Research Centers
Molecular Mechanisms of Aging and Age-associated Diseases

Aging, Stem Cell Aging, Signal Transduction Pathways, Apoptosis

KFO 142 – Molecular and Cellular Aging – from Mechanisms to Clinical Perspectives
Funded by the German Research Foundation (DFG) 29

KFO 167 – Regulation of Apoptosis and its Dysfunction in Human Diseases
Funded by the German Research Foundation (DFG) 30

GRK 1789 – CEMMA: Cellular and Molecular Mechanisms in Aging
Funded by the German Research Foundation (DFG) 31

Collaborative Project SyStaR - Molecular Systems Biology of Impaired Stem Cell Function and Regeneration during Aging
Funded by the German Federal Ministry of Education and Research (BMBF) 32

Center of Cellular Decision and Signaling Pathways during Aging – From Mechanisms to Clinical Perspectives
Funded by the State of Baden-Württemberg 33

Else Kröner Research College Ulm – Stem Cells, Aging and Malignant Transformation: From Experimental Models to Clinical Application
Funded by the Else Kröner-Fresenius-Stiftung 34

Boehringer Ingelheim Ulm University BioCenter (BIU) Research Center in Public-Private Partnership 35

Hemato-Oncology

SFB 1074 – Experimental Models and Clinical Translation in Leukemia
Funded by the German Research Foundation (DFG) 36

Joint Project ApoCanBA - Targeting Apoptosis for Cancer Therapy: Preclinical and Clinical Evaluation of Betulinic Acid Derivate BA10 as a novel Lysosomotropic Anticancer Drug
Funded by the German Federal Ministry of Education and Research (BMBF) 37

Collaborative Project CancerEpiSys – Integrative Analysis of Epigenetic Networks that Determine the Chronic Lymphocytic Leukemia Disease State
Funded by the German Federal Ministry of Education and Research (BMBF) 38
<table>
<thead>
<tr>
<th>Research Centers – Content</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Helmholtz Virtual Institute: Resistance to Apoptosis and Therapy in Leukemia</strong>&lt;br&gt; Funded by the Helmholtz Association</td>
</tr>
<tr>
<td><strong>Comprehensive Cancer Center Ulm (CCCU)</strong>&lt;br&gt; Funded by German Cancer Aid</td>
</tr>
<tr>
<td><strong>Research Consortium Tumor Stem Cells</strong>&lt;br&gt; Funded by German Cancer Aid</td>
</tr>
<tr>
<td><strong>Rare Neurodegenerative Diseases</strong></td>
</tr>
<tr>
<td><strong>German Frontotemporal Lobar Degeneration Consortium: FTLD-C</strong>&lt;br&gt; Funded by the German Federal Ministry of Education and Research (BMBF)</td>
</tr>
<tr>
<td><strong>MND-NET – the German ALS Network</strong>&lt;br&gt; Funded by the German Federal Ministry of Education and Research (BMBF)</td>
</tr>
<tr>
<td><strong>Helmholtz Virtual Institute: RNA Dysmetabolism in Amyotrophic Lateral Sclerosis and Frontotemporal Dementia</strong>&lt;br&gt; Funded by the Helmholtz Association</td>
</tr>
<tr>
<td><strong>Charcot Foundation and ALS Research Center</strong>&lt;br&gt; Funded by the Charcot Foundation</td>
</tr>
<tr>
<td><strong>CHDI (Cure Huntington's Disease Initiative) – USA/ (EHDN) European Huntington's Disease Network</strong>&lt;br&gt; Funded by the High Q Foundation</td>
</tr>
<tr>
<td><strong>Cardiometabolic Diseases (Diabetes and Obesity)</strong></td>
</tr>
<tr>
<td><strong>Consortium „Adolescents with Extreme Obesity“ within the Competence Network Obesity (CNO)</strong>&lt;br&gt; Funded by the German Federal Ministry of Education and Research (BMBF)</td>
</tr>
<tr>
<td><strong>Join the Healthy Boat – Program for Health Promotion in Primary Schools</strong>&lt;br&gt; Funded by Baden-Württemberg Foundation</td>
</tr>
<tr>
<td><strong>Trauma Research (physical and psychic)/ Musculoskeletal Research</strong></td>
</tr>
<tr>
<td><strong>Collaborative Research Center CRC1149</strong>&lt;br&gt; Funded by the German Research Foundation (DFG)</td>
</tr>
<tr>
<td><strong>KFO 200 – Inflammatory Response following Musculo-Skeletal Trauma</strong>&lt;br&gt; Funded by the German Research Foundation (DFG)</td>
</tr>
<tr>
<td><strong>FOR 793 – Mechanisms of Fracture Healing and Bone Regeneration in Osteoporotic Bone</strong>&lt;br&gt; Funded by the German Research Foundation (DFG)</td>
</tr>
<tr>
<td><strong>Collaborative Project CANMANAGE: Case Management in Child Abuse and Neglect</strong>&lt;br&gt; Funded by the German Federal Ministry of Education and Research (BMBF)</td>
</tr>
<tr>
<td><strong>Collaborative Project TRANS-GEN: My Childhood – Your Childhood</strong>&lt;br&gt; Funded by the German Federal Ministry of Education and Research (BMBF)</td>
</tr>
<tr>
<td><strong>Innovation Fund Medicine: Trauma</strong>&lt;br&gt; Funded by the State of Baden-Württemberg</td>
</tr>
<tr>
<td><strong>Competence Center Child Abuse and Neglect</strong>&lt;br&gt; Funded by the State of Baden-Württemberg</td>
</tr>
<tr>
<td><strong>Cross-sectional Centers</strong></td>
</tr>
<tr>
<td><strong>GSC 270 – International Graduate School in Molecular Medicine Ulm</strong>&lt;br&gt; Funded by the Excellence Initiative of the German federal and state governments</td>
</tr>
<tr>
<td><strong>Additional Topics</strong></td>
</tr>
<tr>
<td><strong>PAK 270 – Neuro-Cognitive Mechanisms of Conscious and Unconscious Visual Perception</strong>&lt;br&gt; Funded by the German Research Foundation (DFG)</td>
</tr>
<tr>
<td><strong>Center of Excellence for Rare Diseases Baden-Württemberg</strong>&lt;br&gt; Funded by the State of Baden-Württemberg</td>
</tr>
<tr>
<td><strong>Center of Medicine and Society</strong>&lt;br&gt; Funded by the State of Baden-Württemberg</td>
</tr>
</tbody>
</table>
Research Centers

