Find *your way* in Life Sciences

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Meet Your future research groups

How to do Life Sciences at U(K)R

ScieGuide

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btS
Die Life Sciences Studierendeninitiative

Find *your way* in Life Sciences

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Research Groups at UR

Research group leader: Prof. Dr. Christoph Engel

Research Topic
Structural Biochemistry

Short description of the project(s)
- structural characterization of macromolecular complexes
- in vitro structure-function analysis
- molecular mechanisms of transcription from yeast to human

Methods
- Single Particle cryo-Electron Microscopy
- X-Ray crystallography
- Functional protein biochemistry
- cell culture techniques (mammalian cultures and CRISPR/Cas9 genome editing)
- biophysical and liquid chromatographic methods
- 3D molecular modelling

Opportunities to participate in the research group

x Internships (with a minimum duration of six weeks) **x** Bachelor thesis

x Master thesis **x** SHK **x** WHK **x** PhD positions

Others: _____

Contact person
Name: Prof. Dr. Christoph Engel
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Research group leader: Prof. Dr. Dina Grohmann

Research Topic
Mechanisms of (i) transcription, (ii) posttranscriptional regulation (e.g. Argonaute proteins, RNA chaperones), (iii) RNA modifications and (iv) CRISPR-Cas; archaeal biology

Short description of the project(s)
to be discussed individually
Further project related information on our website: https://www.uni-regensburg.de/biologie-vorklinische-medizin/mikrobiologie/research/index.html

Methods
- single-molecule Nanopore DNA and RNA sequencing
- single-molecule FRET
- classical biochemical and molecular biology methods
- genetic manipulation of Archaea
- cultivation and microbiological characterization of new archaeal isolates

Opportunities to participate in the research group

x Internships (with a minimum duration of _____) **x** Bachelor thesis

x Master thesis SHK WHK **x** PhD positions

Others: _____

Contact person
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Research group leader: Prof. Dr. Gernot Längst

Research Topic
Epigenetics and Chromatin dynamics in disease processes

Short description of the project(s)
Our group uses different model systems to address the role of DNA/RNA packaging in gene regulation. We study the enzymes and molecular mechanisms that establish specific DNA/RNA packaging patterns and their changes during pathogenic processes. Furthermore, we study non-coding RNA targeting the eukaryotic via the formation of RNA-DNA triple-helices and their role in organizing the nuclear architecture.

We study the dynamic changes of Adenovirus chromatin structure during infection and its effects on the human host genome. We analyze the chromatin structure of Plasmodium falciparum, study essential chromatin remodelling enzymes in the parasite life cycle, develop specific drugs to treat malaria. Like DNA, the SARS-CoV2 virus RNA genome is packaged by proteins, forming a particular architecture important for viral activity. We study the functional role of the SARS-CoV2 N protein in RNA packaging, organizing genome structure and as a potential therapeutic target. Furthermore, we use yeast models to study the role of histone N-termini in shaping chromatin structure and human cancer models to address the role of chromatin remodelling enzymes in tumour progression.

Methods
- Biochemistry: Protein Expression, Purification and Activity Analysis.
- Biophysics: Binding Affinities, Protein Structure and Stability
- Cell Biology: Imaging and Analysing Nucleoprotein Structure
- High Throughput Sequencing and Bioinformatics
- High Throughput Screenings for Protein-Drug Interactions

Opportunities to participate in the research group

x Internships (with a minimum duration of six weeks) **x** Bachelor thesis

x Master thesis **x** SHK **x** WHK **x** PhD positions

Others: _____

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Research group leader: Prof. Dr. Gunter Meister

Research Topic
RNA biology, RNA biochemistry, gene silencing, non-coding RNA and regulation of gene expression in human

Short description of the project(s)
Currently, our main focus is on:
- mechanisms of human microRNA function and RNAi
- regulation of gene expression by RNA-binding proteins
- regulation of gene regulation by RNA modifications (m6A)
- non-coding RNAs and RNA-binding proteins in early metastasis

Methods
- biochemical methods (protein expression and characterization, western blot, IPs, etc.)
- molecular biology (RNA-seq, CRISPR knock out and knock in, etc.)
- in vivo (tissue culture) and in vitro work

Opportunities to participate in the research group

x Internships (with a minimum duration of six weeks) **x** Bachelor thesis

x Master thesis SHK WHK **x** PhD positions

Others: _____

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Research Groups at UKR

Research group leader: Prof. Dr. Diego F. Calvisi

Research Topic
Investigation of pharmacotherapeutic approaches in liver cancer

Short description of the project(s)
Primary liver cancer, including Hepatocellular carcinoma (HCC) and Cholangiocarcinoma (CCA), is a rare but aggressive disease with poor patient outcome and increasing incidence. Currently, therapeutic options for advanced stage cancers are limited.

