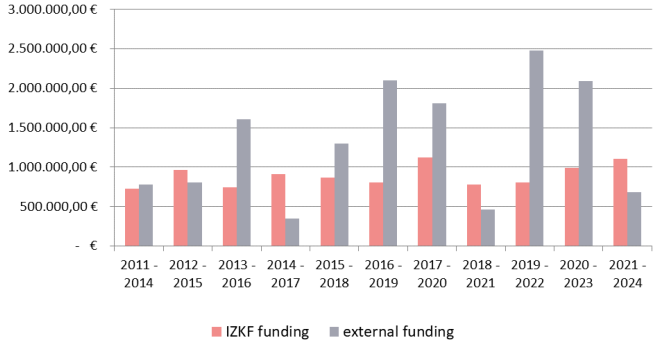
The Junior Projects also perform very well in raising external funding. 73% from the projects that started between 2009 and 2021 applied for third-party funding to an external funding agency. This development has been stable over the entire duration of the programme.



Approved applications for external funding of junior projects (projects initiated between 2009 and 2021)



External funding received from junior projects started between 2009 and 2021



External funding received from junior projects initiated between 2011 and 2021

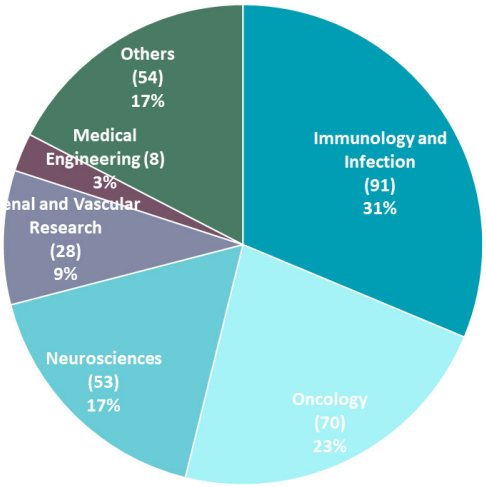
Pilot Projects (ELAN)

Pilot projects are intended to support scientists at an early career stage. Additionally, limited funds are also available for supporting tenured Faculty members in obtaining third party funding.

In the reporting period, 38 proposals were assessed by the ELAN-Committee. Of these, 25 (66%) received funding. The approved projects cover all main research areas of the Faculty of Medicine: immunology and infection (6), neurosciences (6), oncology (5), renal and vascular research (3) as well as medical engineering (3), and two pertained to other research topics. Successful applicants were from 18 different institutions, 13 (52%) being women and 12 (48%) men. Median age was 37 (36 for women and 39 for men).

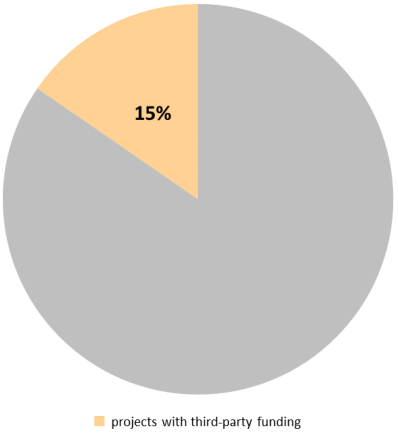
Applications for pilot projects can be submitted electronically via the application tool FlexAP at any time. The ELAN-Committee meets four times a year and selects projects for funding after external and internal peer review. Between 2012 and 2024, a total of 427 proposals for pilot projects were reviewed in the ELAN-programme. Overall, 310 (72%) projects were funded. The gender ratio was even, with 156 women (50%) and 154 men (50%) being successful, and the median age was 34 years.

All main research areas of the Faculty were represented; with the areas of immunology and infection (31%) and oncology (23%) contributed the majority of successful applications.

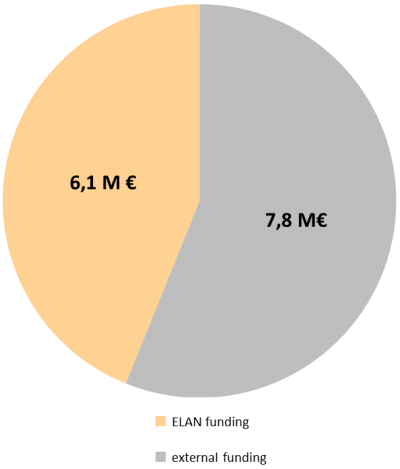


Distribution of pilot projects as per main research area between 2012 and 2024

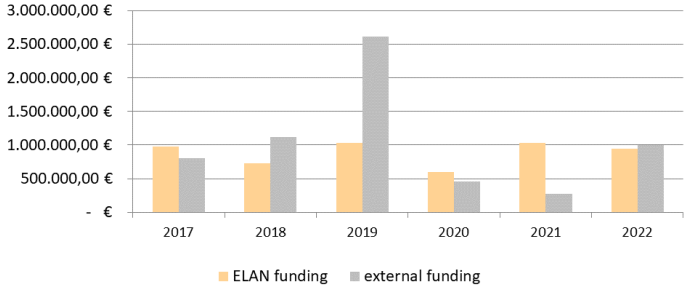
In the following, the success rate of acquiring external funding is summarised.



Pilot projects with external funding (completed projects with approval years between 2016 and 2022)



External funding received from all completed pilot projects (year of approval between 2016 and 2022)



External funding from completed pilot projects started between 2017 and 2022

Career Development junior scientists

Laboratory Rotations

In 2024, 32 physicians were funded with a rotation position. In addition to pure laboratory rotations, positions are also open to junior project leaders, participants in the Module Step 1 and Step 2 of the Clinician Scientist Programme. Participants of the DFG-funded NOTICE Programme are funded with 10% of their salary by the IZKF.

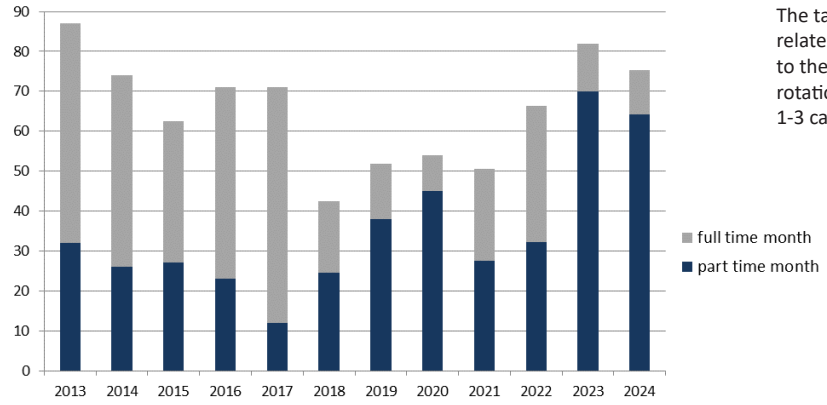
Rotations		
Dr. Melissa Pauly	Institute of Human Genetics	07/2023 - 06/2024, 50%
Dr. Nadine Bayerl	Department of Radiology	02/2024 - 01/2025, 50%
Dr. Ella Ohlsson	Department of Operative Dentistry and Periodontology	04/2024 - 04/2025, 50%
Dr. Felix Elsner	Institute of Pathology	06/2024 - 05/2025, 50%
Dr. Leah Trumet	Department of Operative Dentistry and Periodontology	10/2024 - 09/2025, 50%
Dr. Alina Hilger	Department of Paediatrics and Adolescent Medicine	07/2024 - 06/2025, 50%
Dr. Kereshmeh Tasbihi	Department of Medicine 5	10/2024 - 03/2025, 100%

Rotations of Junior Project Leaders		
Dr. Miriam Düll	Department of Medicine 1	04/2023 - 03/2025, 50%
Dr. Alina Hilger	Department of Paediatrics and Adolescent Medicine	10/2022 - 09/2024, 50%
PD Dr. Benedikt Jacobs	Department of Medicine 5	02/2022 - 01/2024, 50%
Dr. Eva Maier	Department of Operative Dentistry a. Periodontology	03/2023 - 02/2024, 100%
Dr. Christian Matek	Institute of Pathology	01/2023 -12/2024, 50%
Dr. Stephanie Naas	Department of Medicine 4	08/2024 - 07/2026, 50%
Dr. Alexander German	Department of Molecular Neurology	11/2024 - 10/2025, 100%

Rotations of successfull applicatants of Clinician Scientists Programme		
Dr. Lisette Warkentin	Institute of General Practice	07/2023 - 06/2025, 50%
Dr. Elias Koch	Department of Dermatology	03/2024 - 02/2026, 50%
Dr. Marius Brazdis	Department of Psychiatry and Psychotherapy	09/2024 - 08/2025, 100%

Rotations of Clinician Scientists in the NOTICE-Programme		
Dr. Armin Atzinger	Department of Nuclear Medicine	05/2023 - 09/2025, 10%
Dr. Janina Auth	Department of Medicine 3	05/2023 - 04/2026, 10%
Dr. Giulia Corte	Department of Medicine 3	05/2023 - 04/2026, 10%
Dr. Franziska Czubayko	Department of Surgery	01/2024 - 04/2026, 10%
Dr. Filippo Fagni	Department of Medicine 3	05/2023 - 04/2026, 10%
Dr. Panagiotis Garantziotis	Department of Medicine 3	05/2023 - 04/2026, 10%
Dr. Anne Jacobsen	Department of Surgery	05/2023 - 04/2026, 10%
Dr. Tilman Jobst-Schwan	Department of Medicine 4	05/2023 - 04/2026, 10%
Dr. Anna Kanewska	Department of Orthopaedic and Trauma Surgery	05/2023 - 08/2024, 10%
Dr. Claudius Mathy	Department of Radiology	05/2023 - 04/2026, 10%
Dr. Maria Gabriella Raimondo	Department of Medicine 3	05/2023 - 04/2026, 10%
Dr. Moritz Ronicke	Department of Dermatology	05/2023 - 04/2026, 10%
Dr. Jonas Schmid	Department of Medicine 1	05/2023 - 04/2026, 10%
Dr. Julia Scholz	Department of Medicine 5	05/2023 - 04/2026, 10%
Dr. Sebastian Schramm	Department of Medicine 1	05/2023 - 04/2026, 10%
Dr. Lukas Sollfrank	Department of Dermatology	05/2023 - 04/2026, 10%

Laboratory rotations 2024 with name, institute, funding period und scope of position



The table shows the claimed months related to full time for each year. Due to the duration of 6-24 months, the rotations usually last over a period of 1-3 calendar years.

Clinician Scientist Programme

During the funding period, altogether 29 physicians took part in the CSP. A rotation position within the CSP (Module Step 2) can be applied for. The submission of applications is continuously possible.

In 2023 2 applications were submitted. The Clinician Scientist Programme RECORD has been funded by the Else Kröner-Fresenius Foundation since January 1, 2020 and is associated to the Clinician Scientist Programme.

The following physicians participated in the Clinician Scientist Programme in 2024:

Module Step 1	
Dr. Nadine Bayerl	Department of Radiology (S)
Dr. Alexander Grotemeyer	Department of Psychiatry and Psychotherapy
Dr. Henriette Mandelbaum	Department of Paediatrics and Adolescent Medicine (S)
Dr. Alaa Hamzeh	Institute of Pathology
Dr. Nicolas Kaiser	Department of Medicine 4
Dr. Elias Koch	Department of Dermatology (C)
Dr. Hannah Schwarz	Department of Medicine 4 (S)
Dr. Melissa Pauly	Institute of Human Genetics
Dr. Ella Ohlsson	Department of Operative Dentistry and Periodontology (S)
Dr. Christina Regensburger	Department of Paediatrics and Adolescent Medicine (C)
Dr. Jan Schaefer	Department of Paediatrics and Adolescent Medicine
August Fiegl	Department of Pathology (S)
Dr. Thanos Tsaktanis	Department of Neurology (C)

(S) started in 2024
(C) completed in 2024

Module Step 2	
Dr. Christina Bergmann	Department of Medicine 3
Dr. Miriam Düll	Department of Medicine 1
Dr. Razvan Marius Brazdis	Department of Psychiatry and Psychotherapy (S)
Dr. Thanos Tsaktanis	Department of Neurology
Dr. Ingo Ganzleben	Department of Medicine 1
Dr. Alina Hilger	Department of Paediatrics and Adolescent Medicine
PD Dr. Benedikt Jacobs	Department of Medicine 5
Dr. Alexander Schnell	Department of Paediatrics and Adolescent Medicine (S)
Dr. Johanna Kurzhagen	Department of Medicine 4
Dr. Eva Maier	Department of Operative Dentistry and Periodontology (C)
Dr. Christian Matek	Institute of Pathology
Dr. Elias Koch	Department of Dermatology (S)
Dr. Stephanie Naas	Department of Medicine 4 (S)
Dr. Alexander German	Department of Neuroradiology (S)
Dr. Patrick Süß	Department of Molecular Neurology
Dr. Lisette Warkentin	Institute of General Practice

The fourth retreat of the IZKF Clinician Scientists took place at the Fraunhofer Research Campus in Waischenfeld in the beginning of October. The participants of the NOTICE-CSP and the mentees from the ARIADNEmed programme were again part of the meeting. In total, around 30 young clinician scientists accepted the invitation.

The programme included the participants' own presentations as well as some guest lectures. There were lectures from the fields of preclinical and clinical research from various institutions in Erlangen. On Friday evening, Prof. Ben Fabry from the Department of biophysics gave a lecture that was as informative as it was rich in images, taking the participants into the Antarctic landscape and its animal inhabitants discovering the famous penguin patterns.

This year the evening networking produced many new insights, ideas and synergies.

Many thanks to the two organizers Eva Maier and Alexander Schnell for their great commitment and the all-round successful event.

Additionally following courses were organized:

Course	Lecturer
Research data management	Barbara Bärthlein, Marcus Walther
The successful research proposal	Astrid Schmitz
Good Scientific Practice	Anne Hamker

Courses given in 2024 for participants of the CSP

PostDoc Programme

For the first cohort, 12 PostDocs were selected. They started the new programme in January 2025. The active phase of the programme covers a period of 18 months, after which further participation in network meetings etc. is possible as an associate member.

Participants	
Dr. Genevieve Marie Auger	Institute of Physiology and Pathophysiology
Dr. Dominik Damm	Harald zur Hausen Institute of Virology
Dr. Lena Erkert	Department of Medicine 1
Dr. Maria de los Reyes Gamez Belmonte	Department of Medicine 1
Dr. Lukas Heger	Department of Transfusion Medicine and Hemostaseology
Dr. Laura Hidalgo Garcia	Department of Medicine 1
Dr. Christina James	Department of Stem Cell Biology
Dr. Lisa Janina Klotz-Weigand	Institute of Biochemistry
Dr. Aleix Rius Rigau	Department of Medicine 3
Dr. Juliane Szkitsak	Department of Radiation Oncology
Dr. Hannah Vogt	Department of Paediatrics and Adolescent Medicine
Dr. Liang Zhang	Department of Medicine 3

Life@FAU as structured training programme for doctoral fellows

In 2023, 592 doctoral fellows took part, in the reporting year 518. Several doctoral students were able to complete the programme last year. In addition, the number of active participants in the MD-thesis programme has decreased. The reduction of the programme duration to 12 months is now becoming visible. The doctoral fellows are distributed between research training groups, research centres etc. as follows:

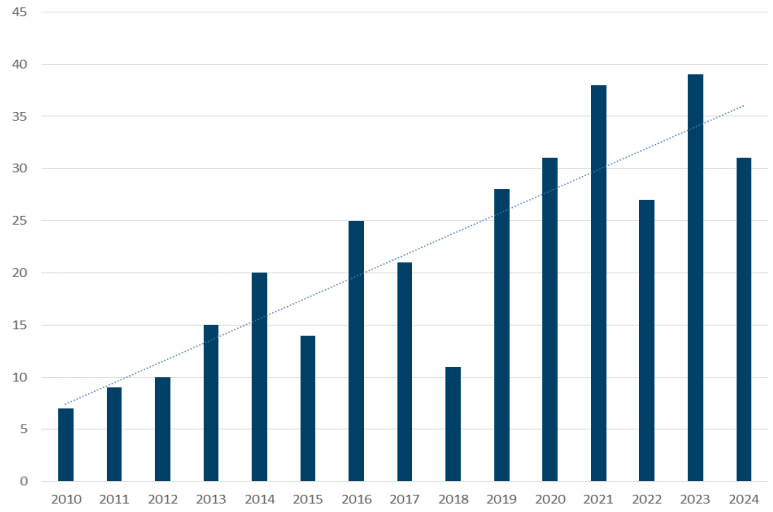
Programme/ Research Training Group	Registered participants	thereof Dr. rer. nat. and others	thereof Dr. med. / dent.
GRK 2162	39	25	14
GRK 2504	37	24	13
GRK 2599	40	27	13
GRK 2740	17	15	2
SFB 1350	1	1	0
KFO 5024	8	8	0
TRR 221	10	7	3
TRR 225	17	17	0
TRR 241	26	20	6
TRR 305	8	7	1
TRR 369	5	5	0
IZKF	38	38	0
IZKF associated	77	68	9
IZKF MD	91	0	91
no connection to RTG	62	59	3
Ongoing	**476**	**321**	**155**
GRK 1660	**3**	**2**	**1**
GRK 1962	**7**	**7**	**0**
SFB 1181	**32**	**20**	**12**
Expired	**42**	**29**	**13**
total	**518**	**350**	**168**

Research Training Groups participating in Life@FAU, indicating the number of participants as of 31st December 2024

MD-Thesis Scholarships

In 2024, a total of 58 medical doctoral students from 24 institutions were funded. Due to the fact that some scholarships granted in 2023 ended in 2024, the number of funded doctoral students is higher than the number of scholarships available.

Overall, 41 applications for the MD-Thesis scholarship programme have been received in 2024. The Junior Scientists Committee approved 31 applications (76%), 18 (58%) of the successful applicants were females and 13 (42%) males. The median age was 24 years. Since its inception in 2007, the IZKF supported a total of 359 medical students with a scholarship. Medical students usually initiate experimental work on their doctoral thesis during their studies. They will finish the thesis frequently several years after they graduate. By the end of 2024, 128 (36%) students had already completed their doctoral thesis. Interestingly, 48 students (38%) obtained the highest degree possible, summa cum laude. This compares very favourably to the average 5% of all MD-Theses presented and is testimony to the excellent quality of MD-Theses performed within this programme.



Newly granted MD-Scholarships between 2010 and 2024

The following overview shows all participants of the MD-Thesis scholarship programme with their name, institution and funding period, who had an ongoing scholarship in 2024.

Institute of Biochemistry	
Giese, Sebastian	08/2023 - 03/2024
Deckert, Lorenz	02/2024 - 09/2024
Gilbert, Ben	08/2024 - 03/2025
Görtz Lizarraga, Matthias	06/2024 - 01/2025

Department of Dermatology	
Lange, Cuno Laurin	03/2024 - 10/2024
Meusel, Leonie	11/2023 - 06/2024
Seidel, Christina	03/2024 - 10/2024

Department of Medicine 1	
Böllet, André	03/2024 - 10/2024
Hindermann, Johanna	08/2023 - 03/2024
Hobauer, Julia	06/2023 - 01/2024
Moser, Christina	12/2024 - 07/2025

Department of Paediatrics and Adolescent Medicine	
Fuhrmann, Tobias	08/2023 - 03/2024
Grodzki, Milena	04/2024 - 11/2024
Keskiner-Kemerli, Melisa	08/2024 - 03/2025
Reisinger, Chiara	03/2024 - 10/2024
Sofokleous, Thaleia	06/2024 - 01/2025
Weidt, Jonathan	02/2024 - 09/2024
Wolf, Ronny	12/2023 - 07/2024

Department of Radiation Oncology	
Schäfer, Anna	04/2024 - 11/2024
Steinsdörfer, Leonie	06/2024 - 01/2025
Trottnow, Magnus	04/2024 - 11/2024

Institute of Physiology and Pathophysiology	
Heininger, Hannah	08/2023 - 03/2024
Miering, Tobias	08/2023 - 03/2024
Priller, Christina	08/2023 - 03/2024

Institute of Radiology	
Egger-Hackenschmidt, Saskia	04/2024 - 11/2024
Mayr, Simon	02/2024 - 09/2024
Sommerfeld, Lisa	08/2023 - 03/2024

Department of Surgery	
Clausen, Finn-Niklas	04/2024 - 11/2024
Döll, Lukas	04/2024 - 11/2024
Roth, David	11/2023 - 06/2024
Salein, Nina	12/2024 - 07/2025
Wendler, Laura	04/2024 - 11/2024

Others		
Ammon, Leander	Department of Neurology	04/2024 - 12/2024
Baumann, Bettina	Department of Anesthesiology	09/2024 - 04/2025
Blunk, Hannah	Department of Medicine 5	03/2024 - 10/2024
Eisenack, Lea	Institute of Anatomy	06/2024 - 01/2025
Gawor, Jule	Institute of Microbiology	11/2023 - 06/2024
Gehrke, Raffaela	Department of Psychiatry and Psychotherapy	10/2023 - 05/2024
Kramer, Katharina	Department of Plastic and Hand Surgery	08/2023 - 03/2024
Lauter, Luis	Department of Cardiac Surgery	10/2023 - 05/2024
Leischner-Merk, Daria	Department of Otorhinolaryngology	08/2023 - 03/2024
Menzl, Lynn	Department of Neurosurgery	12/2024 - 07/2025
Moll, Leander	Department of Medicine 3	12/2024 - 07/2025
Mundlos, Hanna	Department of Molecular Neurology	09/2023 - 04/2024
Neuner, Laura Sophie	Institute of Microbiology	06/2024 - 01/2025
Orthen, Hannah	Department of of Molecular Immunology	12/2023 - 07/2024
Pechmann, Leonie	Department of of Molecular Immunology	04/2024 - 11/2024
Roedel, Jan	Department of Anesthesiology	08/2024 - 03/2025
Rist, Carmen	Department of Medicine 4	03/2024 - 10/2024
Schrade, Jonas	MCO BT - Faculty of Biology, Chemistry & Earth Sciences	10/2024 - 05/2025
Schwarzmann, Laura	Institute of Pathology	08/2024 - 03/2025
Speiseder, Jonas	Department of Neurology	08/2023 - 03/2024
Steger, Lisa	Department of Medicine 5	04/2024 - 11/2024
Tripp, Sonja	Institute of Experimental and Clinical Pharmacology and Toxicology	06/2023 - 01/2024
Veneris, Sophia Georgia	Institute of Anatomy	10/2024 - 05/2025
Weidenfeller, Martin	Department of Molecular Neurology	07/2024 - 02/2025
Wientjes, Peter	Institute of Clinical and Molecular Virology	09/2023 - 04/2024
Wunder, Björn	Department of Plastic and Hand Surgery	12/2023 - 07/2024
Zimmermann, Hendrik	Institute of Neuropathology	01/2024 - 08/2024

Training courses in the IZKF

The IZKF Research Training Group again offered numerous courses in 2024. Almost all courses were offered as a virtual workshop.