Ulm University Medicine has a strong scientific profile in the following main areas:

• **Molecular Mechanisms of Aging and Age-associated Diseases**
  - Aging, Stem Cell Aging, Signal Transduction Pathways, Apoptosis
  - Hemato-Oncology
  - Rare Neurodegenerative Diseases
  - Cardiometabolic Diseases (Diabetes and Obesity)

• **Trauma Research (physical and psychic)/Musculoskeletal Research**

• **Cross-sectional Centers**

• **Additional Topics**

These research topics are based on several collaborative research networks funded by a variety of funding agencies such as: the German Research Foundation (*Deutsche Forschungsgemeinschaft, DFG*); the Excellence Initiative of the German federal and state governments (*Exzellenzinitiative des Bundes und der Länder*); the Federal Ministry of Education and Research (*Bundesministerium für Bildung und Forschung, BMBF*); the European Union (EU); the State of Baden-Württemberg; and the Helmholtz Association. Funding is also received from such foundations as German Cancer Aid (*Deutsche Krebshilfe*), the *Else Kröner-Fresenius-Stiftung* or the CHDI Foundation (USA). The scientific activities of these research networks are described on the pages below.

In addition to the collaborative research networks described in this chapter, Ulm University Medicine harbors several programs dealing primarily with the promotion of young scientists. These are financed mainly by the Excellence Initiative of the German federal and state governments, the German Research Foundation and foundations such as the *Else Kröner-Fresenius-Stiftung* as described in the chapter on the *Promotion of Young Scientists* (see page 61).
Increased activity of Cdc-42 correlates with a depolarized phenotype in hematopoietic stem cells.

Representative pictures of the small RhoGTPase Cdc-42 reveal differences in distribution and activity in young (A) and old (B) hematopoietic stem cells shown on dark background (i) or as overlap with phase contrast picture (ii) ([Cell Stem Cell 10:520, 2012]).

Selected Publications:
Molecular Mechanisms of Aging and Age-associated Diseases
Aging, Stem Cell Aging, Signal Transduction Pathways, Apoptosis

KFO 167 – Regulation of Apoptosis and its Dysfunction in Human Diseases

Funded by the German Research Foundation (DFG)

Speaker: Prof. Dr. Klaus-Michael Debatin, Department of Pediatrics and Adolescent Medicine
Head: Prof. Dr. Christian Beltinger, Department of Pediatrics and Adolescent Medicine

Keywords: apoptosis | cancer | HIV infection | DNA damage | signal transduction

Apoptosis is the major form of cell death in humans and is thus tightly regulated. Too much apoptosis causes disease, as, for example, in HIV infection, tissue injury or neurodegeneration. Too little apoptosis, as in cancer, is also detrimental. Although the molecular basis of apoptosis is increasingly understood, the clinical translation of this knowledge remains a challenge.