The aim of our research group is the investigation and discovery of novel treatment options for liver cancers targeting oncogenic signaling pathways involved in tumor initiation and progression utilizing in vitro and in vivo approaches (see methods below).

Methods
Cell culture, human tumor tissue, immunohistochemistry, histology, RNA extraction, protein extraction, Western Blot, Real-time PCR, Real-time cell metabolic analysis (Seahorse), chicken chorioallantois-membrane (CAM) assay, liver organoids, flow cytometry (FACS), functional assays (cell viability, proliferation, apoptosis, migration, invasion,...), liver cancer mouse models

Opportunities to participate in the research group

x Internships (with a minimum duration of three weeks) **x** Bachelor thesis

x Master thesis **x** SHK WHK **x** PhD positions

x Others: Erasmus program

Contact person
Name: Prof. Dr. Diego F. Calvisi
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Research group leader: Prof. Dr. Matthias Edinger

Research Topic
Immunoregulation in allogeneic stem cell transplantation

Short description of the project(s)
Allogeneic bone marrow transplantation (BMT) is a curative treatment option for many patients with hematopoietic malignancies and for selected patients with non-malignant bone marrow failures. The success of this treatment modality relies on the replacement of diseased hematopoietic stem cells with stem cells from healthy donors, but equally important also on immunological mechanisms provided by co-transplanted donor T cells. They facilitate engraftment of stem cells, support immune reconstitution and initiate an immune response against the leukemia/lymphoma (graft-versus-leukemia effect, GvL) Thus, BMT is a cellular and mainly immunologic treatment modality to cure otherwise lethal diseases. The risk of this treatment consists of overshooting immune responses where donor T cells also attack patient´s solid organs, such as skin, liver and gut. Such side effects can cause life-threatening complications (graft-versus-host disease, GvHD). The main goal of our research group is the elucidation of immune mechanisms in BMT to separate beneficial from harmful immunologic mechanisms in BMT. We hereby focus on physiological mechanisms, mainly the role of CD4+CD25+FOXP3+ regulatory T cells.

Methods
- cell biology methods to evaluate T cell phenotype and function in vitro (multiparametric FACS, proliferation, suppression & cytokine secretion assays, bulk and sc-sequencing)
- BMT models for the in vivo evaluation of novel cell therapy concepts in BMT
- multiparametric analysis of T cell frequency, phenotype, function and genetic regulation using material from healthy donors and transplant patients
- GMP (good manufacturing practice)-compliant production of cell therapy products for the treatment of patients within clinical trials

Opportunities to participate in the research group

Internships (with a minimum duration of _____) Bachelor thesis

x Master thesis SHK WHK **x** PhD positions

x Others: MD thesis, SHK, WHK and bachelor thesis ocasionally

Contact person
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Research group leader: Dr. Miodrag Gužvić

Research Topic
Urological oncology; Prostate and bladder cancer; Cancer progression and metastasis

Short description of the project(s)
We are trying to understand the biology of cancer at the timepoint of diagnosis, in particular the aspects related to cancer progression. In addition, we are also interested in understanding the biology of progression, and to identify new possible therapies/treatments.
Related to this, we are developing patient derived in vitro models, that help us to understand the disease on personalized level, and to study and manipulate cancer cells and their environment.
Finally, we are studying how cancer alters patients's organism (especially in the context of ageing, since most of the patients are old), and how these alterations influence disease outcome.

Methods
- Immunohistochemistry
- Cell culture
- Organoids
- PCR
- NGS
- ELISA

Opportunities to participate in the research group

x Internships (with a minimum duration of two months) **x** Bachelor thesis

x Master thesis SHK WHK PhD positions

x Others: _____

Please contact and inquire what is possible/available, it changes over time

Contact person
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Research group leader: Prof. Dr. Tobias Pukrop

Research Topic
Mechanisms of metastatic organ colonization

Short description of the project(s)
Our group investigates mechanisms of metastatic organ colonization, with a special focus on brain metastases. In organ metastasis, the encounter between cancer cells originating from other organs and the microenvironment of target organs seems to be the crucial step. This competitive situation often results in apoptosis of the pre-metastatic cells and thus prevents successful organ colonization/organ metastasis. However, surviving cells have fatal consequences for the patient. Therefore, the underlying goal of our research is the development of effective therapies that can stop or prevent organ metastasis by cancer cells. Recently, we have demonstrated that organ metastases differ in their infiltration patterns at the macro-metastasis-organ-parenchymal interface (MMPI) – probably due to different molecular mechanisms. Studying these mechanisms will hopefully lead to the development of innovative therapeutic concepts, which are translated into early clinical trials with the goal of improving patient survival.