Course	Course days	Offers 2024	Lecturer
Basics in Translational Bioinformatics with Practicals	5*0,5	1	Dr. Fulvia Ferrazzi Department of Nephropathology
Bioinformatics Analysis of Bulk RNA-seq	2	2	Dr. Leila Taher CUBiDA
Good Scientific Practice and Scientific Integrity – An Introduction	0,5	1	Dr. Christian Schmitt-Engel Office of Research Career Development and Graduate Centre
Good Scientific Practice	1	6	Dr. Anne Hamker Weiterbildung - Wissenschaftsberatung - Projektmanagement
Grant Writing	5 individual meetings during the semester	1	Prof. Dr. Christoph Becker (Dep. of Medicine 1), Prof. Dr. Felix Engel (Institute of Pathology), Prof. Dr. Friederike Zunke (Dep. of Molecular Neurology)
Kommunikation und Rhetorik	2	1	Gerhard Kranz Seminare - Personalentwicklung - Trainings
Poster Workshop	1,5	2	Dr. Deborah Bennett Bennett English Training for Academics
Presentation skills	2	2	Dr. Deborah Bennett Bennett English Training for Academics
Scientific Writing 1 An introduction to scientific writing	5*0,5	2	Dr. Deborah Bennett Bennett English Training for Academics
Scientific Writing 2 Writing research articles	5*0,5	1	Dr. Deborah Bennett Bennett English Training for Academics
Scientific Writing 3 Writing a PhD Thesis	5*0,5	1	Dr. Deborah Bennett Bennett English Training for Academics
Statistics	2*0,5	2	Dr. Matthias Englbrecht Healthcare Data Science & Business Coaching
Staying on track: optimize your dissertation project management	3	1	Dr. Dunja Mohr Go Academic! Beratung – Coaching - Kompetenzentwicklung

Soft skill- and statistic courses given in 2024

As part of the IZKF-Postgraduate Workshop on October 8th, 2024, two doctoral students were awarded a poster prize:

- Lili Bao (Department of Medicine 1) Epithelial OPA1 links mitochondrial fusion to inflammatory bowel disease
- Zubeir El Ahmad (Institute of biochemistry) AP-1 mediates bidirectional transcription regulation in malignant melanoma

In a two-hour poster session, three scientists reviewed each of the participants' posters. The best six participants were invited to present their posters to the auditorium in spontaneous flash talks. Mrs Bao and Mr El Ahmad received the poster prizes worth €250.00. Congratulations to both of them.

This year, for the first time, the even and odd poster numbers were reviewed separately to improve dialogue between the participants. Overall, it was recognised that the quality of all the posters presented was very high. We would like to thank all participants.

On 23th April, doctoral students of the IZKF Research Training Group went to the IZKF Retreat at Fraunhofer Forschungscampus Waischenfeld. The retreat is prepared by the speakers of the Jour Fixe groups and organised with the support of the administrative office. The programme included contributions from each doctoral student.

The doctoral students shared information about their research projects in several lectures and poster sessions.

IZKF Retreat 2024 at Fraunhofer Forschungscampus in Waischenfeld

Organisation of the IZKF Research Training Group

All members regularly participate in the Jour Fixe (JF) once a month. Due to the broad thematic range of the doctoral theses at the IZKF, several Jour Fixes are held, which are at the moment

- Digital information technology (DigIT)
- Immunology, infection, kidney and vascular research (Ink)
- Medical and healthcare technology (MedTech)
- Neurology (Neuro) and
- Oncology (Onco)

Each JF is supervised by one to two spokespersons from the doctoral students who are elected by the participants for a period of 2-3 years. Usually, a new election takes place at the end of the doctoral thesis of the respective spokesperson. In addition to the spokespersons, each established JF has an appointed professor as scientific head.

Jour Fixe DigIT

Scientific Head
Prof. Dr. Olaf Gefeller, Institute of Medical Informatics, Biometry and Epidemiology

Spokespersons
Daniel Firmbach, Institute of Pathology
Corinna Södel, Institute of Medical Informatics, Biometry and Epidemiology

The JF DigIT is aimed at doctoral students with a data-analytical methodical approach. All participating institutions are dedicated to life sciences on the basis of their researchorientation, even if in some doctoral projects there are clear references to other fields of science such as mathematics/ statistics, computer science, physics and electrical engineering

Jour Fixe Ink

Scientific Head
Prof. Dr. Christoph Becker, Department of Medicine 1

Spokespersons
Clara Reichardt, Department of Medicine 3
Lorenz Scherpinski, Institute of Experimental and Clinical Pharmacology and Toxicology

At the Jour Fixe INK, doctoral fellows working in the areas of immunology, infection, renal and vascular research will present the progress and results of their respective doctoral projects. The seminar is held in English and takes place once a month. It promotes both the transfer of knowledge between doctoral fellows in the different fields and the presentation and discussion skills in front of an audience.

Jour Fixe MedTech

Scientific Head
Prof. Dr. Christoph Bert, Department of Radiation Oncology

Spokespersons
Johann Brand, Department of Radiation Oncology
Benjamin Kahlert, Department of Radiation Oncology

The Jour Fixe MedTech is aimed at all doctoral students with a medical-technical/-physical/-biological connection and/or background, but is also open to all other interested parties. The focal points of the Jour Fixes are questions from medical physics (radiation therapy, MR physics, audiology), radiation biology and radiology. Members of the Jour Fixe meet monthly. One project presentation per doctoral student is planned every year.

Jour Fixe Neuro

Scientific Head
Prof. Dr. Dieter Chichung Lie, Institute of Biochemistry

Spokespersons

Carlotta Kaißer, Department of Molecular Neurology
Alexander von Eyb, Institute of Biochemistry

The neuroscientific doctoral fellows of the FAU Erlangen-Nuremberg meet monthly for the Jour Fixe „Neuroscience“, at which the doctoral fellows discuss new methods and techno logies in addition to their respective doctoral projects. The programme of the Jour Fixe is solely organised by the doctoral students.

Jour Fixe Onco

Scientific Head
Prof. Dr. Anja Bosserhoff, Institute of Biochemistry

Spokespersons
Hannah Ehnis, Institute of Biochemistry
Tatjana Itzenhäuser, Institute of Biochemistry

In the Oncology Jour Fixe, doctoral fellows focusing on research in different fields of oncology discuss ongoing work as well as new approaches. Every participant presents her/ his own project once a year in the form of a progress report. The topics of this seminar range from basic research in various cancer entities to clinical studies and targeted therapies.

Scientific Reports

Funded Advanced projects in 2024:

No.	Name	Institution	Project title
A93	Prof. Dr. Christoph Becker	Department of Medicine 1	Cytosolic citrate metabolism in IEC
A94	Prof. Dr. Armin Ensser	Harald zur Hausen Institute of Virology	SARS-CoV-2 host adaptation
A95	Prof. Dr. Thomas Gramberg	Harald zur Hausen Institute of Virology	Viral RNA methylation inhibits MDA5 sensing
A96	Prof. Dr. Kai Hildner Prof. Dr. Thomas Winkler	Department of Medicine 1 Department Biology - Chair of Genetics	Immune/ IEC crosstalk during intestinal CMV
A97	Prof. Dr. Dr. Clemens Neufert	Department of Medicine 1	STAT3 in IMCs during mucosal healing in IBD
A98	Prof. Dr. Kilian Schober	Institute of Microbiology	RA-T
A99	PD Dr. Ulrike Steffen	Department of Medicine 3	Mechanisms of cortical bone remodelling
A100	Prof. Dr. Alexander Steinkasserer	Department of Immune Modulation	sCD83 induces wound healing
A101	Prof. Dr. Matthias Tenbusch	Harald zur Hausen Institute of Virology	IgG4 responses after SARS-CoV-2 RNA vaccination
A102	Prof. Dr. Maximilian Waldner Prof. Dr. Jochen Guck	Department of Medicine 1 Dep. of Physics - Chair of Biological Optomechanics	Mechanics of innate immune cells in colitis
A103	PD Dr. Benno Weigmann	Department of Medicine 1	Secretory IgA molecules in intestinal immunity
A104	Dr. Sebastian Zundler Prof. Dr. Stefan Uderhardt	Department of Medicine 1 Department of Medicine 3	Mechanical regulation of intestinal T cell egress
D37	PD Dr. Imke Atreya	Department of Medicine 1	ACLY in IBD-associated cancer
D38	Prof. Dr. Anja Bosserhoff	Institute of Biochemistry	AP2e in malignant melanoma
D39	PD Dr. Simone Brabletz	Chair of Experimental Medicine I	EMT and ferroptosis
D40	PD Dr. Dr. Peter Dietrich	Department of Medicine 1	The role of DDX46 in liver cancer
D41	Prof. Dr. Felix Engel Dr. Markus Eckstein	Department of Nephropathology Institute of Pathology	Therapy resistance in urothelial cancer
D42	Prof. Dr. Claus Hellerbrand	Institute of Biochemistry	PSAP in liver steatosis-triggered liver cancer
D43	PD Dr. Simon Völkl Prof. Dr. Julio Vera Gonzalez	Department of Medicine 5 Department of Dermatology	Regulation of CD19.CAR T-cells
E32	Dr. Sven Falk	Institute of Biochemistry	Molecular nexuses in neurodevelopmental diseases
E33	Dr. Melanie Küspert	Institute of Biochemistry	Deubiquitinase Otud7b in CNS myelination
E34	Prof. Dr. Dieter Chichung Lie Prof. Dr. Kristian Franze	Institute of Anatomy (Institute of Biochemistry until 09/2024) Institute of Medical Physics	Regulation of the adult CNS stem cell niche
E35	Prof. Dr. André Reis Prof. Dr. Peter Soba	Institute of Human Genetics Institute of Physiology and Pathophysiology	Deciphering recessive NDDs
E36	Dr. Andreas Sagner	Institute of Biochemistry	Temporal patterning of dopaminergic neurons
E37	Prof. Dr. Michael Wegner Prof. Dr. Anna Fejtova	Institute of Biochemistry Department of Psychiatry and Psychotherapy	CtBP1, oligodendrocytes & myelination

Cytosolic citrate metabolism in IEC

Prof. Dr. Becker

A93 07/2023 - 12/2025

Prof. Dr. Christoph Becker, Department of Medicine 1
e-mail: christoph.becker@uk-erlangen.de

Abstract

We have identified the enzyme ATP Citrate Lyase (ACLY) as a key immunometabolic regulator of intestinal inflammation. We therefore hypothesize that diminished ACLY expression in the intestinal epithelium drives the pathogenesis of Inflammatory Bowel Disease. To evaluate our hypothesis, we plan to elucidate the regulation of Acly, its molecular mode of action and its functional impact for the steady-state gut and for intestinal inflammation using newly generated knockout mice.

Special methods

- Experimental colitis models
- Gut organoids
- RNA sequencing

Important results

Acly expression is dysregulated in the epithelium of IBD patients and negatively correlated with inflammatory cytokines. We found that epithelial Acly regulates key metabolic pathways and identified a role for Acly in the expression of prostaglandins, key regulators of epithelial homeostasis, and studied the impact of these pathways on cell death.

Publications

Erkert L, Gamez-Belmonte R, Kabisch M, Schödel L, Patankar JV, Gonzalez-Acera M, Mahapatro M, Bao LL, Plattner C, Kühl AA, Shen J, Serneels L, De Strooper B, null , Neurath MF, Wirtz S, Becker C. (2024) Alzheimer's disease-related presenilins are key to intestinal epithelial cell function and gut immune homoeostasis. Gut: 73 (10), 1618-1631

SARS-CoV-2 host adaptation

Prof. Dr. Ensser

A94 07/2023 - 12/2025

Prof. Dr. Armin Ensser, Harald zur Hausen Institute of Virology
e-mail: armin.ensser@fau.de

Abstract

The continuous adaptation of the SARS-CoV-2 replicative machinery, as well as the consequences of nonstructural protein (Nsp) mutations to the virus-host interaction need to be considered in emerging variants. SARS-CoV-2 marker viruses will be used to address the role of existing and new variant virus mutations in Nsp's in different culture systems, in viral replication and in their escape from cellular restriction, focusing on the non-spike related phenotype of these variants.

Publications

Cordsmeier A, Jungnickl D, Herrmann A, Korn K, Ensser A. (2023) Analysis of SARS-CoV-2 Spike Protein Variants with Recombinant Reporter Viruses Created from a Bacmid System. International journal of molecular sciences: 24 (9), 1422-0067

Important results

Bacmids harboring the nonstructural and additional ORFs of Omicron BA.5 genome were cloned and reconstituted and are currently analyzed.

Special methods

- Recombinant SARS-CoV-2, viral infection under BSL3 conditions
- Wide-field fluorescence microscopy in BSL3 and Wide field high content imaging under BSL2 conditions, including GPCRs
- Methods for single cell sequencing of virus-infected cells

Viral RNA methylation inhibits MDA5 sensing

Prof. Dr. Gramberg

A95 01/2023 - 12/2025

Prof. Dr. Thomas Gramberg, Harald zur Hausen Institute of Virology
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Abstract

2'-O-Methylation of mRNA by cellular methyltransferases (MTases) enables discrimination of self and non-self. We found that SARS-CoV-2 lacking the viral MTase Nsp16 triggers an enhanced innate immune response that depends on the RNA receptor MDA5. Thus, we will analyse Nsp16 as a means of SARS-CoV-2 to counteract innate immune sensing and will test the hypothesis that the 2'-O-methylation of viral RNA in general protects from sensing by the pattern recognition receptor MDA5.

Important results

- Differential gene expression upon SARS-CoV-2 delta Nsp16 and wt infection
- Effects on RNA splicing and MDA5 RNA sensing

Special methods

- SARS-CoV-2 in vitro and in vivo model
- Next Gen Sequencing
- Innate immune sensing assays

Publications

Russ A, Wittmann S, Tsukamoto Y, Herrmann A, Deutschmann J, Lagisquet J, Ensser A, Kato H, Gramberg T. (2022) Nsp16 shields SARS-CoV-2 from efficient MDA5 sensing and IFIT1-mediated restriction. EMBO reports 23: e55648

Immune/ IEC crosstalk during intestinal CMV

Prof. Dr. Hildner

Prof. Dr. Winkler

A96 05/2023 - 10/2025

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Abstract

Reactivation of latent Cytomegalovirus (CMV) infections represent a severe, life-threatening intestinal complication in immunocompromised patients. Underlying cellular and molecular mechanisms regulating the immune epithelial cell interaction are only partially understood and targeted treatment options are not available. We seek to decipher the immune / epithelial cell interaction in the context of CMV infection combining novel ex vivo organoid co-culture with innovative genetic model systems.

Important results

First, we established a novel model system allowing us to infect and culture murine CMV (mCMV)-infected conventional dendritic cells (cDCs). Then, we sort-purified both mCMV+ and mCMV- cDCs 48h after infection and performed global gene expression. Preliminary study results reveal substantial gene expression regulation within cDCs.

Special methods

1. MCMV infection of intestinal organoids to study epithelial-immune cell interaction ex vivo
2. New transgenic mouse model system to study the impact of CMV-specific gd T cells on MCMV/ intestinal epithelial cell biology
3. Dendritic cell/ intestinal organoid co-culture model system

Publications

no project-specific publications so far

STAT3 in IMCs during mucosal healing in IBD

Prof. Dr. Dr. Neufert

A97 07/2023 - 12/2025

Prof. Dr. Dr. Clemens Neufert, Department of Medicine 1
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Abstract

The function of intestinal mesenchymal cells (IMCs) in inflammatory bowel diseases (IBD) has not been clarified yet. The goal of this project is to characterize and to functionally study the role of STAT3 activation in IMCs during mucosal healing in the gut by using established in vivo models and human tissue specimens. Perspectively, these studies aim to pave the way for novel therapeutic options in IBD care.

Publications

Koop K, Enderle K, Hillmann M, Ruspeckhofer L, Vieth M, Sturm G et al. (2023) Interleukin 36 receptor-inducible matrix metalloproteinase 13 mediates intestinal fibrosis. Frontiers in immunology 14:1163198

Important results

- Col6+ IMCs are highly enriched in two mucosal injury models
- RNA-seq of Col6+ IMCs highlights genes that promote wound healing
- Wound repair in the biopsy model is controlled by STAT3 in Col6+ IMCs
- Co-cultures show STAT3-dependent crosstalk of Col6+IMCs with IEC organoids
- STAT3 activation in Col6+ IMCs controls inflammatory fibroblasts & macrophage infiltration

Special methods

- Co-culture systems with IMCs and intestinal epithelial organoids and/or immune cells
- Experimental models of intestinal mucosal healing
- Modulation of STAT3 activation in gut resident cell populations

RA-T

Prof. Dr. Schober

A98 03/2023 - 09/2025

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Abstract

Autoreactive T cells are thought to play a key role during the pathogenesis of rheumatoid arthritis (RA), but their specificity and their contribution to RA remain elusive. In this project, we will identify autoreactive T cells, their receptors and cognate antigens in RA patients, and study the dynamics of the autoreactive T cell response at different stages of RA. This will yield important information on the pathogenesis of RA and provide the base for a novel generation of immunotherapies.

Publications

no project-specific publications so far

Important results

Using single-cell and bulk RNA and T cell receptor sequencing from patients with rheumatoid and osteoarthritis, as well as blood and synovial fluid, we were able to identify T cell clonotypes that are specific to the tissue of RA patients. We are currently performing epitope mapping for about 90 of these clones after transgenic TCR re-expression.

Special methods

- Single-cell RNA sequencing
- Transgenic T cell receptor expression
- Epitope mapping

Mechanisms of cortical bone remodelling

PD Dr. Steffen

A99 07/2023 - 12/2025

PD Dr. Ulrike Steffen, Department of Medicine 3

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Abstract

Constant bone remodelling is important to prevent fractures. In bones with a thick cortex, we found that remodelling is based on endosteal bone formation and periosteal resorption which stands in contrast to existing models. In this project we will characterize this process and analyse its dependence on age, mechanical load, osteoclast and osteocyte activity. We aim to explain why some bone sites are prone to fracture and to develop new treatment strategies to prevent insufficiency fracture.

Important results

- Cortical bone is formed at the endosteoum and resorbed at the periosteum in normal aged and old mice.
- With age, bone remodeling decreases, but does not stop completely.
- Bone remodeling rate is independent of mouse sex.
- Endosteal and periosteal osteoclasts seem to be of different origin.

Publications

no project-specific publications so far

Special methods

- Lightsheet and immunofluorescence microscopy
- Electron microscopy
- Murine models of bone loss

sCD83 induces wound healing

Prof. Dr. Steinkasserer

A100 07/2023 - 12/2026

Prof. Dr. Alexander Steinkasserer, Department of Immune Modulation

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Abstract

New medications for the treatment of chronic wounds are urgently needed. Our preliminary data show that sCD83 accelerated wound healing processes in a systemic as well as a topical treatment. Cellular analyses revealed the increase of pro-resolving macrophages, known to improve wound healing processes. These striking regenerative capacities make sCD83 a promising candidate to treat chronic- and hard-to-heal wounds. Within the current project we aim to elucidate the underlying mechanisms.

Important results

Within this project, we analyze the therapeutic potential of sCD83 in wound healing in general and especially in aged mice with delayed wound healing properties. Of particular interest is the role of CD83 expressing macrophages during these wound healing processes as well as the identification of sCD83-responder cells in human skin.

Publications

no project-specific publications so far

Special methods

- sCD83 treated samples will be investigated using FACS in respect to neutrophils, monocytes, macrophages, B cells and T cells.
- Trans-differentiation of macrophages in WT and CD83 cKO-mice
- Analyses of distinct skin cell populations, including keratinocytes, fibroblasts, epithelial stem cells, melanocytes and endothelial cells

IgG4 responses after SARS-CoV-2 RNA vaccination

Prof. Dr. Tenbusch

A101 04/2023 - 09/2025

Prof. Dr. Matthias Tenbusch, Harald zur Hausen Institute of Virology
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Abstract

Recently, we identified atypical, antiviral IgG4 responses after immunizations with a SARS-CoV-2 mRNA vaccine. Since IgG4 responses are considered as anti-infammatory and rather tolerogenic, the impact of this type of antibody response on preventing viral infections or disease will be elucidated. Whether antigen re-exposures in form of infections or boost immunization will further shift the SARS-CoV-2 response towards IgG4 will be analysed as well as potential underlying mechanisms.