The DFG-funded clinical research unit “Regulation of Apoptosis and its Dysfunction in Human Diseases” addresses this challenge by bringing together eight apoptosis research projects that focus on human disease in the areas of cancer, infection and aging. By forming an interdisciplinary consortium, both preclinical-theoretical institutes (Legal Medicine, Molecular Medicine, Physiological Chemistry, and Molecular Virology) and clinical departments of the Medical Faculty (Pediatrics and Adolescent Medicine, Internal Medicine III and the Section of Gynecological Oncology) have joined forces in research with the ultimate aim of benefitting patients.

Selected Publications:


Molecular Mechanisms of Aging and Age-associated Diseases
Aging, Stem Cell Aging, Signal Transduction Pathways, Apoptosis

GRK 1789 – CEMMA:
Cellular and Molecular Mechanisms in Aging

Funded by the German Research Foundation (DFG)
Speaker: Prof. Dr. Hartmut Geiger, Institute of Molecular Medicine
Keywords: aging | stem cells | cancer | neurodegenerative diseases | immunology

Demographic development predicts an inversion of the demographic structure in most Western societies over the coming decades that will result in a significant increase in age-associated diseases. These diseases and their prevention will become a key focus of medicine, business and social studies. Improved knowledge of the molecular and cellular mechanisms of aging will allow rational approaches and therapies to be devised that are ultimately aimed at achieving healthy aging. The research training program known as “Cellular and Molecular Mechanisms in Aging” (CEMMA) will recruit and train the next generation of scientists engaged in aging research, a very critical task in light of anticipated demographic development. CEMMA has been designed as a structured and internationally recognized training program for doctoral students working in the field of aging research. The qualification program on aging research includes specific teaching modules on model systems in aging research and on the theories of molecular aging in addition to modules analyzing aging in the context of general medicine and social studies. CEMMA works closely together with the International Graduate School in Molecular Medicine Ulm.
Molecular Mechanisms of Aging and Age-associated Diseases
Aging, Stem Cell Aging, Signal Transduction Pathways, Apoptosis

Collaborative Project SyStaR – Molecular Systems Biology of Impaired Stem Cell Function and Regeneration during Aging

Funded by the German Federal Ministry of Education and Research (BMBF)
Speakers: Prof. Dr. Karin Scharffetter-Kochanek, Department of Dermatology and Allergic Diseases
PD Dr. Hans Kestler, Friedrich-Schiller University Jena
Prof. Dr. Hartmut Geiger, Institute of Molecular Medicine
Keywords: Molecular Systems Biology | Stem Cells | Aging | Regeneration

Aging-associated decreases in regenerative capacity and organ maintenance represent major factors limiting the quality of life during aging. It is assumed that limiting self-renewal and function of adult stem cells or the regenerative reserve of somatic organ cells are major underlying causes of tissue aging. To this end, an interdisciplinary research team will analyze age-related alterations in stem cell compartments and regenerative tissues of model organisms, in genetic mouse models of aging and in humans. Systems biology analysis will be used to generate mathematical models on aging-associated alteration in signaling pathways that are relevant to human aging. Functional analysis and validation of the generated models will be conducted in model organisms and in genetic mouse models, thereby inducing an iterative process of model optimization and experimental re-evaluation.

The SyStaR consortium will identify functionally relevant signaling pathways, contributing to a decline in stem cell function and regeneration during human aging. SyStaR will determine whether identified signaling pathways can serve as therapeutic targets for treatment or prevention of regenerative dysfunction and impaired organ maintenance during human aging.

Prof. Dr. Scharffetter-Kochanek (clinic), Prof. Dr. Hartmut Geiger (basic research and life sciences) und PD Dr. Kestler (systems biology) coordinate SyStaR.

Selected Publications:
Molecular Mechanisms of Aging and Age-associated Diseases
Aging, Stem Cell Aging, Signal Transduction Pathways, Apoptosis

Center of Cellular Decision and Signaling Pathways during Aging – From Mechanisms to Clinical Perspectives

funded by the State of Baden-Württemberg
Speaker: Prof. Dr. Karin Scharffetter-Kochanek, Department of Dermatology and Allergic Diseases
Keywords: Aging | Aging associated-diseases | Molecular and cellular Mechanisms of Aging | Signaling pathways

Major research efforts will be required to successfully meet the urgent challenges of current demographic development. Aging is defined as a progressive loss of function with a gradual increase in frailty, morbidity and mortality. Aging research within this collaborative program aims to advance our mechanistic understanding of the cellular and molecular processes of intrinsic aging and how this relates to aging-associated diseases, including infectious diseases, autoimmunity, impaired tissue regeneration, degenerative disorders and cancer. Major questions address stem cell exhaustion in different tissues with lack of tissue regeneration and anti-aging pathways, including the IGF-1, Wnt-, Notch- and stress response pathways. Functional analysis of key-regulatory components have already been identified and we will further identify biomarkers and target molecules to monitor and delay aging and aging-related diseases with the ultimate goal of promoting healthy aging for the benefit of all our patients. Due to the unique interaction of basic, translational and clinical research with the opportunities for novel targeted strategies, this research center will further enhance the internationally recognized profile of aging research at Ulm.