Methods
- Cell culture (tumor cell lines, primary cell culture and Spheroid 3D cultures)
- Molecular biology (PCR, q-RT-PCR, Western Blot, FACS, Immunohistochemistry, Immunofluorescence)
- Organotypic 3D ex-vivo brain co-cultures
- In vivo colonization models (stereotactic intracortical injection)

Opportunities to participate in the research group

x Internships (with a minimum duration of 12 weeks) **x** Bachelor thesis

x Master thesis SHK WHK PhD positions

Others: _____

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Research group leader: Prof. Dr. Kathrin Renner-Sattler

Research Topic
The interaction between tumor and immune cell metabolism as a target in immunotherapy

Short description of the project(s)
Tumor cells display a high nutrient uptake and in some instances altered nutrient flux mandatory to sustain proliferation. The accelerated and adapted metabolic activity induces a metabolic microenvironment characterized by nutrient depletion and accumulation of (toxic) metabolites. This contributes to immune evasion by limiting T-cell activity and fostering suppressive immune response. We seek for an opportunity to target the tumor metabolism in order to strengthen anti-tumor immunity and increase efficacy of immunotherapies.

Methods
Immune cell isolation from blood and tissue, multi-colour flow cytometry, cell culture (2D cell culture, 3D cell culture, primary cells, co-cultures), high resolution respirometry (analysis of mitochondrial activity and function), retroviral transduction, standard molecular biology methods, pre-clinical animal models, immunohistochemistry

Opportunities to participate in the research group

x Internships (with a minimum duration of four weeks) **x** Bachelor thesis

x Master thesis SHK WHK PhD positions

Others: _____

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Research group leader: Prof. Dr. Barbara Schmidt

Research Topic
Infection Immunology of Viruses (HSV-1, BoDV-1, SARS-CoV-2)

Short description of the project(s)
My group focuses on the interaction of viruses with the immune system, i.e. how the immune system fights against viruses and how viruses escape the immune system.

1) HSV-1: how do oncolytic herpes viruses kill melanoma cells?

2) BoDV-1: how can we prevent transmission of bornaviruses from shrews to humans?

3) SARS-CoV-2: which are the molecular determinants of Post-COVID syndrome?

Methods
(real-time)-PCR and sequencing; flow cytometry; Western Blot, ELISA; molecular cloning and mutagenesis; CRISPR-Cas9 technology; cell culture (primary cells and cell lines) in S2 and S3 laboratories; recombinant viruses (HSV-1, HIV); virus isolation, cultivation, and titration; isolation of immune cells from blood (Ficoll gradient; magnetic bead technology); reporter cell experiments; functional tests (viability, e.g. MTT; neutralization experiments)

Opportunities to participate in the research group

x Internships (with a minimum duration of one week) **x** Bachelor thesis

x Master thesis SHK WHK **x** PhD positions

Others: _____

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Research group leader: Prof. Dr. Dietmar Zaiß

Research Topic
Immune Cell Communication

Short description of the project(s)
The overarching aim of our research is to understand how local immune responses are orchestrated to maintain tissue homeostasis under inflammatory conditions. Specifically, we want to understand the crosstalk of tissue resident immune cells and the surrounding tissue and to understand the underlying molecular mechanisms by which pro- and anti-inflammatory stimuli determine the outcome of local immune responses. Deficiencies in local immune regulation often lead to inflammation-associated diseases, such as fibrotic diseases, atherosclerosis or arthritis, as well as to auto-immune diseases or allergies. Thus, a better understanding of the fundamental mechanisms that regulate local immune responses are of central importance in order to find more efficient ways of treating such diseases.
For further information: https://www.uni-regensburg.de/medicine/immune-cell-communication/research/index.html

Opportunities to participate in the research group

Internships (with a minimum duration of _____) Bachelor thesis

Master thesis SHK WHK PhD positions

x Others: Contact us for available opportunities

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Research Groups at Biopark

Research group leader: Dr. Bernhard Polzer

Research Topic
Liquid Biopsy applications and single cell analysis/Preclinical drug testing and biomarker discovery

Short description of the project(s)
Fraunhofer ITEM-R aims to close the translational gap between basic science (academia) and product development (industry) in oncology. Therefore, we developed liquid biopsy applications using single cell technologies to follow the genetic evolution of systemic cancer and generate patient-derived models. Moreover, we focus on pushing the liquid biopsy concept beyond blood samples to other body fluids and even tissues to develop tailored strategies for defined clinical questions.

Methods
- Tumor Cell Enrichment
- Single Cell Isolation and Molecular Analysis
- NGS and bioinformatics
- Model generation from patient samples
- Functional Assays for drug testing

Opportunities to participate in the research group

Internships (with a minimum duration of _____) **x** Bachelor thesis

x Master thesis **x** SHK WHK PhD positions

Others: _____

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