Important results

- Functional characterization of patient-derived SARS-CoV-2-specific antibodies --> production of recombinant antibodies of all IgG subclasses
- scRNA sequencing from memory B-cells and plasmablasts during SARS-CoV-2 re-infections to reveal clonal relationship of IgG4-switched B-cells
- Serological characterization of hypervaccinated individual

Publications

Kocher K, Moosmann C, Drost F, Schülein C, Irrgang P, Steininger P, Zhong J, Träger J, Spriewald B, Bock C, Busch DH, Bogdan C, Schubert B, Winkler TH, Tenbusch M, Schuster EM, Schober K. (2024) Adaptive immune responses are larger and functionally preserved in a hypervaccinated individual. The Lancet. Infectious diseases: 24 (5), e272-e274

Special methods

- Single-cell RNA sequencing
- Recombinant antibody production and in vitro charcterization
- SARS-CoV-2 infection model in humanized FcgR mice

Mechanics of innate immune cells in colitis

Prof. Dr. Waldner

Prof. Dr. Guck

A102 07/2023 - 12/2025

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Prof. Dr. Jochen Guck, Department of Physics - Chair of Biological Optomechanics
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Abstract

Immune cell trafficking plays a central role in the pathogenesis of ulcerative colitis (UC). Based on our preliminary data, we propose cell mechanics as an important mechanism in this process. To explore this hypothesis, we will investigate mechanisms regulating mechanics of innate immune cells in colitis models. We will further explore the functional consequences of immune cell deformability in acute colitis and explore therapeutic opportunities for a modulation of cell mechanics in UC.

Important results

- Neutrophils from ulcerative colitis (UC) patients are increased in size and show altered mechanical properties.
- Changes in neutrophil mechanics are paralleled by an upregulation of activation markers.
- Mouse models of colitis reflect the phenotype of neutrophil mechanics in UC and will be used in subsequent functional studies.

Publications

no project-specific publications so far

Special methods

- RT-fDC measurements to identify immune cell populations and evaluate their mechanical properties.
- Molecular analysis of neutrophils using qPCR, bulk RNA-sequencing and flow cytometry to identify signaling pathways regulating cell mechanics.
- Evaluation of tissue stiffness in healthy and inflamed mouse tissue using Brillouin microscopy.

Secretory IgA molecules in intestinal immunity

PD Dr. Weigmann

A103 07/2023 - 12/2025

PD Dr. Benno Weigmann, Department of Medicine 1
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Abstract

Intestinal diseases (IBD) are chronic inflammations of the gastrointestinal tract. Secretory antibodies (SIgA) are produced by mucosal surfaces and are intestinal defences. The project aims to elucidate the role of SIgA in the uptake/retro process at the endothelium. Furthermore, an analysis of the SIgA-selected bacterial strains in the intestine will be carried out and new targets for a SIgA-mediated therapeutic approach in therapy will be found.

Publications

no project-specific publications so far

Important results

We have started to investigate the different routes of administration of SIgA antibodies. We were also able to analyze the in vivo kinetic distribution of SIgA antibodies in a type 2 Hapten-mediated colitis model with fluorescence-labeled antibodies using the IVIS imaging system.

Special methods

- Specific SIgA/IgA sandwich ELISA developed for serum antibodies
- Measurement of TEER (transepithelial endothelial electrical resistance) of an in vitro cell barrier tissue model
- Hapten-mediated acute experimental colitis model that mimics human ulcerative colitis disease through the production of specific cytokines

Mechanical regulation of intestinal T cell egress

Prof. Dr. Dr. Zundler

Prof. Dr. Uderhardt

A104 01/2023 - 11/2025

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Prof. Dr. Stefan Uderhardt, Department of Medicine 3
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Abstract

It is still unclear, how the in vivo trafficking of autoreactive T cells in IBD is coordinated. Preliminary data indicate that mechanical properties regulate the motility of gut T cells. Thus, we aim to investigate the interplay of intestinal T cell mechanics and trafficking in a joint effort combining the expertise of two clinician scientist PIs in cell trafficking and bioimaging. We ultimately hope to identify new targets for organ-selective IBD therapy controlling T cell dynamics in the gut.

Publications

Ullrich KA, Derdau J, Baltes C, Battistella A, Rosso G, Uderhardt S, Schulze LL, Liu LJ, Dedden M, Spocinska M, Kainka L, Kubánková M, Müller TM, Schmidt NM, Becker E, Ben Brahim O, Atreya I, Finotto S, Prots I, Wirtz S, Weigmann B, López-Posadas R, Atreya R, Ekici AB, Lautenschläger F, Guck J, Neurath MF, Zundler S (2023) IL-3 receptor signalling suppresses chronic intestinal inflammation by controlling mechanobiology and tissue egress of regulatory T cells. Gut 72: 2081-2094

Important results

We developed a quantitative tissue imaging platform to study T cell egress into lymphatics at tissue scale. Our analyses revealed that T cells undergo specific morphological deformations at discrete nodal points, which serve as preferential exit sites into the lymphatic network.

Special methods

- Transfer colitis
- Volumetric tissue imaging
- 3d histocytometry

ACLY in IBD-associated cancer

PD Dr. Atreya

D37 04/2023 - 09/2025

PD Dr. Imke Atreya, Department of Medicine 1
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Abstract

Our preliminary data indicate a beneficial role of the metabolic enzyme ACLY in T cells in the AOM/DSS-induced CAC (colitis-associated cancer) model, while published data implicate that upregulation of ACLY in colon tumor cells promotes metastasis. Thus, we aim on the development of clinically applicable strategies to trigger ACLY activity selectively in tumor-infiltrating T cells and will focus on the identification of those CAC patients, who could best benefit from an ACLY-targeting therapy.

Publications

Schulz-Kuhnt A, Rühle K, Javidmehr A, Döbrönti M, Biwank J, Knittel S, Neidlinger P, Leupold J, Liu LJ, Dedden M, Taudte RV, Gessner A, Fromm MF, Mielenz D, Kreiss L, Waldner MJ, Schürmann S, Friedrich O, Dietel B, López-Posadas R, Plattner C, TRR241 IBDome Consortium , Zundler S, Becker C, Atreya R, Neurath MF, Atreya I. (2024) ATP citrate lyase (ACLY)-dependent immunometabolism in mucosal T cells drives experimental colitis in vivo. Gut: 0017-5749

Important results

We described the inflammation-associated downregulation of ACLY in gut T cells in IBD as a regulatory process to dampen their colitogenic capacity. However, in the AOM/DSS-induced CAC model, ACLY levels in LPMC were initially decreased during early colitis induction, but were restored later, implicating modulation of ACLY by the tumor micromilieu.

Special methods

- Experimental in vivo model for colitis-associated cancer (AOM/DSS CAC model)
- Genetic mouse model: Conditional knockout mice carrying a T cell-restricted ACLY (ATP Citrate Lyase) deficiency (Cre-loxP system)
- Purification and flow cytometric characterization of intestinal lamina propria and tumor-infiltrating immune cells

AP2e in malignant melanoma

Prof. Dr. Bosserhoff

D38 03/2023 - 09/2025

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Abstract

The transcription factor family AP2 has important functions in development. AP2e was discovered in cooperation with this PI. We newly observed delayed onset of tumorigenesis in a murine Ap2e-deficient melanoma model. This is supported by expression data showing induced AP2e mRNA expression in early tumor development and a correlation of high Ap2e expression with reduced overall survival. In the project, the role of Ap2e in development and progression of melanoma is explored in molecular detail.

Important results

The AP2 transcription factors regulate developmental processes of the neural crest. To investigate the role of AP2e in melanoma, a murine AP2e-deficient melanoma model was generated. Here, we revealed a delayed onset of tumorigenesis due to loss of AP2e. As further result, we showed that AP2e is important for metastasis and dormancy of melanoma.

Special methods

- Knockout mouse
- Transcriptional regulation (Reporter assay, EMSA)
- Cellular analysis (proliferation, migration)

Publications

Staebler S, Rottensteiner-Brandl U, El Ahmad Z, Kappelmann-Fenzl M, Arkudas A, Kengelbach-Weigand A, Bosserhoff AK, Schmidt SK. (2024) Transcription factor activating enhancer-binding protein 2ε (AP2ε) modulates phenotypic plasticity and progression of malignant melanoma. Cell death & disease: 15 (5), 351

EMT and ferroptosis

PD Dr. Brabletz

D39 07/2023 - 12/2025

PD Dr. Simone Brabletz, Chair of Experimental Medicine I - Molecular Pathogenesis Research
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Abstract

We have demonstrated that the EMT-activator ZEB1 provides cancer cells not only with aberrant motility, but also with survival traits enabling tumor progression, metastasis and drug resistance. Our aim is to eliminate these aggressive 'untargetable' EMT-state cancer cells, which strikingly show a high sensitivity to ferroptotic cell death. In this project, we want to elucidate the molecular basis of ZEB1 – associated ferroptosis sensitivity to exploit it as a novel therapeutic target.

Important results

- Validation of ZEB1/EMT dependent ferroptosis sensitivity in various tumor cell systems
- ZEB1 dependent splice variants of CD44 correlate with ferroptosis sensitivity
- Estabilishment of CD44 splice variant cell clones to test their impact on ferroptosis and Rhonox-M (Fe2+) and Hyal-FITC Costaining, to track CD44 mediated internalization

Special methods

- Ferroptosis induction in cell lines; rescue experiments with ferrostatin1 to distinguish ferroptosis from other types of cell death
- Determine cell viability via MTT-assays or live imaging with the Incucyte device in combination with SYTOX cell death indicator
- Intracellular quantification of lipid peroxidation with C11-BODIPY

Publications

Menche C, Schuhwerk H, Armstark I, Gupta P, Fuchs K, van Roey R, Mosa MH, Hartebrodt A, Hajjaj Y, Clavel Ezquerra A, Selvaraju MK, Geppert CI, Bärthel S, Saur D, Greten FR, Brabletz S, Blumenthal DB, Weigert A, Brabletz T, Farin HF, Stemmler MP. (2024) ZEB1-mediated fibroblast polarization controls inflammation and sensitivity to immunotherapy in colorectal cancer. EMBO reports: 25 (8), 3406-3431

Schwab A, Rao Z, Zhang J, Gollowitzer A, Siebenkäs K, Bindel N, D'Avanzo E, van Roey R, Hajjaj Y, Özel E, Armstark I, Bereuter L, Su F, Grander J, Bonyadi Rad E, Groenewoud A, Engel FB, Bell GW, Henry WS, Angeli JPF, Stemmler MP, Brabletz S, Koeberle A, Brabletz T. (2024) Zeb1 mediates EMT/plasticity-associated ferroptosis sensitivity in cancer cells by regulating lipogenic enzyme expression and phospholipid composition. Nature cell biology: 26 (9), 1470-1481

The role of DDX46 in liver cancer

PD Dr. Dr. Dietrich

D40 03/2023 - 02/2026

PD Dr. Dr. Peter Dietrich, Department of Medicine 1
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Abstract

The neuropeptide Y (NPY) system was shown by the applicant to be a major driver of HCC. Transcriptome screening revealed that DEAD-box RNA helicase DDX46 is a novel and attractive NPY-regulated target in HCC. The major aims of this study are to characterize NPY-mediated regulation of DDX46 and to decipher the role of DDX46 as a novel and promising diagnostic and therapeutic target in HCC.

Important results

Transcriptome screening revealed that DEAD-box RNA helicase DDX46 is a NPY-regulated target in HCC. We have characterized the time-dependent NPY-mediated regulation of DDX46 in HCC cells. Moreover, DDX46 appears as promising therapeutic target in HCC: Inhibition of DDX46 in HCC cells markedly reduces clonogenicity and proliferation.

Publications

Roth D, Düll MM, Horst LJ, Lindemann A, Malzer X, Koop K, Zundler S, Vetter M, Jefremow A, Atreya R, Geppert C, Weidemann S, Waldner MJ, Dietrich P, Günther C, Munoz LE, Herrmann M, Scheffold A, Neurath MF, Siebler J, Schramm C, Kremer AE, Leppkes M. (2024) Integrin αVß6 - autoantigen and driver of epithelial remodeling in colon and bile ducts in primary sclerosing cholangitis and inflammatory bowel disease. Journal of Crohn's & colitis: 1873-9946167 (6), 1183-1197

Special methods

- HCC models
- RNAi techniques in vivo and in vitro
- Patient-derived samples and biobanking

Dorner H, Stolzer I, Mattner J, Kaminski S, Leistl S, Edrich LM, Schwendner R, Hobauer J, Sebald A, Leikam S, Gonzalez Acera M, Düll M, Lang R, Seidel G, Seitz T, Hellerbrand C, Fuhrmann G, Distler U, Tenzer S, Eichhorn P, Vieth M, Schramm C, Arnold P, Becker C, Weidinger C, Siegmund B, Atreya R, Leppkes M, Naschberger E, Sampaziotis F, Dietrich P, Rauh M, Wirtz S, Kremer AE, Neurath MF, Günther C. (2024) Gut Pathobiont-Derived Outer Membrane Vesicles Drive Liver Inflammation and Fibrosis in Primary Sclerosing Cholangitis-Associated Inflammatory Bowel Disease. Gastroenterology: 167 (6), 1183-1197

Therapy resistance in urothelial cancer


Prof. Dr. Engel


PD Dr. Eckstein

D41 07/2023 - 12/2025

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PD Dr. Markus Eckstein, Institute of Pathology
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Abstract

Urothelial carcinoma (UC) is among the ten most common cancers worldwide and overall therapy systemic response rates are limited (~20%). Molecular insights in processes driving therapy resistance are scarce. Here, we propose to expand our existing patient-derived living UC biobank, develop a novel zebrafish model to study the role of fatty acid metabolism and ferroptosis in UC, and to determine if the zebrafish allows the pre-selection of therapy responsive patients.

Important results

Urothelial cancer (UC) cell lines are sensitive to ferroptosis-inducing drugs in vitro and in vivo (zebrafish). Sensitivity depends on cell type and inducing agent type and concentration. SCD inhibition enhances this sensitivity. The patient-derived tumoroid biobank of metastatic UC patients has been expanded by n = 6 patients.

Special methods

- Biomarker identification
- Bioinformatical data mining with DeSEQ2
- Zebrafish xenograft/co-injection model
- Lentivirus-mediated knockdown and overexpression

Publications

Schwab A, Rao Z, Zhang J, Gollowitzer A, Siebenkäs K, Bindel N, D'Avanzo E, van Roey R, Hajjaj Y, Özel E, Armstark I, Bereuter L, Su F, Grander J, Bonyadi Rad E, Groenewoud A, Engel FB, Bell GW, Henry WS, Angeli JPF, Stemmler MP, Brabletz S, Koeberle A, Brabletz T. (2024) Zeb1 mediates EMT/plasticity-associated ferroptosis sensitivity in cancer cells by regulating lipogenic enzyme expression and phospholipid composition. Nature cell biology: 26 (9), 1470-1481

Bannier PA, Saillard C, Mann P, Touzot M, Maussion C, Matek C, Klümper N, Breyer J, Wirtz R, Sikic D, Schmitz-Dräger B, Wullich B, Hartmann A, Försch S, Eckstein M. (2024) AI allows pre-screening of FGFR3 mutational status using routine histology slides of muscle-invasive bladder cancer. Nature communications: 15 (1), 10914. 2041-1723

Klümper N & Eckstein M. (2024) NECTIN4 Amplification Is Frequent in Solid Tumors and Predicts Enfortumab Vedotin Response in Metastatic Urothelial Cancer. Journal of clinical oncology : official journal of the American Society of Clinical Oncology: 42 (20), 2446-2455

PSAP in liver steatosis-triggered liver cancer


Prof. Dr. Hellerbrand

D42 04/2023 - 09/2025

Prof. Dr. Claus Hellerbrand, Institute of Biochemistry
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Abstract

Non-alcoholic fatty liver disease (NAFLD) is the leading cause of hepatocellular carcinoma (HCC). Furthermore, NAFLD promotes HCC progression but the mechanism are elusive. Our preliminary work indicates that enhanced expression of prosaposin (PSAP) in NAFLD promotes HCC growth. Therefore, this project aims to characterize the molecular mechanisms by which PSAP affects HCC cells, to test the therapeutic potential of PSAP inhibition and to validate the function of PSAP in clinical HCC samples.

Publications

no project-specific publications so far

Important results

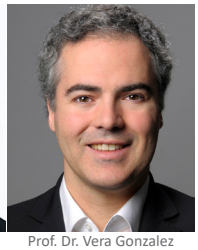
We validated the protumorigenic role of PSAP in HCC cells in functional in vitro analysis of HCC cells with RNAi mediated PASP suppression or stimulation with recombinant PSAP. These data confirm the therapeutic potential of PSAP inhibition in liver steatosis related HCC which will be further analyzed in the ongoing project.

Special methods

- In vitro models of cellular lipid accumulation and characterization of cellular lipid metabolisms
- Murine HCC models
- Diet induced models of hepatic steatosis in mice

Regulation of CD19.CAR T-cells


PD Dr. Völkl


Prof. Dr. Vera Gonzalez

D43 03/2023- 09/2025

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Prof. Dr. Julio Vera Gonzalez, Department of Dermatology
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Abstract

CD19-directed chimeric antigen receptor (CAR) T-cells have shown high efficacy in the treatment of B-cell malignancies and are now emerging as a standard approach for patients with relapsed and refractory disease. Despite this progress, a significant portion of patients still experience resistance to treatment. We aim to understand the intrinsic mechanisms controlling persistence and effector functions of CAR T-cells and therefore identify strategies to overcome treatment failure.

Publications

Auth J, Müller F, Völkl S, Bayerl N, Distler JHW, Tur C, Raimondo MG, Chenguiti Fakhouri S, Atzinger A, Coppers B, Eckstein M, Liphardt AM, Bäuerle T, Tascilar K, Aigner M, Kretschmann S, Wirsching A, Taubmann J, Hagen M, Györfi AH, Kharboutli S, Krickau T, Dees C, Spörl S, Rothe T, Harrer T, Bozec A, Grieshaber-Bouyer R, Fuchs F, Kuwert T, Berking C, Horch RE, Uder M, Mackensen A, Schett G, Bergmann C. (2024) CD19-targeting CAR T-cell therapy in patients with diffuse systemic sclerosis: a case series. The Lancet. Rheumatology: 2665-9913

Important results

Early CAR T-cell expansion at day 7 post transfusion predicted treatment response in relapsed or refractory large B-cell lymphoma and was associated with survival. This finding offers the possibility to identify treatment failure within the first week after CAR T-cell therapy and thereby laying out the ground for future intervention studies.

Special methods

- Analysis of immune cells using high-dimensional flow cytometry
- Cytotoxicity and signaling assays
- Third-generation Oxford Nanopore sequencing for investigating the vector integration

Molecular nexuses in neurodevelopmental diseases


Dr. Falk

E32 07/2023 - 12/2025

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Abstract

The development of a functional central nervous system depends on the accurate coordination of the highly dynamic microtubule cytoskeleton. Here we propose to chart the molecular landscape induced by mutations in microtubule cytoskeleton components implicated in neurodevelopmental disorders in human brain organoids to uncover unifying and diverging molecular features in a tissue-like context to design strategies to interfere with disease-phenotype progression.

Important results

- scRNAseq based deconstruction of the molecular framework resulting in neuronal long-range connection malformations
- Uncovered shared cellular and molecular principles driving neuronal malformations
- Adaptation of the hiPSC based platform to perform pooled perturbation screens

Special methods

- iPSC based brain organoids modeling early human brain development
- Pooled genetic perturbation screens utilizing single cell RNAseq for phenotyping
- Patient derived iPSC

Publications

Karpf J, Unichenko P, Chalmers N, Beyer F, Wittmann MT, Schneider J, Fidan E, Reis A, Beckervordersandforth J, Brandner S, Liebner S, Falk S, Sagner A, Henneberger C, Beckervordersandforth R. (2022) Dentate gyrus astrocytes exhibit layer-specific molecular, morphological and physiological features. Nature neuroscience: 25 (12), 1626-1638

Menon R, Petrucci L, Lohrer B, Zhang J, Schulze M, Schichor C, Winner B, Winkler J, Riemenschneider MJ, Kühn R, Falk S, Karow M. (2023) Human Induced Pluripotent Stem Cell-Derived Pericytes as Scalable and Editable Source to Study Direct Lineage Reprogramming Into Induced Neurons. Cellular reprogramming: 25 (5), 212-223

Frank S, Gabassi E, Käseberg S, Bertin M, Zografidou L, Pfeiffer D, Brennenstuhl H, Falk S, Karow M, Schweiger S. (2024) Absence of the RING domain in MID1 results in patterning defects in the developing human brain. Life science alliance: 7 (4), 2575-1077

Deubiquitinase Otud7b in CNS myelination

Dr. Küspert

E33 07/2023 - 12/2025

Dr. Melanie Küspert, Institute of Biochemistry
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Abstract

Specific regulation of protein degradation by the ubiquitin-proteasome system plays important roles in myelination, remyelination and neurodegenerative diseases. I want to analyse the functions of the deubiquitinase Otud7b in oligodendrocytes in vitro and in vivo in an oligodendrocyte-specific Otud7b knockout mouse model and identify functional targets of Otud7b in oligodendrocytes to deepen the understanding of posttranscriptional regulatory events during OL differentiation and CNS myelination.

Publications

no project-specific publications so far

Important results

We identified Otud7b as novel target of the transcription factors Sox10 and Klf9, both important drivers of oligodendrocyte differentiation. Consistently, we also found Otud7b to be essential for timely CNS myelination, since delayed oligodendrocyte maturation and myelination were detected in mice with oligodendrocyte-specific Otud7b ko.