Selected Publications:

Fig.1 Oxidative damage within mitochondria of manganese superoxide dismutase deficient skin fibroblasts. Transmission electron microscopy and assessment of mitochondria revealed a severely disturbed structure with loss of cristae and degeneration of intramitochondrial structure in more than 80% of all assessed mitochondria in manganese superoxide dismutase (Sod2) deficient mutant fibroblasts (mut) compared with 40% damaged mitochondria in Sod2 heterozygous (h) and only 5% in wild type Sod2-competent fibroblasts (co).
Molecular Mechanisms of Aging and Age-associated Diseases
Aging, Stem Cell Aging, Signal Transduction Pathways, Apoptosis

Else Kröner Research College Ulm – Stem Cells, Aging and Malignant Transformation: From Experimental Models to Clinical Application

funded by the Else Kröner-Fresenius-Stiftung

Speakers: Prof. Dr. Stephan Stilgenbauer, Department of Internal Medicine III
Prof. Dr. Hartmut Geiger, Institute of Molecular Medicine

Keywords (up to five): Stem cells | aging, malignant transformation | physician scientist | career development

The Else Kröner Forschungskolleg Ulm is a structured postgraduate training program for highly talented junior physicians in the phase of clinical specialization. It is financially supported through a research grant from the Else Kröner-Fresenius-Stiftung. It facilitates scientific career development by freeing junior physicians from clinical duties and allowing them to fully dedicate their time for scientific projects. The scientific theme of the Forschungskolleg is “stem cells, aging and malignant transformation,” a research priority of Ulm University with a documented track record in publications and research grant funding. The Forschungskolleg is an autonomous structure with its own budget and is based on participating institutions and clinical departments. It is structurally embedded in the Medical Faculty and the University Medical Center of Ulm University. The promotion of scientific career development is a key topic and is supported by Ulm University as one of its ultimate goals. The selection procedure of the participants involves a structured application process that outlines their research project within a mentoring concept. The support of the clinical department must be documented through a commitment statement issued by its medical director. In addition to scientific research, there is a structured mentoring concept that allows the development of individual career perspectives. Therefore, each participant is supported in such a way to develop their personal integrated concept of research and clinical training. The ultimate goal of the Else-Kröner Forschungskolleg Ulm is to support junior physicians in pursuit of a career as a “physician scientist” within a truly translational concept that combines basic scientific research and clinical application. The Else-Kröner Forschungskolleg Ulm was initiated in 2011 and has supported ten participants who have so far authored 41 original reports and eight reviews in international journals.

Selected Publications:
Molecular Mechanisms of Aging and Age-associated Diseases
Aging, Stem Cell Aging, Signal Transduction Pathways, Apoptosis

Boehringer Ingelheim Ulm University BioCenter (BIU)
Research Center in Public-Private Partnership

Speaker: Prof. Dr. Klaus-Michael Debatin, Department of Pediatrics and Adolescent Medicine
Vice Speaker: Prof. Dr. Gerd Schnorrenberg, Boehringer Ingelheim Pharma GmbH & Co. KG
Keywords: Cardio metabolic diseases | COPD | Neurodegenerative diseases

On 19 October 2011, Prof. Dr. Gerd Schnorrenberg, Senior Vice President of Boehringer Research Germany, and Prof. Dr. Karl Joachim Ebeling, President of Ulm University, signed the co-operation agreement for the “Public-Private Partnership research consortium Boehringer Ingelheim Ulm University BioCenter (BIU)” in the presence of Theresia Bauer, Minister of Science, Research and the Arts of the State of Baden-Württemberg, and Prof. Dr. Dr. Andreas Barner, the speaker of the Boehringer Ingelheim management.