Special methods

- Phenotypic analysis of Ctrl and Otud7b cko CNS tissue and primary oligodendroglial cell cultures (IHC, ISH)
- Characterization of the Otud7b upstream regulatory network (reporter gene assay, gel shift assay, ChIP)
- Characterization of the Otud7b interactome in oligodendrocytes (Co-IP, PLA, retroviral transduction)

Regulation of the adul CNS stem cell niche

Prof. Dr. Lie

Prof. Dr. Franze

E34 07/2023 - 03/2026

Prof. Dr. Dieter Chichung Lie, Institute of Anatomy (Institute of Biochemistry until 09/2024)
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Prof. Dr. Kristian Franze, Institute of Medical Physics
e-mail: kristian.franze@fau.de

Abstract

An adverse local environment ("niche") impairs the activity of neural stem cells (NSCs) in the adult brain. We investigate the new hypothesis that NSCs play an active role in generating favorable and adverse niche conditions. Specifically, we will investigate how dysfunctional NSCs generate adverse niche conditions focusing i) on the composition and the biomechanical properties of the extracellular matrix and ii) on NSC-derived exosomes and their composition.

Publications

no project-specific publications so far

Important results

We have established exosome isolation from neural stem cells and the generation of substrates of defined stiffness for culturing neural stem cells. We found that stem cells produce long-chain fatty acids in a FoxO-dependent manner and that a long-chain fatty acid / lysosome acidification axis controls stem cell proliferation.

Special methods

Measurement of autophagic-lysosomal flux via biochemistry and imaging. Biochemical analyses of exosomes. Neural stem cell cultures. Retroviral vectors. Stereotactic injections (mouse). Atomic force microscopy. Traction force microscopy. Custom-built compliant cell culture substrates.

Deciphering recessive NDDs


Prof. Dr. Reis


Prof. Dr. Soba

E35 04/2023 - 09/2025

Prof. Dr. André Reis, Institute of Human Genetics
e-mail: andre.reis@uk-erlangen.de

Prof. Dr. Peter Soba, Institute of Physiology and Pathophysiology
e-mail: peter.soba@fau.de

Abstract

Autosomal recessive mutations significantly contribute to intellectual disability and neurodevelopmental disorders (NDDs). However, high genetic heterogeneity of NDDs makes it difficult to prove pathogenicity. Using a comprehensive approach, we will combine genome sequencing and transcriptomics in a unique patient cohort of consanguineous Turkish families with at least two affected children, together with in silico analysis of candidates and in vivo screening in the Drosophila model organism.

Publications

no project-specific publications so far

Important results

Genetic screening of 82 consanguineous families with multiple affected children revealed 58 known and 58 novel candidate gene variants causing neurodevelopmental disorders. Analysis of orthologous genes in Drosophila uncovered behavioral defects for about one third, some of which were rescued by human wildtype but not patient variant expression.

Special methods

- Genetic screening of patients by exome sequencing and RNAseq
- Optogenetic behavioral screening in Droposhila melanogaster
- Functional testing of pathogenicity of candidate variants in Drosophila

Temporal patterning of dopaminergic neurons


Dr. Sagner

E36 07/2023 - 12/2025

Dr. Andreas Sagner, Institute of Biochemistry
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Abstract

Parkinson's disease is a neurodegenerative movement disorder characterized by the progressive loss of midbrain dopaminergic (mDA) neurons. mDA neurons can be partitioned into numerous molecularly and functionally distinct neuronal subtypes. The molecular mechanisms orchestrating mDA neuron subtype specification are still largely unclear. This project will test the hypothesis that a temporal patterning program I recently uncovered contributes to the establishment of mDA neuron diversity.

Publications

no project-specific publications so far

Important results

The chronologically ordered expression of several temporal transcription factors correlates with and is functionally required for the specification of dopaminergic neuron subtypes. Further functional characterization of these transcription factors by various epigenomic profiling assays in stem cell-based differentiations is currently on-going.

Special methods

- EdU/BrdU birth-dating of mouse midbrain dopaminergic neurons (mDANs)
- Differentiation of human iPSCs into mDANs
- Epigenetic profiling (CUT&RUN; ATACseq) of mDANs

CtBP1, oligodendrocytes & myelination


Prof. Dr. Wegner


Prof. Dr. Fejtova

E37 02/2023 - 12/2025

Prof. Dr. Michael Wegner, Institute of Biochemistry
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Prof. Dr. Anna Fejtova, Department of Psychiatry and Psychotherapy
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Abstract

Mutations in transcriptional corepressor CtBP1 cause the neurodevelopmental disorder HADDTS. Functional CtBP1 studies in the central nervous system so far focused on neurons. We recently found that CtBP1 is also important in oligodendrocytes. Here we will characterize the oligodendroglial functions of CtBP1 and the underlying cellular and molecular mechanisms in mice and a human ES cell-derived cellular disease model to show that defects in oligodendrogenesis and myelination contribute to HADDTS.

Publications

no project-specific publications so far

Important results

- CtBP1 is necessary for maintenance and survival of oligodendrocytes (OL) in adult mouse brain but not spinal cord.
- Deletion of CtBP1 impacts cell proliferation, differentiation, glucose uptake and metabolism in OL precursors.
- Integrin/FAK signalling is dysregulated after OL-specific CtBP1 deletion according to omics analyses of the corpus callosum.

Special methods

- Conditional gene manipulation in oligodendroglial cells in vivo and in vitro
- Multiomics
- Analysis of proliferation, metabolism and cell signalling

Funded projects Jochen-Kalden-Funding Programme in 2024:

No.	Name	Institution	Project title
N5	Prof. Dr. Claudia Günther	Department of Medicine 1	Organ crosstalk in IMIDs
N6	Prof. Dr. Janina Müller-Deile	Department of Medicine 4	Rare glomerular diseases
N7	Prof. Dr. Marisa Karow	Institute of Biochemistry	Forging neural cell identity
N8	Prof. Dr. Friederike Zunke	Department of Molecular Neurology	Lysosomes & glial cells
N9	Prof. Dr. Caroline J. Voskens	Department of Dermatology	Engineered cells in skin diseases
N10	Prof. Dr. Ricardo Grieshaber-Bouyer	Department of Medicine 3	LAMP1+ neutrophils in lupus nephritis
N11	Prof. Dr. Lydia Meder	Chair of Experimental Medicine I	ERBB2 in der SCLC Immunantwort
N12	Prof. Dr. Christiane Krystelle Nganou Makamdop	Department of Medicine 3	Autoimmunity therapies and T cell function

Inter-kingdom communication and organ crosstalk

Prof. Dr. Günther

N5 07/2021 – 03/2025

Prof. Dr. Claudia Günther, Department of Medicine 1

e-mail: c.guenther@uk-erlangen.de

Abstract

Both host environmental components as well as host cells release Extracellular vesicles (EVs) who are increasingly recognized for their immune-stimulatory properties and their potential role as biological shuttle system for inter-kingdom communication. Within this project, we will elucidate the role of extracellular vesicles as communication system and the impact of such vesicles on the pathogenesis of immune-mediated inflammatory diseases

Important results

With our research we could expand our mechanistic understanding of cellular communication in immune-mediated inflammatory diseases (IMIDs) and are now using this knowledge for innovative diagnostic and therapeutic interventions.

Special methods

- bEV Isolation
- Organoids
- Stem Cells

Publications

Bittel M, Reichert P, Sarfati I, Dressel A, Leikam S, Uderhardt S, Stolzer I, Phu TA, Ng M, Vu NK, Tenzer S, Distler U, Wirtz S, Rothhammer V, Neurath MF, Raffai RL, Günther C, Momma S. (2021) Visualizing transfer of microbial biomolecules by outer membrane vesicles in microbe-host-communication in vivo. J Extracell Vesicles. 10(12):e12159

C. Günther, B. Winner, M.F. Neurath, T.S. Stappenbeck. (2022) Organoids in gastrointestinal diseases: from experimental models to clinical translation. Gut. 71(9):1892-1908

Dorner H, Stolzer I, Mattner J, Kaminski S, Leistl S, Edrich LM, Schwendner R, Hobauer J, Sebald A, Leikam S, Gonzalez Acera M, Düll M, Lang R, Seidel G, Seitz T, Hellerbrand C, Fuhrmann G, Distler U, Tenzer S, Eichhorn P, Vieth M, Schramm C, Arnold P, Becker C, Weidinger C, Siegmund B, Atreya R, Leppkes M, Naschberger E, Sampaziotis F, Dietrich P, Rauh M, Wirtz S, Kremer AE, Neurath MF, Günther C. (2024) Gut Pathobiont-Derived Outer Membrane Vesicles Drive Liver Inflammation and Fibrosis in Primary Sclerosing Cholangitis-Associated Inflammatory Bowel Disease. Gastroenterology.167(6):1183-1197.e16.

Prof. Dr. Müller-Deile

N6 04/2021 – 12/2024

Prof. Dr. Janina Müller-Deile, Department of Medicine 4

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Abstract

I investigate rare glomerular diseases with different cell culture models, transgenic zebrafish models, podocyte specific knockout models, innovative techniques, interdisciplinary collaborations and patient material to cover multidimensional aspects of the disease in a patient centered manner. Cell-cell signaling through miRs, exosomes, autophagy and circulating factors are investigated to learn more about pathomechanisms of rare glomerular diseases that might translate into novel therapeutic targets in the future.

Important results

1. Podocyte-derived nephronectin is important for proper glomerular function and is regulated by endothelial cell derived miRNA-192 loaded exosomes.
2. miRNA-378a increases podocyte autophagy flux by targeting mTOR-pathway.
3. Mass spectrometry of sera fshowed a dysbalance of proteases and protease inhibitors in pFSGS.

Special methods

- Exosome reporter plasmids
- 3D glomerular co-culture model
- Different transgenic zebrafish models

Publications

Müller-Deile J, Sopel N, Ohs A, Rose V, Gröner M, Wrede C, Hegermann J, Daniel C, Amann K, Zahner G, Schiffer M. (2021) Glomerular Endothelial Cell-Derived microRNA-192 Regulates Nephronectin Expression in Idiopathic Membranous Glomerulonephritis. Journal of the American Society of Nephrology : JASN: 32 (11), 2777-2794

Sopel N, Ohs A, Schiffer M, Müller-Deile J (2022) A Tight Control of Non-Canonical TGF-Pathways and MicroRNAs Downregulates Nephronectin in Podocytes. Cells 11(1):149

Ursu R, Sopel N, Ohs A, Tati R, Buvall L, Nyström J, Schiffer M, Müller-Deile J. (2022) Glomerular Endothelial Cell-Derived miR-200c Impairs Glomerular Homeostasis by Targeting Podocyte VEGF-A. International journal of molecular sciences: 23 (23), 1422-0067

Forging neural cell identity

Prof. Dr. Karow-Falk

N7 07/2021 – 02/2025

Prof. Dr. Marisa Karow-Falk, Institute of Biochemistry

e-mail: marisa.karow@fau.de

Abstract

This IZKF grant will be essential to realize my vision of using direct lineage reprogramming for the identification of novel regulators of human neurogenesis. My data provide evidence for the exciting opportunity to identify new potential molecular targets to enhance and navigate human neurogenesis for improving reprogramming and understanding developmental neurogenesis. We will study putative new neurogenesis key players during direct lineage reprogramming and early human brain development.

Important results

- New results point towards a key role for a metabolic regulator (CHCHD2) during pericyte-to-neuron conversion as assessed by live imaging and metabolomics
- New live imaging data obtained during pericyte-to-neuron reprogramming show the dynamics of the cooperativity between the reprogramming factors Ascl1 and Sox2

Special methods

- Continuous live-imaging of fluorescently labelled cells for long period of time (up to 2 weeks)
- Dox-inducible down regulation or up regulation of transgenes during reprogramming
- scATAC-/scRNA-seq using 10xGenomics platform (using the chromium controller) including library construction

Publications

Menon R, Petrucci L, Lohrer B, Zhang J, Schulze M, Schichor C, Winner B, Winkler J, Riemenschneider MJ, Kühn R, Falk S, Karow M. (2023) Human Induced Pluripotent Stem Cell-Derived Pericytes as Scalable and Editable Source to Study Direct Lineage Reprogramming Into Induced Neurons. Cellular reprogramming: 25 (5), 212-223

Frank S, Gabassi E, Käseberg S, Bertin M, Zografidou L, Pfeiffer D, Brennenstuhl H, Falk S, Karow M, Schweiger S. (2024) Absence of the RING domain in MID1 results in patterning defects in the developing human brain. Life science alliance: 7 (4), 2575-1077

Prof. Dr. Zunke

N8 02/2021 – 11/2024

Prof. Dr. Friederike Zunke, Department of Molecular Neurology

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Abstract

Recent studies suggest that glial dysfunction significantly contributes to neurodegeneration in Parkinson's disease (PD). Since lysosomal degradation is important for cellular function, we aim to analyse the molecular consequences of lysosomal dysfunction within different cells of the central nervous system (CNS). A better understanding of glial regulation and lysosomal turnover will help to unravel molecular mechanisms in PD and might facilitate the identification of novel therapeutic strategies in neurodegenerative disorders.

Important results

1. Oligodendrocytes and astrocytes exposed to a-synuclein show changes in the lysosomal system.
2. Application of recombinant lysosomal cathepsins (CTSD, B and L) in neurons and oligodendrocytes had positive effects and are further validated as novel treatment strategy for Parkinson's disease as well as Multiple System Atrophy (MSA).

Special methods

1. Structure-function analyses of proteins/protein complexes; recombinant protein expression, proteinbiochemistry
2. Intracellular readouts: protein trafficking/maturation, enzyme activities, pH measurements
3. Enrichment methods of lysosomal compartments, extracellular vesicles (EVs)
4. Induced pluripotent stem cells & differentiation protocols

Publications

Dobert JP, Bub S, Mächtel R, Januliene D, Steger L, Regensburger M, Wilfling S, Chen JX, Dejung M, Plötz S, Hehr U, Moeller A, Arnold P, Zunke F. (2024) Activation and Purification of ß-Glucocerebrosidase by Exploiting its Transporter LIMP-2 - Implications for Novel Treatment Strategies in Gaucher's and Parkinson's Disease. Advanced Science (Weinheim, Baden-Wurttemberg, Germany): 11 (25), e2401641. 2198-3844

Mächtel R, Dobert JP, Hehr U, Weiss A, Kettwig M, Laugwitz L, Groeschel S, Schmidt M, Arnold P, Regensburger M, Zunke F. (2024) Late-onset Krabbe disease presenting as spastic paraplegia - implications of GCase and CTSB/D. Annals of Clinical and Translational Neurology: 11 (7), 1715-1731. 2328-9503

Bolsinger MM, Drobny A, Wilfling S, Reischl S, Krach F, Moritz R, Balta D, Hehr U, Sock E, Bleibaum F, Hanses F, Winner B, Huarcaya SP, Arnold P, Zunke F. (2024) SARS-CoV-2 Spike Protein Induces Time-Dependent CTSL Upregulation in HeLa Cells and Alveolarspheres. Journal of Cellular Biochemistry: 125 (9), e30627. 0730-2312

Engineered cells in skin disease

Prof. Dr. Voskens

N9 07/2024 – 06/2026

Prof. Dr. Caroline J Voskens, Department of Dermatology

e-mail: caroline.bosch-voskens@uk-erlangen.de

Abstract

We hypothesize that, during inflammation, a highly motile subset of lymphocytes, including T cells, B cells and regulatory T cells migrates from the blood into the skin. The characterization of this highly motile subset would allow us to identify the migration and suppressive molecules selectively employed by these cells to reach the site of inflammation. We propose that we can engineere blood erived immune cells with these molecules. In such a scenario, these engineered immune cells are highly migratory and ready to move to the site of inflammation after adoptive cell transfer.

Special methods

- Cell-engineering by mRNA-electroporation
- the measurement of Treg function in classical suppression assays and three-dimensional collagen gels

Publications

no project-specific publications so far

LAMP1+ neutrophils in lupus nephritis

Prof. Dr. Grieshaber-Bouyer

N10 07/2024 - 06/2026

Prof. Dr. Ricardo Grieshaber-Bouyer, Department of Medicine 3

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Abstract

My preliminary data highlight that neutrophil phenotypes define distinct SLE patients and that LAMP-1 is a strongly dysregulated protein in SLE. I hypothesize that LAMP1 expression defines a distinct activation state of neutrophils associated with a clinical subgroup of SLE patients with more severe kidney involvement. Hence, this project aims to study the functional role of LAMP1 in neutrophils and probe associations of LAMP1 expression and serum levels with clinical features in SLE.

Special methods

1. Neutrophil stimulation
2. RNA-seq
3. Functional characterization by imaging flow cytometry and confocal microscopy (phagocytosis, reactive oxygen species, bacterial killing, migratory potential, NET formation, cytokine release)
4. Quantification of LAMP1 in serum, cell-based reporter assays to screen for autoantibodies

Publications

no project-specific publications so far

ERBB2 in SCLC immune response

Prof. Dr. Meder

N11 04/2024 - 03/2026

Prof. Dr. Lydia Meder, Chair of Experimental Medicine I

e-mail: lydia.meder@fau.de

Abstract

My preliminary results suggest that ERBB2 is upregulated in SCLC during metastasis and resistance to immune checkpoint blockade (ICB), helping the tumor to escape the immune system. We plan to investigate ERBB2 inhibitors regarding their immunoregulatory properties ex vivo in precision cut tissue slices (PCTS) and in a SCLC mouse model. We will elucidate the underlying molecular mechanisms downstream of ERBB2 and identify patients who may benefit from an ERBB2 targeted therapy.

Important results

1. SCLC shows substantial MHC-I loss in metastasis compared to the primary lung tumor
2. Laminin-binding integrins are increased in metastasis and contribute to MHC-I regulation in SCLC cells
3. Targetable kinases, down-stream or inter-connected with laminin, can be inhibited to trigger MHC-I surface expression

Special methods

1. scRNASeq of murine primary small cell lung cancer (SCLC) and metastases
2. Genomic knock out SCLC cell lines using CRISPR combined with laminin-stimulation assays and kinase inhibition to modulate MHC-I on SCLC cells in 2D and 3D cultures
3. Investigating colonization capacity of SCLC cells in precision cut tissue slices

Publications

no project-specific publications so far

Autoimmunity therapies and T cell function

Prof. Dr. Nganou Makamdop

N12 04/2025 - 03/2027

Prof. Dr. Christiane Krystelle Nganou Makamdop, Department of Medicine 3
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recently started

Abstract

The proposed project will investigate the effect of common therapies such as hydroxychloroquine, tocilizumab, mycophenolate mofetil or rituximab in systemic lupus and systemic sclerosis patients. Closing a major gap in our knowledge of how distinct therapies influence T cell differentiation, metabolic reprogramming, subsets distribution and effector functions; this study will guide the improvement of disease management to favour immune competence.

Special methods hier die Methoden für N12:

- T cell in vitro differentiation and metabolic activity (read-outs by absorbance, luminescence and flow cytometry)
- Recall vaccine/antigen-specific T cell responses (read-outs by ELISA and flow cytometry)
- Transcriptome analysis of antigen-specific T cells
- T cell epitope mapping

Funded junior projects in 2024:

No.	Name	Institution		Project title
J90	Dr. Darja Andreev	Department of Medicine 3	I	The impact of Eos on bone loss
J91	Dr. Jean-Philippe Auger	Department of Medicine 3	I	Glucocorticoid-induced macrophage reprogramming
J93	PD Dr. Liubov Kalinichenko	Department of Psychiatry and Psychotherapy	N	Lipids and Serotonin in drug instrumentalization
J94	Dr. Patrick Süß	Department of Molecular Neurology	N	Neuroinflammation and synucleinopathy in IBD
J95	Dr. Franziska Thiele	Institute of Biochemistry	N	Role of Tip60 in the PNS
J96	Dr. Maria de los Reyes Gamez Belmonte	Department of Medicine 1	S	Bace1/Bace2 in colorectal cancer development
J97	PD Dr. Benedikt Jacobs	Department of Medicine 5	S	Immune-metabolic dysfunction of NK cells
J98	Dr. Alina Hilger	Department of Pediatrics and Adolescent Medicine	R	Detecting disease genes in urorectal malformations
J99	Dr. Miriam Düll	Department of Medicine 1	N	Reactive carbonyls in metabolic diseases
J100	PD Dr. Dennis Lapuente	Harald zur Hausen Institute of Virology	O	Mucosal vaccination against lung metastases
J101	Dr. Dr. Christian Matek	Institute of Pathology	O	AI for GI Histopathology
J102	Dr. Michael Rückert	Department of Radiation-Oncology	O	cDC1s in abscopal effects and HHP vaccination
J103	Dr. Eva Maier	Department of Operative Dentistry and Periodontology	M	Predicting clinical longevity of dental materials
J104	Dr. Tanja Müller	Department of Medicine 1	I	Stat5 in chronic colitis
J105	Dr. Katharina Pracht	Department of Molecular Immunology	I	GLUT1- metabolism and antibody response
J106	Dr. Maria Gabriella Raimondo	Department of Medicine 3	I	Skin-derived immune cells in psoriatic arthritis
J107	Dr. Simon Rauber	Department of Medicine 3	I	PU.1 in osteoblasts and osteoproliferation
J108	Dr. Alexander Schnell	Department of Paediatrics and Adolescent Medicine	I	Functional role of CFTR in immune cells
J109	Dr. Fanni Annamaria Boros	Department of Molecular Neurology	N	Extracellular vesicles in Parkinson's disease
J110	Dr. Oana- Maria Thoma	Department of Medicine 1	I	Epithelial telomere shortening in UC
J111	Dr. Alexander German	Department of Molecular Neurology	N	Voxelomic Atlas
J112	Dr. Daniil Thoma	Department of Stem Cell Biology	N	Lysosomal and protein dysregulation in SPG11
J113	Dr. Kerstin Hübner	Institute of Pathology	O	Role of ATF2 during peritoneal metastasis
J114	Dr. Stephanie Naas	Department of Medicine 4	O	Key transcriptional circuitries in kidney cancer
J115	Dr. Nora Bartels	Institute of Experimental and Clinical Pharmacology and Toxicology	O	Steroid conjugates in adrenal tumors

I - Infection and Immunology, N - Neurosciences, O - Oncology, R - Renal and Vascular Research, M - Medical Engineering, S - Others

The impact of Eos on bone loss

Dr. Andreev

J90 01/2022 - 06/2024

IMMUNOLOGY AND INFECTION

Dr. Darja Andreev, Department of Medicine 3 (until 07/2024)
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Abstract

A healthy skeleton relies on a balance between bone-forming osteoblasts and bone-resorbing osteoclasts. A shift towards increased osteoclast activity can therefore lead to bone loss. The immune system strongly affects osteoclast biology, usually promoting osteoclast development. Interestingly, we demonstrated that eosinophils negatively regulate osteoclast formation and activity. Thus, it is of high relevance to unveil the molecular mechanisms underlying this regulatory function of eosinophils.

Important results

- Eos release EPX, which lowers ROS level in pre-osteoclasts, thereby inhibiting RANKL-mediated signaling.
- Eos deficient mice (lack of EPX expression) have increased osteoclast numbers, leading to more bone loss.
- Treatment with EPX reduces osteoclast numbers and decreases bone loss.
- High number of Eos is linked to increased bone mass in humans.

Publications

Andreev D, Kachler K, Liu M, Chen Z, Krishnacoumar B, Ringer M, Frey S, Krönke G, Voehringer D, Schett G, Bozec A (2024) Eosinophils preserve bone homeostasis by inhibiting excessive osteoclast formation and activity via eosinophil peroxidase. Nature communications 15: 1067
Kachler K, Andreev D, Thapa S, Royzman D, Gießl A, Karuppusamy S, Llerins Perez M, Liu M, Hofmann J, Gessner A, Meng X, Rauber S, Steinkasserer A, Fromm M, Schett G, Bozec A (2024) Acod1-mediated inhibition of aerobic glycolysis suppresses osteoclast differentiation and attenuates bone erosion in arthritis. Annals of the rheumatic diseases 83: 1691-1706

Special methods

- In vitro cell differentiation of murine osteoclasts from bone marrow-derived monocytes and human osteoclasts from peripheral blood mononuclear cells
- Murine models of postmenopausal osteoporosis and inflammatory arthritis
- Single-cell RNA sequencing with sorted eosinophils and RNA sequencing with in vitro generated osteoclasts

Glucocorticoid-induced macrophage reprogramming

Dr. Auger

J91 01/2022 - 06/2024

IMMUNOLOGY AND INFECTION

Dr. Jean-Philippe Auger, Department of Medicine 3
e-mail: jean-philippe.auger@charite.de

Abstract

Glucocorticoids are amongst the most important anti-inflammatory drugs, promoting inflammatory resolution via the functional reprogramming of macrophages, a process that promotes itaconate production. Though itaconate is a metabolite participating in immune-metabolic rewiring, its role and effects, as with the underlying mechanisms involved in its production, on immunometabolism and inflammatory resolution remain unknown, yet could contribute to further optimizing glucocorticoid treatment.

Important results

- Glucocorticoids (GC) promote tricarboxylic acid cycle activity in pro-inflammatory macrophages via increased pyruvate uptake, which results in increased itaconate production, required for the anti-inflammatory effects of GCs
- Absence of Acod1 abrogates the anti-inflammatory potential of GCs in macrophages and in various mouse models of disease

Publications

Auger JP, Zimmermann M, Faas M, Stifel U, Chambers D, Krishnacoumar B, Taudte RV, Grund C, Erdmann G, Scholtysek C, Uderhardt S, Ben Brahim O, Pascual Maté M, Stoll C, Böttcher M, Palumbo-Zerr K, Mangan MSJ, Dzamukova M, Kieler M, Hofmann M, Blüml S, Schabbauer G, Mougiakakos D, Sonnewald U, Hartmann F, Simon D, Kleyer A, Grüneboom A, Finotto S, Latz E, Hofmann J, Schett G, Tuckermann J, Krönke G (2024) Metabolic rewiring promotes anti-inflammatory effects of glucocorticoids. Nature 629: 184-192

Special methods

- Primary mouse and human macrophage cultures in vitro and ex vivo
- Evaluation of the metabolic state of primary cells and cell lines using extracellular flux analyses (Seahorse XF Analyzer)
- Murine models of acute lipopolysaccharide-induced lung injury, ovalbumin-induced allergic asthma and autoimmune K/BxN serum transfer arthritis

Lipids and Serotonin in drug instrumentalization

NEUROSCIENCES

PD Dr. Kalinichenko

J93 01/2022 - 06/2024 (bonus time until 12/2024)

PD Dr. Liubov Kalinichenko, Department of Psychiatry and Psychotherapy
e-mail: liubov.kalinichenko@uk-erlangen.de

Abstract

Alcoholism and depression are highly comorbid disorders. Neutral sphingomyelinase (NSM) is suggested as a missing link between emotional status and alcohol consumption due to the downstream effects on the serotoninergic system. A new line of mice with NSM gene knockout specifically in the brain serotoninergic system was created to investigate if the interaction between NSM and the brain serotoninergic system determines the comorbidity between negative emotional state and alcohol consumption.

Publications

Kalinichenko LS, Zoicas I, Bienia AM, Bühner C, Robinson J, Küttermeyer J, Labonte A, Raveendran T, Warth L, Smaga I, Filip M, Eulenburg V, Rhein C, Fejtova A, Gulbins E, Kornhuber J, Müller CP (2025) Brain acid sphingomyelinase controls addiction-related behaviours in a sex-specific way. Neurobiology of disease 206: 106800

Important results

Specific neutral sphingomyelinase knockout in the serotonergic neurons of female mice has protective effects against depression and stress-associated alcohol consumption, while memory performance of these mice was attenuated. The observed behavioural phenotypes are associated with reduced presynaptic efficacy and synaptic vesicle release.

Special methods

The following methods are used in the project:

- behavioral testing of animals for evaluation of anxiety/depression-like behavior, cognitive performance, stress-associated and social alcohol drinking;
- in-vivo microdialysis allowing to analyze the response of brain monoaminergic systems to drug administration;
- electrophysiology.

Neuroinflammation and synucleinopathy in IBD

NEUROSCIENCES

Dr. Süß

J94 12/2021 - 10/2024 (bonus time until 11/2024)

Dr. Patrick Süß, Department of Molecular Neurology
e-mail: patrick.suess@uk-erlangen.de

Abstract

Inflammatory bowel disease (IBD) predisposes for synucleinopathies like Parkinson Disease. This is putatively caused by propagation of chronic inflammation into the brain. The hypothesis of this project is that chronic inflammation in IBD activates microglia in distinct brain regions, thereby mediating neuronal pathology and aggravating synucleinopathy. This hypothesis will be tested in post mortem brain tissue of IBD patients and mice with colitis.

Publications

Masanetz RK, Baum W, Schett G, Winkler J, Süß P (2023) Cellular plasticity and myeloid inflammation in the adult brain are independent of the transcriptional modulator DREAM. Neuroscience letters 137061

Sankowski R, Süß P, Benkendorff A, Böttcher C, Fernandez-Zapata C, Chhatbar C, Cahueau J, Monaco G, Gasull AD, Khavaran A, Grauvogel J, Scheiwe C, Shah MJ, Heiland DH, Schnell O, Markfeld-Erol F, Kunze M, Zeiser R, Priller J, Prinz M (2024) Multiomic spatial landscape of innate immune cells at human central nervous system borders. Nature medicine 30:186-198

Important results

- Chronic DSS-induced colitis induces innate and adaptive immune cell response at CNS border regions.
- Chronic gut inflammation is transmitted across CNS borders, leading to T cell infiltration and microglial activation in the substantia nigra.
- Mouse models of IBD show dopaminergic neuron loss in the substantia nigra.

Special methods

- Tracing and gene targeting of microglia using a novel and highly specific reporter mouse model based on the microglial marker gene Hexb
- Confocal microscopy of CNS immune cells in the parenchyma and CNS border regions
- RNA sequencing of dissected brain regions and FACS-sorted CNS myeloid cells

Role of Tip60 in the PNS

Dr. Thiele

J95 01/2022 - 06/2025

NEUROSCIENCES

Dr. Franziska Thiele, Institute of Biochemistry
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Abstract

Proper Schwann cell development and myelination are essential for a functional peripheral nervous system and regulated by networks of chromatin modifiers and transcription factors. Here I plan to study the role of the acetyltransferase Tip60 as part of the Tip60/Ep400 chromatin remodeling complex in lineage progression and myelination by characterizing its target genes and interaction with transcription factor Sox10. Results may help to better understand peripheral neuropathies.

Publications

no project-specific publications so far

Important results

The histological analyses of Tip60-deficient sciatic nerves confirmed the strong phenotype of a peripheral neuropathy with hypomyelination due to less Schwann cells that show impaired differentiation. RNA-Seq analysis of Tip60-deficient Schwann cells revealed significantly deregulated genes important for signaling and nervous system development.

Special methods

- Phenotypic characterization of a Schwann cell- specific Tip60 mouse mutant using i.a. immunohistochemical staining
- Isolation of sciatic nerves from a Schwann cell- specific Tip60 mouse mutant to perform RNA-Seq
- Co-immunoprecipitations to validate physical interactions of Tip60

Bace1/Bace2 in colorectal cancer development

Dr. Gamez Belmonte

J96 10/2021 - 03/2024 (bonus time until 09/2024)

ONCOLOGY

Dr. Maria de los Reyes Gamez Belmonte, Department of Medicine 1
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Abstract

The β-secretases (Bace1 and Bace2) are proteases involved in the pathogenesis of Alzheimer's disease (AD). However, Bace1/2 can be found in tissues other than the brain, suggesting that their role goes well beyond AD. Interestingly, our preliminary data reveal that the expression of Bace1/2 is modulated in response to intestinal inflammation and during cancer development. We hypothesize that the β-secretases might have regulatory functions in the gut and the pathophysiology of colorectal cancer.

Publications

Gamez-Belmonte R, Mahapatro M, Erkert L, Gonzalez-Acera M, Naschberger E, Yu Y et al. (2022) Epithelial presenilin-1 drives colorectal tumour growth by controlling EGFR-COX2 signalling. Gut. 72(6):1155-1166

Important results

Human tumor cells devoid of BACE2 (beta-secretase 2) exhibit heightened vulnerability to cell death. Conversely, the deletion of Bace1(beta-secretase 1) in intestinal epithelial cells does not impact tumor development in a colorectal cancer mouse model. The administration of BACE inhibitors diminishes tumor size in an allograft tumor model

Special methods

- Gene deletion in tumor organoids and cell lines using CRISPR/Casp9 technology
- Gene expression analysis using RNAscope
- Animal models of colorectal cancer (AOM/DSS, Apc min)

Immune-metabolic dysfunction of NK cells

ONCOLOGY

PD Dr. Jacobs

J97 01/2022 - 06/2024

PD Dr. Benedikt Jacobs, Department of Medicine 5
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Abstract

The metabolism of reconstituting NK cells upon autologous SCT is altered in lymphoma patients who experience an early relapse upon transplantation. We intend to decipher the underlying cellular and molecular mechanism to identify factors leading to the increased relapse risk and to reveal potential opportunities to modify them. This will lay the foundation for further projects investigating NK cell reconstitution upon allogeneic SCT and CAR-transfected NK cell expansion in tumor patients.

Publications

Richter S, Böttcher M, Stoll A, Zeremski V, Völkl S, Mackensen A, Ekici AB, Jacobs B, Mougiakakos D. (2024) Increased PD-1 Expression on Circulating T Cells Correlates with Inferior Outcome after Autologous Stem Cell Transplantation. Transplant Cell Ther. 30(6):628.e1-628.e9

Important results

The immune metabolic profile of reconstituted T and NK cells upon autologous SCT differs between refractory/ recurrent (r/r) und non-r/r lymphoma patients within the first year upon SCT. While the ICP receptor PD1 was only temporarily increased on NK cells, r/r patients demonstrated a continues up-regulation of PD1 on their T cells.

Special methods

Our group is specialized in the analysis of phenotypical, immune-metabolic and functional properties of NK cells from healthy donor and patient samples using multicolor flow cytometry techniques. Moreover, in order to optimize staining quality and reduce false antibody pipetting, we apply live- and fixed-cell fluorescent cell barcoding techniques.

Detecting disease genes in urorectal malformations

RENAL AND VASCULAR RESEARCH

Dr. Hilger

J98 01/2023 - 06/2025

Dr. Alina Hilger, Department of Pediatrics and Adolescent Medicine
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Abstract

Congenital urorectal malformations are rare birth defects with serious consequences for those affected. Still, the genetic causes of which have been little researched to date. The aim of this study is to identify candidate genes for these malformations by exome sequencing and copy number analysis, to re-sequence the identified candidate genes by next generation sequencing in a cohort of about 1100 patients and to characterise them in the zebrafish model by Morpholino oligonucleotide knockdown and CRISPR/Cas9 knockout.

Publications

Ebach F, Wagner P, Stein R, Dolscheid-Pommerich R, Reutter H, Hilger AC. (2024) Familial congenital lower urinary tract obstruction (LUTO) suggested by screening for lower urinary tract dysfunction in parents of patients: A descriptive study. Health science reports: 7 (3), e1935

Stegmann JD, Kalanithy JC … Hilger AC(2024) Bi-allelic variants in CELSR3 are implicated in central nervous system and urinary tract anomalies. NPJ genomic medicine: 9 (1), 18. 2056-7944

Important results

WES & MIP sequencing identified variants in 11 candidate genes for urorectal malformations in 20 patients. Protein interaction for SALL1 and TBX5 is impacted by identified variants.
CNV analyses identified known genes (HPSE2, LRIG2, FOXC1, CHD1L) and a novel candidate gene MBNL1 (in 2 independent patients).

Special methods

- Whole Exome Sequencing (WES) and subsequent molecular inversion probe (MIP) sequencing of candidate genes
- Copy number variations (CNV) anlyses
- Zebrafish as a vertebrate model and cell culture based models for studying indentified candidate genes

Reactive carbonyls in metabolic diseases

Dr. Düll

J99 10/2022 - 03/2025 (bonus time until 09/2025)

NEUROSCIENCES

Dr. Miriam Düll, Department of Medicine 1
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Abstract

Reactive carbonyl species (RCS) are linked to development of metabolic syndrome including neuropathic pain and steatotic liver disease (MASLD), but the possibly synergistic role of RCS in both conditions remains to be investigated. This project aims at analyzing RCS as biomarkers in patients with neuropathy and neuropathic pain, with parallel comprehensive experimental neurophysiological examinations of patients and assessment of functional effects of RCS on sensory neurons in vitro.

Special methods

- Psychophysical testing (Non-invasive tests of C-fiber functionality in healthy volunteers and patients with sensory symptoms such as pruritus and neuropathic pain)
- Microneurography (Minimally invasive recording of action potentials of single C-fibers from a peripheral nerve in human)
- Calcium acitivity assays in cell culture

Important results

Skin biopsies and psychophysical tests showed pathological findings in neuroanatomy and C-fiber function in patients with metabolic syndrome without manifest diabetes type 2. Cell culture experiments with TRPA1-overexpressing HEK cells were established testing various different reactive carbonyl species.

Publications

Roth D, Düll MM, Horst LJ, Lindemann A, Malzer X, Koop K, Zundler S, Vetter M, Jefremow A, Atreya R, Geppert C, Weidemann S, Waldner MJ, Dietrich P, Günther C, Munoz LE, Herrmann M, Scheffold A, Neurath MF, Siebler J, Schramm C, Kremer AE, Leppkes M. (2024) . Integrin αVß6 - autoantigen and driver of epithelial remodeling in colon and bile ducts in primary sclerosing cholangitis and inflammatory bowel disease. Journal of Crohn's & colitis: 1873-9946

Mucosal vaccination against lung metastases

PD Dr. Lapuente

J100 01/2023 - 06/2025 (bonus time until 12/2025)

ONCOLOGY

PD Dr. Dennis Lapuente, Harald zur Hausen Institute of Virology
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Abstract

The presence of tumor-resident memory T cells (TRM) positively correlates with prognosis in many cancers. In our preliminary data, lung TRM induced by a mucosal vaccine efficiently protected against lung metastasis in a preclinical breast cancer model. We want to investigate the vaccine efficacy against lung metastases at different disease stages and the contribution of TRM and their unique features to this efficacy. The efficacy will also be assessed in combination with radio- and chemotherapy.

Publications

Oltmanns F, Vieira Antão A, Irrgang P, Viherlehto V, Jörg L, Schmidt A, Wagner JT, Rückert M, Flohr AS, Geppert CI, Frey B, Bayer W, Gravekamp C, Tenbusch M, Gaipl U, Lapuente D. (2024) Mucosal tumor vaccination delivering endogenous tumor antigens protects against pulmonary breast cancer metastases. Journal for immunotherapy of cancer: 12 (3), 2051-1426

Important results

- Mucosal but not systemic immunization with a viral vector vaccine induces TRM responses in the lung.
- A single mucosal vaccination inhibits growth of pulmonary metastases prophylactically.
- In therapeutic settings, mucosal vaccination was combined with radiotherapy or with a systemic prime leading to synergistic therapeutic effects.

Special methods

- Mucosal vaccination platforms for the respiratory tract
- Lung tumor models
- Isolation and in-depth analyses of tissue-resident memory T cells

AI for GI Histopathology

ONCOLOGY

Dr. Dr. Matek

J101 01/2023 - 06/2025 (bonus time until 12/2025)

Dr. Dr. Christian Matek, Institute of Pathology
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Abstract

The proposed projects aims at using methods from AI-based image analysis to evaluate histopathologic samples from the field of gastrointestinal pathology. Specifically, samples from patients with inflammatory bowel diseases and malignancies of the colorectum will be evaluated. It is the aim of the project to develop algorithms that quantify and detect specific morphologic properties of these samples and integrate them with other data modalities.

Important results

We developed AI classification algorithms to quantitatively analyze the inflammatory environment in the mucosa of IBD patients, providing insights into possible mechanisms of inflammatory mucosal architecture distortion. We also use AI methods to analyse data from other organ systems, specifically from the urogenital tract.

Special methods

We use AI-based bioinformatic methods in order to quantitatively analyze histopathology datasets with a focus on GI pathology. This primarily includes digitized H&E-stained images, but also extends to modern molecular methods from Spatial Biology to bulk-level transcriptomics.

Publications

Schulz A, Schellinger IN, Backhaus SJ, Adler AS, Lange T, Evertz R, Kowallick JT, Hoffmann A, Matek C, Tsao PS, Hasenfuß G, Raaz U, Schuster A. (2024) Association of Cardiac MRI-derived Aortic Stiffness with Early Stages and Progression of Heart Failure with Preserved Ejection Fraction. Radiology. Cardiothoracic imaging: 6 (4), e230344

cDC1s in abscopal effects and HHP vaccination

ONCOLOGY

Dr. Rückert

J102 12/2022 - 05/2025 (bonus time until 11/2025)

Dr. Michael Rückert, Department of Radiation Oncology
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Abstract

Abscopal effects are rare events of local radiotherapy (RT) inducing systemic anti-tumor immune responses leading to the reduction of tumor masses outside of the irradiation field. We hypothesize that the addition of adjuvants to high hydrostatic pressure generated whole tumor cell vaccines in combination with RT and immune checkpoint inhibition induce abscopal effects in an orthotopic breast cancer model. Further, we hypothesize that cDC1s play a central role in this immune response.

Publications

Oltmanns F, Vieira Antão A, Irrgang P, Viherlehto V, Jörg L, Schmidt A, Wagner JT, Rückert M, Flohr AS, Geppert CI, Frey B, Bayer W, Gravekamp C, Tenbusch M, Gaipl U, Lapuente D. (2024) Mucosal tumor vaccination delivering endogenous tumor antigens protects against pulmonary breast cancer metastases. Journal for immunotherapy of cancer: 12 (3), 2051-1426

Important results

- Irradiated cDC1s that survive maintain their functionality to internalize the HHP vaccine and get activated by the adjuvants.
- The addition of adjuvants to the HHP vaccine enhances the local and abscopal tumor control in combination with radiotherapy and immune checkpoint inhibition also in the orthotopic 4T1 model.

Special methods

- In vitro differentiation of murine cDC1s, cDC2s and pDCs from bone marrow
- Co-culture of irradiated DC subsets with the HHP vaccine and adjuvants to investigate their radiosensitivity and functionality
- Murine tumor models (B16 melanoma and 4T1 mammary carcinoma) treated with radiotherapy, immune checkpoint inhibitors and HHP vaccine

Predicting clinical longevity of dental materials

Dr. Maier

J103 12/2022 - 06/2025

MEDICAL ENGINEERING

Dr. Eva Maier, Department of Operative Dentistry and Periodontology
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Abstract

With the rapid translation of emerging material processing technologies for tooth restoration, there is an urgent need for reliable laboratory testing systems that accurately predict the clinical longevity of new materials. The current proposal aims to 1) develop a novel in-vitro wear testing model that demonstrates accurate preclinical predictability of longitudinal clinical trial data and 2) explore the suitability of modern 3D-printing processes for dental material application.

Special methods

- Mechanical characterization of dental resin-based composite materials
- Evaluation of longevity and performance of dental restorations in clinical trials
- Quantitative (profilometry) and qualitative (digital and scanning electron microscopy) analysis of worn surfaces

Important results

Clinical results over 5.5 years showed, that indirect resin-based composite restorations are suitable for aesthetic and functional rehabilitation of severe tooth wear patients. An optimised sensitive in vitro wear testing method was developed. Advanced AI-based automated methods enabled simplified tooth wear monitoring on intraoral scans.

Publications

Maier E, Crins L, Pereira-Cenci T, Bronkhorst E, Opdam N, Galler K, Loomans B. (2024) 5.5-year-survival of CAD/CAM resin-based composite restorations in severe tooth wear patients. Dental materials : official publication of the Academy of Dental Materials: 40 (5), 767-776. 0109-5641

van Nistelrooij N, Maier E, Bronkhorst H, Crins L, Xi T, Loomans BAC, Vinayahalingam S. (2024) Automated monitoring of tooth wear progression using AI on intraoral scans. Journal of dentistry: 150 105323. 0300-5712

Maier E, Ruben J, Palin WM, Bronkhorst E, Olmos M, Matta RE, Loomans B. (2024) Developing an optimised method for accurate wear testing of dental materials using the ‚Rub&Roll' device. Scientific reports: 14 (1), 17885. 2045-2322

Stat5 in chronic colitis

Dr. Müller

J104 11/2023 - 04/2026

IMMUNOLOGY AND INFECTION

Dr. Tanja Müller, Department of Medicine 1
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Abstract

T cells play a key role in IBD, but the impact of Stat5 in CD4+ T cells for chronic colitis is unclear so far. Based on preliminary data demonstrating spontaneous chronic colitis in conditional Stat5 KO mice and decreased Stat5 expression in IBD, I hypothesize that Stat5 in CD4+ T cells counteracts colitis. Thus, in this project, I will explore the mechanisms and effects of CD4-specific Stat5 signalling for experimental colitis and IBD, aiming to identify novel approaches for future therapy.

Publications

no project-specific publications so far

Important results

Conditional KO of Stat5a/b in CD4+ T cells drives spontaneous development of a progressive colitis, heavily impacts on T cell profiles in the large intestine and promotes a subset of proinflammatory resident T cells. mRNA expression of proinflammatory cytokines in LPMCs and lymph nodes is differently regulated in Stat5-KO compared to control mice.

Special methods

- Single cell RNA-Sequencing of LPMCs from Cre+ and Cre- mice
- Flow cytometry of stimulated CD4+ T cells of patients with IBD or healthy controls
- Engineering E. coli nissle to express soluble IL-3

GLUT1- metabolism and antibody response

Dr. Pracht

J105 10/2023 - 03/2026

IMMUNOLOGY AND INFECTION

Dr. Katharina Pracht, Department of Molecular Immunology
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Abstract

The secretion of correctly glycosylated protective antibodies by long-lived plasma cells is essential for our immune protection. To survive and produce antibodies, long-lived plasma cells require an optimized metabolism. The aim of this study is to determine whether the glucose transporter GLUT1 plays a role in the metabolism of long-lived plasma cells and the functionality of their antibodies. Therefore, we will study a GLUT1-deficient mouse model and patients with GLUT1-deficiency syndrome.

Publications

Bierling TEH, Gumann A, Ottmann SR, Schulz SR, Weckwerth L, Thomas J, Gessner A, Wichert M, Kuwert F, Rost F, Hauke M, Freudenreich T, Mielenz D, Jäck HM, Pracht K. (2024) GLUT1-mediated glucose import in B cells is critical for anaplerotic balance and humoral immunity. Cell reports: 43 (2), 113739

Important results

GLUT1-KO in murine B cells reduced plasma cell formation and serum immunoglobulin concentrations. The antigen-specific humoral immune response declined more rapidly. GLUT1-KO serum immunoglobulins showed altered glycosylation patterns. GLUT1 inhibition in plasmacytoma cells or activated human B cells affected their viability and antibody secretion.

Special methods

- Advanced Murine and Human B Cell Culture Systems
- Characterization of subpopulations of B lymphocytes and antibody-secreting cells by flow cytometry assays
- Analysis of antibody glycan structures by flow cytometry, ELISA and Western blot assays

Skin-derived immune cells in psoriatic arthritis

Dr. Raimondo

J106 09/2023 - 02/2026

IMMUNOLOGY AND INFECTION

Dr. Maria Gabriella Raimondo, Department of Medicine 3
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Abstract

To date, it is still obscure why in some patients with psoriasis the autoimmune process is restrained to the skin, whereas in other it extends to the joints. We will adopt models resembling psoriasis and psoriatic arthritis, with the aim of studying the joint involvement secondary to skin inflammation. The comprehension and characterization of the underlying mechanisms involved in the "skin-joint axis" is pivotal for a better understanding of the link between physical barriers and autoimmunity.

Publications

Tur C, Eckstein M, Velden J, Rauber S, Bergmann C, Auth J, Bucci L, Corte G, Hagen M, Wirsching A, Grieshaber-Bouyer R, Reis P, Kittan N, Wacker J, Rius Rigau A, Ramming A, D'Agostino MA, Hartmann A, Müller F, Mackensen A, Bozec A, Schett G, Raimondo MG. (2024) CD19-CAR T-cell therapy induces deep tissue depletion of B cells. Annals of the rheumatic diseases: 0003-4967

Important results

- Identification of migratory cells from the skin to the joint in PsO and PsA patients.
- These migratory cells are skin specific (no in gut or bone marrow)
- PsA mice treated with CD200R agonist have less arthritis
- PsO mice treated with CD200 inhibitor develop arthritis

Special methods

- Imaging Mass Cytometry (IMC) on synovial biopsies from patients with psoriatic arthritis (PsA).
- Psoriasis (PsO) and PsA mouse model with IL-23 overexpression for flow cytometry of bone marrow and gut.
- IL-23 PsO/PsA model treated with CD200R agonist/ CD200 inhibitor for MRI of hind paws, histology, and flow cytometry.

PU.1 in osteoblasts and osteoproliferation

Dr. Rauber

J107 01/2024 - 08/2026

IMMUNOLOGY AND INFECTION

Dr. Simon Rauber, Department of Medicine 3
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Abstract

PU.1 controls the transcriptional network of matrix production in fibrotic fibroblasts. We have now found that PU.1 is also expressed in matrix-producing osteoblasts. In this proposal, we aim to study the PU.1 network in biopsies from patients with osteoproliferative arthritis by imaging mass cytometry, to dissect PU.1-driven transcription in human osteoblastogenic cultures by ATTAC/CHIP/RNA-seq, and to use a novel osteoblast-targeting PU.1 inhibitor in experimental osteoproliferative arthritis.

Publications

Rauber S, Mohammadian H, Schmidkonz C, Atzinger A, Soare A, Treutlein C, Kemble S, Mahony CB, Geisthoff M, Angeli MR, Raimondo MG, Xu C, Yang KT, Lu L, Labinsky H, Saad MSA, Gwellem CA, Chang J, Huang K, Kampylafka E, Knitza J, Bilyy R, Distler JHW, Hanlon MM, Fearon U, Veale DJ, Roemer FW, Bäuerle T, Maric HM, Maschauer S, Ekici AB, Buckley CD, Croft AP, Kuwert T, Prante O, Cañete JD, Schett G, Ramming A. (2024) CD200+ fibroblasts form a pro-resolving mesenchymal network in arthritis. Nature immunology: 25 (4), 682-692

Important results

Using RNA-seq, we identified a further mechanism of osteoblast differentiation. In addition to the PU.1-controlled programme, to which we attribute a homeostatic activity, an ER stress-mediated process plays an important role in the context of osteoproliferation. Tissue CyTOF showed this process is in particular active in enthesial tissue.

Special methods

- RNA seqeuncing of synovial and entheseal fibroblasts
- Tissue CyTOF of osteoproliferative lesions
- In vitro differentiation of human fibroblasts in presence of siRNA overexpression plasmids

Functional role of CFTR in immune cells

Dr. Schnell

J108 01/2024 - 06/2026

IMMUNOLOGY AND INFECTION

Dr. Alexander Schnell, Department of Paediatrics and Adolescent Medicine
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Abstract

This project aims at identifying the expression of the CFTR complex and functionally characterising its role in in peripheral blood mononuclear cells in the context of Cystic Fibrosis (CF). Moreover, the effects of a CFTR-modulating therapy with Elexacaftor - Tezacaftor - Ivacaftor (ETI) on immune cell function and regulation will be examined in a CFTR knock-out cell line and a CF pig model as well as primary patient-derived cells.

Special methods

- FACS
- Cell reporter assay
- 3D cell migration

Important results

Immune cells do not constitutively express CFTR on a protein level, nevertheless we found significant evidence for an impaired phagocytosis capacity in monocytes derived from patients with CF as well as CFTR -/- piglets. Moreover, ETI significantly alters the metabolome in CF patients.

Publications

Schnell A, Aicher C, Schnegelsberg PA, Schwarz B, Schmidt H, Allabauer I, Rückel A, Regensburger AP, Woelfle J, Hoerning A. (2024) Exhausted Lag-3+ CD4+ T cells are increased in pediatric Inflammatory Bowel Disease. Clinical and experimental immunology: 0009-9104

Schnell A, Tamm S, Hedtfeld S, Rodriguez Gonzalez C, Hoerning A, Lachmann N, Stanke F, Dittrich AM, Munder A. (2024) Analysis of CFTR mRNA and Protein in Peripheral Blood Mononuclear Cells via Quantitative Real-Time PCR and Western Blot. International journal of molecular sciences: 25 (12), 1422-0067

Extracellular vesicles in Parkinson's disease


Dr. Boros

J109 01/2024 - 06/2026

NEUROSCIENCES

Dr. Fanni Annamaria Boros, Department of Molecular Neurology
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Abstract

The aim of this project is to facilitate the understanding of the role of extracellular vesicles (EVs) in the development and progression of Parkinson's disease (PD). EVs extracted from blood of PD patients and controls will be fractionated according to cellular origin and cargo profiling will be performed focusing on pathogenic forms of aSyn and regulatory RNAs. The results will offer deeper insights in PD-related signatures, and permit exploring the origin and transfer of pathogenic molecules.

Special methods

I have expanded the used methods of EV isolation by implementing sucrose gradient centrifugation- and size exclusion chromatography (SEC)-based techniques. We implemented enzyme activity detection assays for EV characterization, and used and compared directly NTA and iNTA analysis in EV size and number determination.

Publications

no project-specific publications so far

Important results

We implemented protocols for collection, storage and use of saliva as EV source. I determined that considering the quality and quantity of EVs, SEC is the most suitable isolation method for both saliva and blood processing. Results of protease activity assays of plasma EVs show a tendency of increased activity of CTSB/L and ADAM10 in PD.

Epithelial telomere shortening in UC


Dr. Thoma

J110 11/2024 - 04/2027

IMMUNOLOGY AND INFECTION

recently started

Dr. Oana-Maria Thoma, Department of Medicine 1
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Abstract

Various factors contribute to the pathogenesis of ulcerative colitis (UC). Importantly, telomere shortening is often observed in intestinal epithelial cells (IECs) of patients with UC. Nevertheless, the functional role telomere length in IECs is poorly understood. This project aims to evaluate how telomere length is involved in the regulation of pro-inflammatory pathways and affects the barrier integrity in patients with UC.

Special methods

- Bulk RNA sequencing for analysis of differentially expressed genes in subtelomeric regions in IECs from control and telomerase-deficient mice (Terc-/-, generation G1 to G3)
- DNA methylation and telomere length measurements
- In vivo experimental models of colitis and in vitro co-culture systems using IECs and immune cells

Voxelomic Atlas

Dr. German

J111 10/2024 - 12/2026

Dr. Alexander German, Department of Molecular Neurology
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NEUROSCIENCES

recently started

Abstract

We aim to develop a voxelomic atlas of the brain. We will leverage high-resolution, multi-spectral ex-vivo imaging data from Magnetic Resonance Imaging (MRI) in combination with deep learning techniques, to compare single-voxel data between individuals. The atlas will serve as a tool to interpret single-voxel neuroanatomical variability. The project will build on preliminary work in sample preparation and data processing techniques.

Special methods

- Magnetic resonance imaging
- Machine learning
- Cryoperservation

Lysosomal and protein dysregulation in SPG11

Dr. Kachkin

J112 06/2024 - 11/2026

Dr. rer. nat. Daniil Kachkin, Department of Stem Cell Biology
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NEUROSCIENCES

recently started

Abstract

SPG11-related hereditary spastic paraplegia is a rapidly progressing neurodegenerative disorder caused by the loss of spatacsin protein function. It is characterized by Parkinsonism-like symptoms and disrupted glycosphingolipid metabolism. This project uses diverse cellular models to investigate how spatacsin deficiency affects lysosomal lipid degradation and promotes protein aggregation.

Special methods

- iPSC-derived cortical and dopamine neurons from SPG11-HSP patients
- Genetically modified human cells for modeling SPG11
- Protein aggregation assays

Role of ATF2 during peritoneal metastasis

Dr. Hübner

J113 11/2024 - 04/2027

Dr. Kerstin Hübner, Institute of Pathology
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ONCOLOGY

recently started

Abstract

Although peritoneal metastasis (PM) majorly contributes to colon cancer (CC) related deaths, knowledge on its molecular mechanisms and putative markers is limited. Colon tumors deficient for the transcription factor ATF2 are associated with PM. Our project aims to unravel the role of ATF2 loss during peritoneal seeding and, in particular, the effects on mesothelial cells executed by the secretome of ATF2-deficient CC cells. Thereby, novel therapeutic approaches for PM in CC might be identified.

Special methods

- Establishment of human primary mesothelial cells (HPMC)
- Secretome analysis of ATF2-deficient colon cancer cells
- Bulk RNA-seq of stimulated HPMC

Key transcriptional circuitries in kidney cancer

Dr. Naas

J114 08/2024 - 01/2027

Dr. Stephanie Naas, Department of Medicine 4
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ONCOLOGY

recently started

Abstract

A comprehensive molecular characterization of transcription factor dynamics in ccRCC evolution is a mandatory prerequisite for the development of personalized therapeutic interventions. Aim of this study is to define the components and interactions of oncogenic regulatory circuitries in ccRCC development with innovative NGS techniques. CRISPR/Cas-modified cell lines and patient-derived primary cells will be used to model early tumor stages and analyse epigenetic dysregulation in ccRCC evolution.

Special methods

- CRISPR/Cas9 mediated genome editing
- RNA-seq for transcriptome analysis
- CUT&Tag-seq for mapping of histone marks and transcription factor binding sites

Steroid conjugates in adrenal tumors

Dr. Bartels

ONCOLOGY

J115 08/2024 - 01/2027

Dr. Nora Bartels, Institute of Experimental and Clinical Pharmacology and Toxicology
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recently started

Abstract

A rapid and unambiguous differential diagnosis of adrenal tumors is challenging, but of high clinical relevance. In a preliminary untargeted metabolomics study, conjugated steroids in urine were identified as potentially very promising diagnostic biomarkers. This project aims to develop a quantitative LC-MS assay for steroid conjugates in urine and plasma for a detailed investigation of their utility as diagnostic and prognostic biomarkers for adrenocortical carcinoma in a larger patient cohort.

Special methods

The most important project specific methods were the following:

- Establishment of the optimal liquid chromatography conditions for the separation of several steroid conjugates
- Establishment of the optimal mass spectrometry conditions for the acquisition of the analytes
- Preparation of steroid-free plasma matrix for calibration purposes

Funded ELAN projects in 2024:

No.	Name	Institution		Project title
P063	Prof. Dr. Thomas Kinfe	Department of Neurosurgery	N	Assay of neuroinflammation in chronic pain
P066	Dr. Claudia von Zimmermann	Department of Psychiatry and Psychotherapy	I	Immune Regulation in the treatment of Depression.
P078	Dr. Eva Schäflein / PD Dr. Cosima Rhein	Psychosomatic Medicine a. Psycho-therapy	S	Self-perception in trauma-related disorders
P099	Prof. Dr. Christiane Krystelle Nganou Makamdop	Department of Medicine 3 (Harald zur Hausen Institute of Virology until 10/2024)	I	Interplay between TCR and microbiome
P110	Dr. Lisa Linck-Paulus	Institute of Biochemistry	O	The role of MAGOH in malignant melanoma
P113	Dr. Anna Dietl	Department of Obstetrics and Gynecology	S	3D-Imaging of ovarian follicles in scaffold
P114	Dr. Irmgard Toni	Paediatrics and Adolescent Medicine	S	Data set of drug-related paed. hospitalisations
P117	PD Dr. Iryna Prots	Department of Operative Dentistry and Periodontology (Department Stem Cell Biology until 12/2022)	N	T cell migration in neurodegeneration
P118	Prof. Dr. Ralf Enz	Institute of Biochemistry	N	GPR179, LRRTM4, GABAcR: new players in night vison
P119	Dr. Iris Stolzer	Department of Medicine 1	O	Tryptophan metabolites in intestinal inflammation
P120	PD Dr. Jay Patankar	Department of Medicine 1	I	Enteric glial cell-immune cell crosstalk
P121	Dr. Aparna Mahajan	Department of Medicine 3	I	Resolution of ocular surface inflammation
P122	Dr. Theresa Promny	Department of Plastic and Hand Surgery	O	Establishment of a novel breast tumor model
P123	Dr. Lara Berger	Department of Prosthodontics	M	Current chairside materials in dental practice
P125	Dr. Jannis Hanspach	Institute of Radiology	M	Deep learning QSM in the presence of fat
P126	Dr. Kerstin Hübner	Institute of Pathology	O	Mesentery model for peritoneal metastasis
P127*	Dr. Annika Weigelt	Department of Paediatric Cardiology	R	Myocarditis in relation to sports in children
P128*	Prof. Dr. Wei Xiang	Department of Molecular Neurology	N	FICD-mediated AMPylation in Parkinson's disease
P129	Dr. Rafael Schmid	Department of Plastic and Hand Surgery	O	Biofabricated breast cancer in a perfusion reactor
P130	Dr. Christine Schauer	Department of Medicine 3	I	Nuclear envelope breakdown during NETosis
P132	Dr. Carina Scherbel	Department of Medicine 3	I	Osteoclast metabolism
P133*	Dr. Harald Schuhwerk	KMFZ - Chair of Experimental Medicine I (Molecular Pathogenesis Research)	O	Cancer cells and CAFs as joint therapeutic target
P134	Dr. Nora Bartels	Institute of Experimental and Clinical Pharmacology and Toxicology	O	Untargeted metabolomics in adrenal tumors
P135	Dr. Dr. Ines Willershausen	Department of Orthodontics and Orofa-cial Orthopedics	S	Examination of craniofacial sutures
P136	Dr. Stephanie Sembill	Department of Paediatrics and Adole-scent Medicine	O	Exploring growth retardation under TKI therapy
P137	Dr. Jule Taubmann	Department of Medicine 3	I	Spatial interactions of T-cell clones in RA
P138	Dr. Arwin Groenewoud	Institute of Pathology	O	Lineage tracing of metastases
P139	Dr. Isabell Wank	Chair of Pharmacology and Toxicology	N	Influence of 3-indolepropionic acid on arthritis
P140*	Dr. Matthias Weider	Department of Orthodontics and Orofa-cial Orthopedics	N	iPSC-derived neural crest cells & palate formation
P141	Dr. Daniel Radtke	Department of Infection Biology	I	Basophils in skin-derived sensitization
P142	Dr. Kristina Koop	Department of Medicine 1	I	IL36 in intestinal inflammation and fibrosis
P143*	PD Dr. Marios Marcou	Department of Urology	S	The role of miRNAs in Lichen sclerosus

I - Infection and Immunology, N - Neurosciences, O - Oncology, R - Renal and Vascular Research, M - Medical Engineering, S - Others

* Project leaders beyond age limit

No.	Name	Institution		Project title
P144	Dr. Kerstin Dürholz	Department of Medicine 3	I	Histamin induces resolution of arthritis
P145	Dr. Leah Trumet	Department of Operative Dentistry and Periodontology	I	Th17/Treg immune response in periodontitis
P146	Dr. Annkathrin Hornung-Eichler	Department of Dermatology	O	Melanoma organoids as platform for testing
P147	Dr. Alexandra Birzer	Institute of Clinical and Molecular Virology	I	Intestinal barrier models in HTLV-1 transmission
P148	Dr. Tilman Jobst-Schwan	Department of Medicine 4	R	Wnt/beta-catenin signaling in kidney disease
P149	Prof. Dr. Janina Müller-Deile	Department of Medicine 4	R	Nanoparticles for precision medicine
P150	Dr. Felix Elsner	Institute of Pathology	O	Disseminated cancer cells in NSCLC patients
P151*	Dr. Nina Sopel	Department of Medicine 4	R	NPNT-Integrin interaction in podocytes
P152*	PD Dr. Mircea-Teodor Chiriac	Department of Medicine 1	O	STAT2 in colorectal cancer
P153	Dr. Florian Krach	Department of Stem Cell Biology	N	Compartment-Specific Transcriptome Analysis in ALS
P154*	Dr. Maximilian Stumpfe	Department of Plastic and Hand Surgery	M	Establishing an in vitro NPWT model
P155*	Dr. Yuichi Maeda	Department of Medicine 3	I	Dysbiosis triggers arthritis
P156*	Dr. Isabelle Schöffl	Department of Paediatric Cardiology	M	App based sport intervention for Fontan patients
P157	Dr. Hannah Reimann	Department of Medicine 5	O	TCR cell therapies in a 3D breast cancer model
P158	Dr. Christina James	Department of Stem Cell Biology	N	CSF1R-interactome analysis in HDLS disease
P159	Dr. Ella Ohlsson	Department of Operative Dentistry and Periodontology	S	Indirect Pulp Capping: A 3D-Model Exploration
P160	Dr. Angelika Mennecke	Institute of Neuroradiology	N	AI-based registration for 7T cMRI
P161*	Prof. Dr. Elisabeth Naschberger	Department of Surgery	O	Central organoid platform
P162*	Prof. Dr. Tomohisa Toda	Institute of Medical Physics	N	Stress-induced epigenetic changes in the brain
P163*	PD Dr. Heiko Gaßner	Department of Molecular Neurology	M	Digital mobility outcomes in Parkinson's disease
P164	Dr. Bettina Grötsch	Department of Medicine 3	I	Annexins as ligands of Dectin1 on osteoclasts
P165*	PD Dr. Vladimir Temchura	Harald zur Hausen Institute of Virology	I	Co-delivery of antigens and immunomodulators
P166	Dr. Enes Yagiz Akdas	Department of Psychiatry and Psycho-therapy	N	Role of CTBP1 in Hippocampal Energetics
P167	Dr. Alexander Grotemeyer	Department of Neurology	N	Characterization of immune cells and NLRP3 in MSA
P170	Dr. Katja Schmidt	Department of Ophtalmology	I	Immundysregulation and the effect of BC 007 in PCS
P171	Dr. Sushmita Paul	Department of Dermatology	O	Identification of tumor peptides for immuno-therapy
P172	Dr. Marco Thomas	Harald zur Hausen Institute of Virology	I	Fusion Activity of HCMV Glycoprotein B Variants
P173	Dr. Johanna T. Kurzhagen	Department of Medicine 4	R	Biomarker for immunosuppression in sepsis in KT

I - Infection and Immunology, N - Neurosciences, O - Oncology, R - Renal and Vascular Research, M - Medical Engineering, S - Others

* Project leaders beyond age limit

Assay of neuroinflammation in chronic pain

P063 09/2020 - 07/2024

Prof. Dr. Thomas Kinfe, Department of Neurosurgery (until 09/2024)
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Abstract
Clinical and animal studies implicate neuroinflammatory features (interleukines, chemokines, adipokines, oxytocin, alarmins) as part of the pathophysiology. BurstDR-SCS and DRG-SCS stimulation present a paradigm shift in current neurostimulation to address the treatment of CPSP-associated pain. Such molecular analysis may underpin the emerging role of CPSP-related molecular patterns as potential biomarkers to reliably reproduce spinal stimulation effects.

Immune Regulation in the treatment of Depression

P066 09/2020 - 09/2024

Dr. Claudia von Zimmermann, Department of Psychiatry and Psychotherapy
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Abstract
One third of the depressed patients do not respond adequately to conventional treatment. This seems to be associated with increased production of proinflammatory cytokines such as TNF-a and IL-1, as well as dysregulation of cortisol levels. This project aims to investigate the impact of the new psychotherapeutic method TaKeTiNa on serum lipids, cortisol Levels, and the production of proinflammatory cytokines.

Self-perception in trauma-related disorders

P078 09/2021 - 02/2024

Dr. Eva Schäflein (until 10/2023), PD Dr. Cosima Rhein (from 11/2023), Department of Psychosomatic Medicine a. Psychotherapy
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Abstract
Severe dissociative disorders are characterized by distinct self-perception-related stress accompanied by autonomic blunting. The aim of the current study is to investigate self-reported, psychophysiological and biological stress reactions upon an experimental self-perception paradigm in patients suffering from diverse post-traumatic conditions with different levels of dissociation, to elucidate potential associations between dissociation intensity and the aversiveness of self-perception.

Interplay between TCR and microbiome

P099 04/2022 - 01/2024

Prof. Dr. Christiane Krystelle Nganou Makamdop, Department of Medicine 3 (Harald zur Hausen Institute of Virology until 10/2024)
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Abstract
Changes in the T cell receptor (TCR) repertoire can directly impact on the breath and magnitude of antigen-specific T cell responses. During treated HIV infection, dysfunctional T cell responses associate with inflammation that is at least in part driven by microbial translocation. Therefore, we aim to investigate the relationship between the translocated microbiome, the TCR repertoire and T cell functionality, with emphasis on vaccine-induced antigen-specific responses.

I	Infection and Immunology
N	Neurosciences
O	Oncology
R	Renal and Vascular Research
M	Medical Engineering
S	Others

The role of MAGOH in malignant melanoma

P110 03/2024 - 12/2024

Dr. Lisa Linck-Paulus, Institute of Biochemistry
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Abstract
MAGOH is part of the exon junction complex that binds to mRNA and regulates alternative splicing or mRNA degradation via "nonsense mediated decay". This project investigates the role of MAGOH in malignant melanoma. Preliminary data showed that a loss of MAGOH leads to cell death in melanoma cells, which will be further investigated in different melanoma cell lines, as well as healthy cells. Furthermore, the molecular mechanisms leading to the reduced viability will be analyzed.

3D-Imaging of ovarian follicles in scaffold

P113 02/2023 - 10/2024

Dr. Anna Dietl, Department of Obstetrics and Gynecology
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Abstract
Increasing survival of young cancer patients require fertility-preservation like ovarian-cryopreservation pretherapeutically with retransplantation post-therapy. However, this is not appropriate for all patients due to the risk of relapse. A promising alternative is the artificial ovary: follicles are separated from malignant cells. In the research proposed follicle survival, maturation and growth in 3D-scaffold will be observed by live cell imaging with confocal spinning disc microscopy.

Data set of drug-related paed. hospitalisations

P114 04/2023 - 09/2024

Dr. Irmgard Toni, Department of Paediatrics and Adolescent Medicine
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Abstract
Drug therapy in children and adolescents is often associated with uncertainties. Causes and characteristics of adverse drug reactions and medication errors are poorly understood. The main objective of the project is to establish and descriptively describe a data set with medication data and systematically collected drug-related hospital admissions of children in Germany.

T cell migration in neurodegeneration

P117 01/2023 - 04/2024

PD Dr. Iryna Prots, Op. Dentistry and Periodontology (Stem Cell Biology until 12/2022)
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Abstract
T cells migrate to and impact the central nervous system (CNS) during disease. We show that diseased CNS allows stronger T cell migration by yet unknown mechanisms. Here, T cell-attracting mechanisms of neurodegenerative CNS tissue and T cell-driven neurodegenerative pathomechanisms will be investigated in a human stem cell-based 3D CNS model using RNA sequencing and biochemical methods. Data will provide mechanistic insights how T cell migration is facilitated by CNS during neurodegeneration.

I	Infection and Immunology
N	Neurosciences
O	Oncology
R	Renal and Vascular Research
M	Medical Engineering
S	Others

GPR179, LRRTM4, GABAcR: new players in night vison

P118 02/2023 - 07/2024

Prof. Dr. Ralf Enz, Institute of Biochemistry
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Abstract
We will analyse two new players of the rod pathway in the mammalian retina that are associated with night blindness - GPR179 and LRRTM4. GPR179 and LRRTM4 bind directly to GABAc receptors (GABAcR). Rod bipolar cells express high levels of GABAcR and deletion of LRRTM4 perturbed clustering of GABAcR at their axon terminals. We will analyse these protein complexes in the retina, map binding sites and elucidate functions of the interactions by cell biology, calcium imaging and electrophysiology.

Tryptophan metabolites in intestinal inflammation

P119 08/2023 - 07/2024

Dr. Iris Stolzer, Department of Medicine 1 (until 12/2024)
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Abstract
Extraintestinal manifestations (EIM) are frequent in IBD patients. Our initial data revealed an osteoporosis-& PSC-like phenotype in a murine IBD model. Intestinal inflammation was linked to altered tryptophan metabolism and AHR-signalling, which are assumed to be mediators of EIM. While previous data demonstrate an impact on this pathway, mechanistic knowledge is limited. Within this project we will take advantage of 3D organ cultures to better understand the tryptophan-AHR axis in IBD and EIM.

Enteric glial cell-immune cell crosstalk

P120 07/2023 - 06/2024

PD Dr. Jay Patankar, Department of Medicine 1
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Abstract
The role of the enteric glial cells (EGCs) in regulating mucosal immune homeostasis is largely unknown. We propose that EGC activation is tunable by cytokines and activated EGCs can shape gut immunity. Isolation, ex vivo activation, and submucosal transplantation of EGC will reveal their immunomodulatory capacity. Insights gained will reveal new avenues to curb chronic inflammation in disorders such as IBD.

Resolution of ocular surface inflammation

P121 07/2023 - 06/2024

Dr. Aparna Mahajan, Department of Medicine 3
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Abstract
Eye rheum is a physiological ocular surface discharge contains aggregated neutrophil extracellular traps (aggNETs), indicating that neutrophils are involved in ocular surface homeostasis. In the murine model of allergic eye disease, aggNETs occlude meibomian glands causing meibomian gland dysfunction after ocular surface inflammation. Here we plan to investigate therapeutic potential of eye drops containing DNase-1 or NOX2-inhibitor to alleviate aggNETs driven ocular surface inflammation.

Establishment of a novel breast tumor model

P122 05/2023 - 04/2024

Dr. Theresa Promny, Department of Plastic and Hand Surgery
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Abstract
The aim of the proposed study is to establish a novel and reliable in vivo tumor model by engineering a breast tumor in the arteriovenous rat model. This model could provide the possibility to investigate tumor development, angiogenesis and tumor-stroma interactions in a controlled manner. Selecting appropriate scaffolds for the tumor cells is essential for the success of the model. Therefore, the study includes 3 parts to provide a structured detection of suitable matrices in vitro and in vivo.

Current chairside materials in dental practice

P123 07/2023 - 06/2024

Dr. Lara Berger, Department of Prosthodontics
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Abstract
In this research project, the accuracy of fit of current CAD/CAM crown restorations is to be investigated using a 3D industrial scanner in order to collect scientific data on the success, durability and function of the materials for their clinical application. The fit will be determined material-dependently and also depending on the luting system used. Furthermore, the wear and thus the longevity of the restorations will be tested by means of a chewing simulator and subsequently measured in 3D.

Deep learning QSM in the presence of fat

P125 01/2024 - 12/2024

Dr. Jannis Hanspach, Institute of Radiology
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Abstract
Using advanced deep learning techniques based on synthetic training data, MRI reconstruction methods for quantitative susceptibility mapping (QSM) will be designed and optimized for anatomical regions outside the brain. The neural networks will be generalized for different parameters, such as magnetic field strength, and tested in the prostate, knee, and breast in volunteers and compared against conventional methods.

Mesentery model for peritoneal metastasis

P126 05/2023 - 08/2024

Dr. Kerstin Hübner, Institute of Pathology
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Abstract
Although peritoneal metastasis correlates with poor survival in colorectal cancer (CRC), knowledge on its molecular mechanisms is rather limited. Thus, there is a crucial need for developing novel in vitro models that recapitulate peritoneal seeding and identify putative markers for therapeutic approaches. Our study aims to implement a new ex vivo mesentery model for co-culture with CRC spheroids and organoids to study gene-specific effects on tumor cell adhesion and invasion in the peritoneum.

I	Infection and Immunology
N	Neurosciences
O	Oncology
R	Renal and Vascular Research
M	Medical Engineering
S	Others

Myocarditis in relation to sports in children

P127 09/2023 - 08/2024

Dr. Annika Weigelt, Department of Paediatric Cardiology
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Abstract
The current recommendations concerning physical activity after myocarditis in the young and/or PIMS-TS are based on low evidence and are limited to the adult population. Consequently, physical activity is partly heavily restricted in a generation with an increasing sedentary live-style. We aim to evaluate in a prospective study the relationship between sport and myocarditis/PIMS-TS and the safety of the ensuing recommendations.

FICD-mediated AMPylation in Parkinson's disease

P128 09/2023 - 08/2024

Prof. Dr. Wei Xiang, Department of Molecular Neurology
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Abstract
Protein AMPylation, which can be catalyzed by FICD, has emerged as a modulator of neurogenesis. The role of FICD-mediated AMPylation in neurodegeneration, however, has been less understood. Our preliminary data suggest a promoting function of FICD in the aggregation of alpha synuclein (aSyn), which is linked to the pathogenesis of Parkinson's diseases. This project aims to investigate the pathological relevance of FICD-mediated AMPylation in aSyn aggregation-associated neurodegeneration.

Biofabricated breast cancer in a perfusion reactor

P129 08/2023 - 07/2024

Dr. Rafael Schmid, Department of Plastic and Hand Surgery
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Abstract
Aim is the development of biofabricated 3D breast cancer models, which will act as standardized tumor angiogenesis and therapy models mimicking the in vivo situation by using multiple cell types including endothelial cells as well as the supply via a perfusion bioreactor. Evaluation will be based on metabolic activity, proteomic analysis, microscopy and histology. Assessment as therapeutic model will be done using paclitaxel. Goal is the use in basic research and the improvement of therapies.

Nuclear envelope breakdown during NETosis

P130 07/2023 - 06/2024

Dr. Christine Schauer, Department of Medicine 3
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Abstract
During the course of neutrophil extracellular trap (NET) formation, intracellular calcium plays essential role in activation of enzymes like PAD-4 and calpain which are involved in chromatin decondensation. The preliminary data showed the involvement of calpain in degradation of the nuclear envelope protein nesprin. Here we will delineate the exact role of calpain in degradation of nuclear envelope protein nesprin and unfold the mechanism of nuclear membrane breakdown during NET formation.

Osteoclast metabolism

P132 03/2024 - 02/2025

Dr. Carina Scherbel, Department of Medicine 3
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Abstract
Osteoclasts (OCs) play key roles in the regulation of bone mass and excessive osteoclastogenesis is involved in joint destruction in autoimmune arthritis or osteoporosis. The current knowledge on cellular metabolism and its impact on OC function and bone homeostasis remain unclear. In this project, we aim to characterize metabolic dynamics during osteoclastogenesis and to identify novel regulators of bone turnover.

Cancer cells and CAFs as joint therapeutic target

P133 01/2024 - 09/2024

Dr. Harald Schuhwerk, Chair of Experimental Medicine I
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Abstract
ZEB1 is expressed in chemoresistant tumor cells (TCs) and cancer-associated fibroblasts (CAFs). According to our recent data, it induces replication stress (RS) which can be selectively targeted in TCs for chemo-sensitization. Furthermore, we discovered ZEB1-dependent immunosuppression in CAFs, precluding immune checkpoint therapies. As CAFs also display the ZEB1-driven RS, we now seek to target both unfavorable cell types together in an immunocompetent model to enhance therapeutic efficacy.

Untargeted metabolomics in adrenal tumors

P134 08/2023 - 07/2024

Dr. Nora Bartels, Institute of Experimental and Clinical Pharmacology and Toxicology
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Abstract
The diagnostic workup of frequent adrenocortical adenomas and rare, aggressive adrenocortical carcinomas is challenging and lacks specificity. Determination of deconjugated steroids in urine is an emerging and promising tool in this field, however, the currently best available diagnostic biomarkers provide no benefit to a third of the patients. We plan to screen the urinary metabolome by untargeted metabolomics looking for more suitable diagnostic biomarkers such as intact steroid conjugates.

Examination of craniofacial sutures

P135 01/2024 - 12/2024

Dr. Dr. Ines Willershausen, Department of Orthodontics and Orofacial Orthopedics
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Abstract
In orthodontics, craniofacial sutures play a central role. In the present radiological study, we would like to examine to what extent 7T-MRI images of the midface are comparable to the gold standard (CT/CBCT images). To gain a better understanding of sutural remodelling at the cellular level, cyclic pressure loads will be applied to co-cultures of fibroblasts, chondrocytes and osteoblasts in a controlled in vitro system and their gene expression will be investigated.

I	Infection and Immunology
N	Neurosciences
O	Oncology
R	Renal and Vascular Research
M	Medical Engineering
S	Others

Exploring growth retardation under TKI therapy

P136 01/2025 - 12/2025

Dr. Stephanie Sembill, Department of Paediatrics and Adolescent Medicine
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Abstract
As a result of non-specific inhibition, tyrosine kinase inhibitors (TKIs) also affect bone and cartilage development. Children and adolescents therefore suffer from significant growth retardation during therapy. Alternative therapy concepts are therefore urgently needed. In the proposed project, the influences of different TKIs on bone metabolism and cartilage differentiation will be investigated.

Spatial interactions of T-cell clones in RA

P137 04/2024 - 01/2025

Dr. Jule Taubmann, Department of Medicine 3
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Abstract
RA is a chronic inflammatory autoimmune disease that results in hyperplasia of synovial membrane of joints. However, little is known about the molecular profile and heterogeneity of infiltrating immune cells as well as about the molecular features of their cell-cell interactions. The aim of this project is to generate combined datasets on the molecular features and spatial distribution of resident and infiltrating immune cells via spatial transcriptomics of synovial tissue biopsies.

Lineage tracing of metastases

P138 11/2023 - 11/2024

Dr. Arwin Groenewoud, Institute of Pathology
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Abstract
Despite the clinical importance of bone metastasis, the mechanisms of its formation remain poorly understood. The interaction between cancer and immune cells plays an important role. We propose to use transparent zebrafish larvae to model immune cell interaction during metastatic colonization. Combining immune cell ablation models with a methylation-based transcriptional tracing system, we will measure the effect of individual immune cell populations on the process of metastatic colonization.

Influence of 3-indolepropionic acid on arthritis

P139 06/2024 - 05/2025

Dr. Isabell Wank, Chair of Pharmacology and Toxicology
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Abstract
Our preliminary study demonstrated protective effects of 3-indolepropionic acid (IPA) on the severity of CIA arthritis in mice. Our project will now I) provide insight into general IPA effects on overall brain function at rest and II) use (thermal) fMRI to evaluate central nociception as a functional readout parameter for RA severity. III) We will assess whether long-term IPA treatment up to day 35 may have additional benefits on disease progression.

iPSC-derived neural crest cells & palate formation

P140 10/2023 - 06/2024

Dr. Matthias Weider, Department of Orthodontics and Orofacial Orthopedics
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Abstract
Orofacial clefts are the second-most congenital malformation. Palate development depends on cranial neural crest cells (CNCCs). CNCCs undergo diverse differentiation programs accompanied by vast changes in gene expression, to which the chromatin remodeling complexes BAF and EP400/TIP60 contribute. We will analyze the function of both complexes in iPSC-derived CNCCs in proliferation and in differentiation to tissues relevant for palatogenesis by CRISPR/Cas9-guided knockout of each central ATPase.

Basophils in skin-derived sensitization

P141 10/2023 - 06/2024

Dr. Daniel Radtke, Department of Infection Biology
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Abstract
A disturbed skin barrier allows for sensitization to skin-encountered allergen. Upon lung challenge with the same allergen stronger lung inflammation occurs. Preliminary data shows that basophils drive skin-mediated, allergen-specific antibody formation and we want to analyze their impact on barrier integrity and aspects of the antibody repertoire. We further plan lung-challenge of sensitized basophil deficient mice to determine functional relevance potentially critical for asthma development.

IL36 in intestinal inflammation and fibrosis

P142 11/2023 - 11/2024

Dr. Kristina Koop, Department of Medicine 1
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Abstract
Intestinal fibrosis is a common complication in IBD with an unmet need of therapy options. Recent studies turned fibroblasts into the spotlight of IBD research as they are associated with fibrosis, control of inflammation and personalized therapy. Published own work showed a major role of IL36R signaling during the perpetuation of intestinal inflammation/fibrosis. This project aims to understand the role of stromal IL36R signaling for the resolution of intestinal inflammation/fibrosis.

The role of miRNAs in Lichen sclerosus

P143 03/2024 - 02/2025

PD Dr. Marios Marcou, Department of Urology (until 12/2024)
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Abstract
Lichen sclerosus (LS) is a chronic, inflammatory, scarring disease of the skin, manifesting mostly in the genital region, that can occur at any age and in both sexes. The etiology and pathophysiology of LS remain unknown. The aim of our study is to investigate the expression of miRNAs in the tissue of patients with histologically confirmed LS in all ages and in both sexes. Histological samples from patients without evidence of LS will serve as a control group.

I	Infection and Immunology
N	Neurosciences
O	Oncology
R	Renal and Vascular Research
M	Medical Engineering
S	Others

Histamin induces resolution of arthritis

P144 02/2024 - 07/2024

Dr. Kerstin Dürholz, Department of Medicine 3 (until 07/2024)
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Abstract
Propionate is produced by the gut microbiota and has anti-inflammatory properties. Our preliminary data shows that bacterial histamine production is increased upon propionate treatment. Histamine is able to induce rapid resolution of peripheral inflammation in arthritic mice via the activation of H3 receptor, which is mainly expressed on cells of the central nervous system (CNS). In this project we aim to unravel the role of the CNS in mediating histamine-induced resolution of inflammation.

Th17/Treg immune response in periodontitis

P145 07/2024 - 12/2025

Dr. Leah Trumet, Department of Operative Dentistry and Periodontology
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Abstract
Periodontitis (PA) is a highly prevalent disease that has bidirectional associations with Diabetes and Alzheimer's disease. PA is leading to irreversible destruction of tooth-surrounding tissues and tooth loss. The pathogenesis of PA is poorly understood. Aim is the analysis of possible Th17/Treg disbalance in PA, association with pro- and anti-inflammatory cytokines, and whether these alterations are local or systemic. The goal is to identify biomarkers and potential targets for immunotherapy.

Melanoma organoids as platform for testing

P146 07/2024 - 06/2025

Dr. Annkathrin Hornung-Eichler, Department of Dermatology
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Abstract
Despite good overall response rates, there are also high rates of resistance under immunotherapy and targeted therapy in the treatment of melanoma. Thus, new therapeutic options are necessary and we need laboratory test systems to allow a better prediction of therapy response. 3D organoids can be a promising tool in this regard. The aim of this project is to cultivate melanoma-derived organoids as a test platform for the prediction of response to tumour therapies.

Intestinal barrier models in HTLV-1 transmission

P147 11/2024 - 10/2025

Dr. Alexandra Birzer, Institute of Clinical and Molecular Virology
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Abstract
The focus of the present project is the effect of the human T cell leukemia virus (HTLV-1) on dendritic cells (DCs) in two models. The project focuses on the transmission of HTLV-1 to DCs across an intestinal barrier, analyzing the phenotype of DCs and the mechanism of transmission. For this purpose, two models, a 2D transwell and a 3D organs-on-a-chip model will be established. Finally, both models will be compared regarding their advantages, disadvantages and differences in the DC phenotype.

Wnt/beta-catenin signaling in kidney disease

P148 03/2024 - 12/2024

Dr. Tilman Jobst-Schwan, Department of Medicine 4
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Abstract
We identified a new configuration of the canonical Wnt/ b-catenin signaling mechanism at the luminal membrane of the kidney tubule. Thus, tubular cell culture and zebrafish models are used to further investigate how Wnt ligands activate b-catenin in the tubule, and in particular how this affects the intercalated cells of the collecting duct, a cell type important for acid-base regulation. The findings resulting from these efforts could help to identify tubular targets in the therapy of nephrotic syndrome.

Nanoparticles for precision medicine

P149 01/2025 - 12/2025

Prof. Dr. Janina Müller-Deile, Department of Medicine 4
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Abstract
Lipid nanocapsules, functionalized with RGD sequence to target αVβ3 integrin receptor on podocytes and loaded with therapeutic substances will be investigated as a podocyte specific therapeutic strategy. Uptake and therapeutic potential of loaded nanoparticles to rescue proteinuric phenotypes will be investigated in different zebrafish glomerular disease models. These experiments enable *in vivo* analysis of nanocarriers as potential cell type specific drug delivery systems.

Disseminated cancer cells in NSCLC patients

P150 08/2024 - 08/2025

Dr. Felix Elsner, Institute of Pathology
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Abstract
Protocols for detection of disseminated cancer cells (DCCs) in the lymph node (LN) need to be harmonized. Therefore, immunocytology vs. conventional ultrastaging will be compared and additional methods for isolation of DCCs for subsequent molecular analysis will be tested. Correlation of morphology with DCC-density and ploidy will be examined. The prognostic impact of the morphology of LN metastases will be investigated in archival cases. Further, DCCs in the neoadjuvant setting will be studied.

NPNT-Integrin interaction in podocytes

P151 10/2024 - 09/2025

Dr. Nina Sopel, Department of Medicine 4
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Abstract
In this project we want to analyze by which mechanisms the extracellular matrix (ECM) protein nephronectin (NPNT) is secreted. Inhibition of e. g. exocytosis and lysosomal trafficking will shed light on NPNT export and deposition in the ECM. In addition, we want to identify interaction partners of NPNT on podocytes within the superfamily of integrins and analyze the quality of these interactions both in vitro and in vivo.

I	Infection and Immunology
N	Neurosciences
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M	Medical Engineering
S	Others

STAT2 in colorectal cancer

P152 05/2024 - 08/2024

PD Dr. Mircea-Teodor Chiriac, Department of Medicine 1
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Abstract
Colorectal cancer is the second leading cause of cancer-related deaths in developed countries. Our preliminary results underscore the significant role of the type I IFN-STAT2 pathway in driving necroptotic epithelial cell death, colonic inflammation, colorectal cancer progression, and resistance to anti-cancer drugs. We aim to elucidate the detailed mechanisms behind these findings. This understanding is crucial for developing innovative strategies for managing colorectal cancer in patients.

Compartment-Specific Transcriptome Analysis in ALS

P153 04/2024 - 03/2025

Dr. Florian Krach, Department of Stem Cell Biology
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Abstract
The etiology of ALS, a fatal neurodegenerative disease, remains unclear. Our research focuses on the 'dying-back' mechanism, where neuron degeneration starts from synapses/axons. We aim to study if faulty mRNA splicing causes RNA mislocalization in axons and synapses, potentially exacerbating this mechanism by making use of iPSC-derived motor neurons from ALS apteints andd APEX2 RNA-proximity labeling in neuronal compartments

Establishing an in vitro NPWT model

P154 01/2025 - 12/2025

Dr. Maximilian Stumpfe, Department of Plastic and Hand Surgery
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Abstract
The aim of the planned project is to investigate the effect of NPWT on the cell lines involved in wound healing and on the cells generally found in the skin. Keratinocytes, melanocytes, fibroblasts, endothelial cells and ADSCs will be cultivated in combination with NPWT under dynamic conditions (continuous medium flow via a peristaltic pump). Under optimal cultivation conditions, the effects of a prolonged application of negative-pressure wound therapy will be investigated.

Dysbiosis triggers arthritis

P155 07/2024 - 06/2025

Dr. Yuichi Maeda, Department of Medicine 3
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Abstract
In previous our research, higher Prevotella levels were found in rheumatoid arthritis patients´ gut. We aim to define mechanisms increasing arthritis incidence by Prevotella intestinalis in murine model. We hypothesize that outer membrane vesicles of P. intestinalis disrupt the epithelial barrier, leading to a reduction of IL-18 levels. This disruption allows dendritic cells, primed by the P. intestinalis, to play a pivotal role in triggering Th17 cell-mediated arthritis in mice.

App based sport intervention for Fontan patients

P156 09/2024 - 08/2025

Dr. Isabelle Schöffl, Department of Paediatric Cardiology
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Abstract
Physical activity in Fontan patients has a positive effect on cardiopulmonary capacity. Peak oxygen uptake represents the most robust predictor for morbidity and mortality in these children. It can be improved through exercise. High-intensity interval training (HIIT) represents the most efficient method, but the implementation is difficult. An App-based training represents an alternative with the possibility of providing positive feedback through a Fitness tracker.

TCR cell therapies in a 3D breast cancer model

P157 11/2024 - 10/2025

Dr. Hannah Reimann, Department of Medicine 5
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Abstract
In breast cancer, the success of neoadjuvant chemotherapy depends on tumor-infiltrating lymphocytes and their specificity, especially against neoantigens - promising targets for immunotherapies. 3D-cell cultures offer a more realistic representation of tumor-immune cell interactions than conventional ones. The project seeks to compare 4 T-cell receptor-based immunotherapies against neoantigens in 2D- and 3D-models, aiming to identify the most promising approach for potential future treatments.

CSF1R-interactome analysis in HDLS disease

P158 12 months

Dr. Christina James, Department of Stem Cell Biology
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Abstract
Hereditary diffuse leukoencephalopathy with axonal spheroids (HDLS) is a fatal adult-onset neurological disease caused by pathological variants in CSF1R (colony-stimulating factor-1 receptor). As microglia are primarily affected in HDLS, we developed an iPSC-derived microglia model to study CSF1R function in healthy and HDLS patient lines. Using this model, we propose to investigate novel CSF1R interactions using APEX2-based proximity labeling focusing on transcriptional regulation.

Indirect Pulp Capping: A 3D-Model Exploration

P159 06/2025 - 05/2026

Dr. Ella Ohlsson, Department of Operative Dentistry and Periodontology
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Abstract
Indirect capping of the dental pulp is recommended in deep cavities, but there is little clinical evidence for the success of the procedure. In an innovative simulation model of the pulp-dentin-complex, the effect of different biocompatible capping materials on human pulp cells through a dentin barrier will be tested. By analyzing cell survival, gene expression, oxidative stress and cytokine production, their bioactive effects will be compared in a way that is not possible in vivo.

I	Infection and Immunology
N	Neurosciences
O	Oncology
R	Renal and Vascular Research
M	Medical Engineering
S	Others

AI-based registration for 7T cMRI

P160 12 months

Dr. Angelika Mennecke, Institute of Neuroradiology
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Abstract
Our overarching goal is to enable robust metabolic & multi-parametric brain MRI at 7T in a clinical context. Therefore, a fast and precise motion correction is important, which we aim to realize in this ELAN-project by a deep learning-based registration. From the specific 7T contrasts of interest such as CEST and QSM, at first a virtual reference MPRage will be synthesized, which is registered in the following.

Central CRC organoid platform

P161 10/2024 - 07/2025

Prof. Dr. Elisabeth Naschberger, Department of Surgery
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Abstract
We have established a central platform that will provide, characterise and utilise tumor and normal organoids together with corresponding stromal cells from colorectal cancer patients for scientists, initially as part of a currently proposed DFG-TRR, but also for interested scientists in academia in general. The funding was requested to enable continuous recruitment of patients via the platform, as this unit is a key element in a central project of the proposed DFG-TRR.

Stress-induced epigenetic changes in the brain

P162 01/2025 - 12/2025

Prof. Dr. Tomohisa Toda, Institute of Medical Physics
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Abstract
Chronic stress has long-lasting effects on the hippocampal function, but it still remains unclear how. We investigate stress-induced epigenetic changes as a biological link between chronic stress and brain dysfunction. Our preliminary data has identified lamin B1 as a target of chronic stress. Lamin B1 is an epigenetic factor that maintains heterochromatin. We will investigate how chronic stress downregulates lamin B1, and how stress-induced reduction of lamin B1 affects epigenetic regulation.

Digital mobility outcomes in Parkinson's disease

P163 01/2025 - 12/2025

PD Dr. Heiko Gaßner, Department of Molecular Neurology
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Abstract
Gait impairment as a common and real-life-relevant symptom in Parkinson's disease may be objectively and quantitatively detected by digital technologies in and outside the hospital. In this project, we aim to comprehensively analyse digital mobility data gained in a large multicenter study with regard to detecting objective mobility outcomes for describing the disease course (disease progression or therapy response) in a cohort of PD patients (n=130). All datasets are available.

Annexins as ligands of Dectin1 on osteoclasts

P164 12 month

Dr. Bettina Grötsch, Department of Medicine 3
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Abstract
Our preliminary results suggest that AnnexinA1, which is expressed by dying cells within the bone marrow niche, will bind to Dectin-1 on osteoclasts to induce osteoclast differentiation and bone resorption in non-inflammatory conditions. Therefore, I will analyse the molecular mechanism of AnnexinA1 induced Dectin-1 signaling. Furthermore, I aim to define the AnnexinA1 expressing myeloid cell population within the bone marrow niche and its impact on osteoclast differentiation.

Co-delivery of antigens and immunomodulators

P165 01/2025 - 12/2025

PD Dr. Vladimir Temchura, Harald zur Hausen Institute of Virology
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Abstract
This project aims to develop lipid nanoparticle (LNP) vaccines for targeted delivery of HIV-1 antigens and checkpoint inhibitors (CPI) mRNA. By displaying HIV-1 antigens on the LNP surface, we seek to efficiently target and activate Env-specific B cells. Concurrent delivery of CPI mRNA into the cells is anticipated to induce local checkpoint inhibitor production, modulating immune response without systemic CPI exposure.

Role of CTBP1 in Hippocampal Energetics

P166 11/2024 - 11/2025

Dr. Enes Yagiz Akdas, Department of Psychiatry and Psychotherapy
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Abstract
Mutations in CTBP1 cause rare neurodevelopmental syndrome HADDTS. I have shown that CTBP1 controls hippocampal energy metabolism and protects synaptic transmission from metabolic stress Notably, deletion in glia and/or neurons had distinct effects. Here, we will investigate the role of CTBP1 in neuron-glia metabolic coupling necessary for energetic and functional homeostasis in brain. The results will provide new rational basis for treatment of HADDTS.

Characterization of immune cells and NLRP3 in MSA

P167 02/2025 - 01/2026

Dr. Alexander Grotemeyer, Department of Neurology
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Abstract
The aim of this project is to better understand the influence of T cells and the NLRP3 inflammasome in the context of multiple system atrophy (MSA). Therefore, an already established transgenic mouse model and human brain tissue from MSA patients will be used. The aim is to lay the groundwork for further projects using T cells and NLRP3 as potential pharmacological targets for MSA treatment.

I	Infection and Immunology
N	Neurosciences
O	Oncology
R	Renal and Vascular Research
M	Medical Engineering
S	Others

Immundysregulation and the effect of BC 007 in PCS

P170 02/2025 - 08/2025

Dr. Katja Schmidt, Department of Ophtalmology
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Abstract
In a subgroup of patients with Post-COVID Syndrom (PCS), functional autoantibodies against G protein-coupled receptors (GPCR-fAAbs) occur. We would like to characterise changes in the immune cell compartment of these patients, as we have seen changes of certain immune cells in preliminary experiments. Furthermore, we seek to analyse the effect of the substance BC 007, which can neutralize GPCR-fAAbs, in ex-vivo and in-vitro experiments.

Identification of tumor peptides for immunotherapy

P171 12 month

Dr. Sushmita Paul, Department of Dermatology
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Abstract
Melanoma is a significant health issue. While checkpoint inhibitors (CPIs) have improved survival, therapy-resistant melanoma remains a challenge, approx. 40% of patients not responding to CPI treatments. Enhancing coadjuvant therapies combined with CPIs is needed. Clinical studies suggest that tumor peptide vaccines can reduce CPI resistance. This project aims to develop semi-personalized TAA-based immunotherapy using tumor sequencing, machine learning, and lab experiments to improve outcomes.

Fusion Activity of HCMV Glycoprotein B Variants

P172 03/2025 - 02/2026

Dr. Marco Thomas, Harald zur Hausen Institute of Virology
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Abstract
HCMV glycoprotein B variants are being studied with respect to viral fusion and syncytium formation. The specific objectives are: (1) identification of polymorphisms that enhance or inhibit fusion; (2) characterization of the fusion phenotype of these viruses in different cell lines; and (3) development of a murine CMV with hyperfusogenic gB. This study aims to understand the regulation of gB fusion activity and to identify potential diagnostic markers for HCMV pathogenicity.

Biomarker for immunosuppression in sepsis in KT

P173 12 months

Dr. Johanna T. Kurzhagen, Department of Medicine 4
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Abstract
Kidney transplanted patients are at a high risk for infections including sepsis. In the event of sepsis, a balance must be found between potentially life-saving immune defense and transplant protective immunosuppression. For the targeted treatment of sepsis in transplant patients, we intend to identify immunological and in particular lymphocytic markers that might allow a more patient oriented, individualized therapeutic management in the future.

Funded Synergy projects in 2024:

No.	Name	Institution	Project title
S1	**Prof. Dr. D. Chichung Lie,** Prof. Dr. Katharina Breininger, Prof. Dr. Marisa Karow, Dr. Andreas Sagner, Prof. Dr. Peter Soba, Prof. Dr. Julio Vera-González and Prof. Dr. Andreas Möglich (Institute of Biochemistry, University of Bayreuth, external cooperation)	Institute of Biochemistry	TRAIN: Towards Rationalizing Neurodevelopment
S2	**Prof. Dr. Sebastian Zundler,** Prof. Katharina Breininger, Prof. Stefan Uderhardt, Prof. Caroline Voskens and Prof. Jochen Guck (MPI Science of Light, external cooperation)	Department of Medicine 1	TAME THE FLAME
S3	**Prof. Dr. Veit Rothhammer,** Prof. Dr. Friederike Zunke, PD Dr. Ruth Beckervordersandforth, Prof. Dr. Dieter Henrik Heiland, Prof. Dr. Stephan Rosshart and Prof. Dr. Beate Winner	Department of Neurology	AstroFINDER
S4	**Prof. Dr. Claudia Günther,** PD Dr. Philipp Arnold, Dr. Jan Van Deun, Prof. Dr. Jochen Mattner, Prof. Dr. Gregor Fuhrmann and Prof. Dr. Vahid Sandoghdar	Department of Medicine 1	DISCOVER

TRAIN: Towards Rationalizing Neurodevelopment

S1 01/2024 - 12/2025

Prof. Dr. D. Chichung Lie, Institute of Biochemistry
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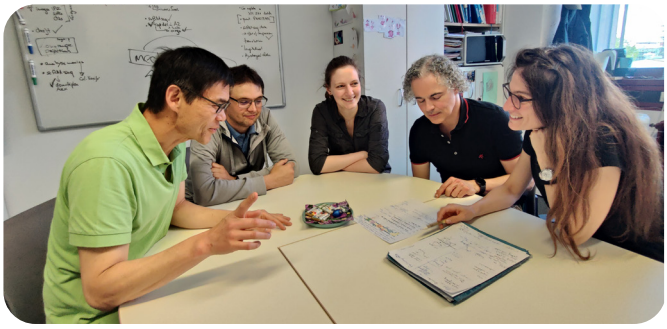
Prof. Dr. Katharina Breininger, University of Würzburg (Department of Computer Science until 06/2024)
Prof. Dr. Marisa Karow, Institute of Biochemistry
Dr. Andreas Sagner, Institute of Biochemistry
Prof. Dr. Peter Soba, Institute of Physiology and Pathophysiology
Prof. Dr. Julio Vera-González, Department of Dermatology
Prof. Dr. Andreas Möglich, University of Bayreuth, Institute of Biochemistry

Abstract

During central nervous system development cells undergo a series of decisions to ultimately form highly specialized networks - the structural basis for behavior and cognition. This developmental decision-making process is poorly understood, yet of high clinical relevance as its disruption can result in neurodevelopmental disorders and loss of resilience to disease in later life. The Synergy Project "TRAIN: Towards Rationalizing Neurodevelopment" pursues a novel concept that key decisions in neurodevelopment are controlled by biological ratios. In TRAIN, experts in neurodevelopment, artificial intelligence, bioinformatics, and optogenetic engineering join forces to generate tools for prediction, genetic manipulation, and high-content analyses of ratios driving neurodevelopmental decisions.



Hence, TRAIN will create a truly interdisciplinary research environment allowing to drill deep into the mechanisms of central nervous system development.

TAME THE FLAME

S2 01/2024 - 12/2025

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Prof. Dr. Caroline J. Voskens, Department of Dermatology
Prof. Dr. Katharina Breininger, University of Würzburg (Department of Computer Science until 06/2024)
Prof. Dr. Stefan Uderhardt, Department of Medicine 3
Prof. Dr. Jochen Guck, Max Planck Institute for the Science of Light

Abstract

Cell trafficking is crucially involved in the pathogenesis of immune-mediated inflammatory diseases such as rheumatoid arthritis or inflammatory bowel disease. While the contribution of cell surface receptors to such trafficking has been explored in detail and has already lead to therapeutic applications, cell-intrinsic properties affecting the cellular migratory behavior have largely been overlooked. Here, we hypothesize that cell mechanical properties and cell trafficking are inextricably linked. Thus, in an interdisciplinary and synergistic effort, this project addresses the role of cellular mechanobiology for homing to the inflamed gut and synovia as well as the mechanical features of therapeutic regulatory T cells and pharmacological opportunities to manipulate cell mechanics. In the long-term perspective, we hope that our insights might provide novel and specific targets for mitigating chronic inflammation.

AstroFINDER

S3 04/2025 - 03/2027

Prof. Dr. Veit Rothhammer, Department of Neurology
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Prof. Dr. Friederike Zunke, Department of Molecular Neurology
PD Dr. Ruth Beckervordersandforth, Institute of Biochemistry
Prof. Dr. Dieter Henrik Heiland, Department of Neurosurgery
Prof. Dr. Stephan Rosshart, Department of Microbiome Research
Prof. Dr. Beate Winner, Department of Stem Cell Biology not started yet

Abstract

AstroFINDER: Astrocyte Function in Inflammation, Degeneration, Epilepsy, Neoplastic DisoRders

Neurological diseases like Alzheimer's, Parkinson's, Multiple Sclerosis, Epilepsy as well as malignant glioma affect millions of people, but disease-modifying therapies remain limited. This research initiative joins forces of its principal investigators Profs. Veit Rothhammer, Friederike Zunke, Beate Winner, Ruth Beckervordersandforth, Henrik Heiland, and Stephan Rosshart to investigate the role of astrocytes—key glial cells involved in the function of the central nervous system—in inflammatory, neurodegenerative and neoplastic disorders.
By combining expertise in disease pathology, stem cell technology, biochemistry, microbiome research, and bioinformatics, the consortium seeks to uncover common and disease-specific mechanisms of astrocyte function in health and disease.

Our goal is to understand the role of astrocytes in disease pathology, identify new therapeutic targets and develop innovative treatment strategies, forming the basis for a DFG-supported Clinical Research Unit at FAU Erlangen-Nuremberg dedicated to astrocyte-focused neurological research.

DISCOVER

S4 04/2025 - 03/2027

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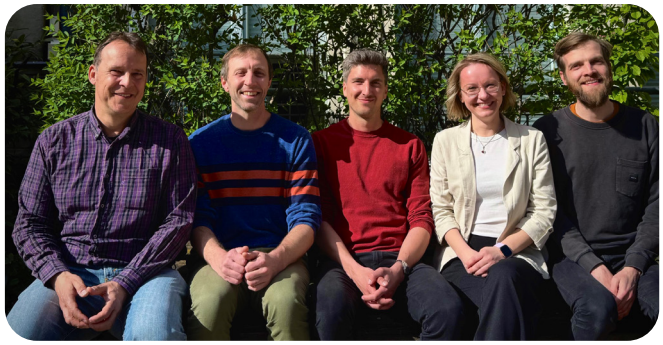
Dr. Jan Van Deun, Department of Dermatology
Prof. Dr. Jochen Mattner, Institute of Microbiology
Prof. Dr. Gregor Fuhrmann, Department Biology - Chair of Pharmaceutical Biology
Prof. Dr. Vahid Sandoghdar, Max Planck Institute for the Science of Light

Abstract

Systemic inflammation is a hallmark of a broad spectrum of diseases, encompassing both acute and chronic conditions. Despite their diverse etiologies, these diseases share a common feature: a dysregulated immune response that frequently extends beyond the initially affected organ. This evolving insight into the systemic nature of inflammation has led to a growing interest in extracellular vesicles (EVs), which are emerging as key players in mediating inter-organ communication and immune modulation. As their contents are a spatiotemporal fingerprint of the originating cell EVs have become prime biomarker candidates for various diseases. Beyond their diagnostic potential, EVs hold innovative therapeutic potential, as they actively participate in the regulation of tissue and immune homeostasis. However, translational research on EVs remains underdeveloped. gram will train medical- and clinician-scientists to develop EV-based innovations, advancing precision medicine and improving patient care.

To address this, we propose the Graduate Research Training Group „DISCOVER," focusing on EV mechanisms, diagnostics, and therapies in IMIDs. By integrating EV biology with translational research and industrial collaboration, the program will train medical- and clinician-scientists to develop EV-based innovations, advancing precision medicine and improving patient care.



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