The BioCenter includes in total 17 research projects focusing on neurodegenerative (e.g. Morbus Parkinson and Morbus Alzheimer) and cardio metabolic diseases (Adipositas, Diabetes and Cardiac Infarction) as well as lung diseases (e.g. COPD - Chronic Obstructive Pulmonary Disease). The goals of this research center are the identification and characterization of new biomarkers and the analysis of deregulated signaling pathways in diseases as well as establishing new innovative preclinical and clinical concepts in translational research. The BioCenter, which is unique in Germany because of its scientific interaction between academia and the pharmaceutical industry, has been established according to the structures and criteria of excellence stipulated by the well-established collaborative research centers of the German Research Foundation (DFG). The pharmaceutical company of Boehringer Ingelheim, the State of Baden-Württemberg and the Medical Faculty of the Ulm University support this program and have contributed €4.5 million for an initial three year period. A second three to five year funding period has also been planned.
Molecular Mechanisms of Aging and Age-associated Diseases
Hemato-Oncology

SFB 1074 – Experimental Models and Clinical Translation in Leukemia

Funded by the German Research Foundation (DFG)
Coordinating Principal Investigator: Prof. Dr. Hartmut Döhner, Department of Internal Medicine III
Keywords: Leukemia | Malignant transformation | Genomics | Animal models | Clinical translation

The focus of cancer drug development has shifted from conventional chemotherapy to therapeutics targeting molecular lesions of cancer cells. Despite major efforts to catalog genetic lesions that drive human cancers, a major challenge remains to integrate these findings from basic scientific research and clinical investigations in order to improve patient outcome.

The SFB1074 aims to bridge this gap in a highly focused area of cancer research, namely, acute and chronic leukemias, diseases which are most prevalent in the elderly population. Ulm University has a long-standing commitment to cutting-edge basic, translational and clinical research on hematopoietic malignancies as reflected by a large number of research groups focusing on diverse aspects of leukemia biology as well as by some of the largest biobanks and most prestigious clinical programs in this area.

Research within the CRC is organized into two Project Groups which closely interact with each other to fully exploit the potential of combining excellent basic science with clinical expertise. Projects in Group A use a broad spectrum of physiologically relevant in vitro and in vivo experimental systems to investigate cellular and molecular mechanisms of leukemogenesis. Projects in Group B have a strong translational aspect and are aimed at the genetic, epigenetic and functional characterization of leukemia samples from patients with acute and chronic leukemia and/or human-derived experimental systems.

In summary, the SFB1074 provides a superb opportunity to realize the concept of translational research “from bench to bedside and back” in acute and chronic leukemias. It is hoped that this approach will substantially contribute to an improved understanding of leukemia biology and, more importantly, to a better clinical management of patients with these diseases.

The SFB1074 was initiated in July 2012 and has started its programs very successfully with already more than ten publications in international journals.
After treatment with B10, key components of both the apoptosis and the lysosomal cell death signaling cascade are redistributed within the cells. Left: untreated cells; right: treated with B10.

Molecular Mechanisms of Aging and Age-associated Diseases
Hemato-Oncology

Joint Project ApoCanBA – Targeting Apoptosis for Cancer Therapy: Preclinical and Clinical Evaluation of Betulinic Acid Derivate BA10 as a novel Lysosomotropic Anticancer Drug

Funded by the German Federal Ministry of Education and Research (BMBF)

Speaker: Prof. Dr. Klaus-Michael Debatin, Department of Pediatrics and Adolescent Medicine

Keywords: Lysosomal cell death | betulinic acid | mitochondria

Despite aggressive protocols, the inefficacy of established treatments remains a major problem in oncology and highlights the need for novel strategies. In response to this demand, this consortium aims to develop betulinic acid (BA) as a novel class of anticancer drugs with a wide therapeutic index that triggers apoptosis and lysosomal membrane permeabilization, two intrinsic cell death programs. BA is a natural product extracted from the bark of the birch tree. Since it exerts its antitumor action in a manner different from conventional anticancer drugs, it is able to overcome resistance. This joint project combines the expertise of an industrial partner, a preclinical partner and a clinical partner. It aims at pharmacodynamically optimizing a BA derivative, evaluating its preclinical toxicity profile and producing it under good medical practice (GMP) conditions for evaluation in a clinical trial in malignant brain tumors.

Selected Publications:
Most tumor cells die without support from neighboring cells. When primary leukemic cells from patients (small cells) are cultured with supporting cells from the bone marrow (large cells), these interactions can be investigated in detail. Picture by Bhattacharya and Mertens. Also published in Die Zeit, 13.6.2013

Molecular Mechanisms of Aging and Age-associated Diseases

Hematology

Collaborative Project CancerEpiSys – Integrative Analysis of Epigenetic Networks that Determine the Chronic Lymphocytic Leukemia Disease State

Funded by the German Federal Ministry of Education and Research (BMBF)

Speakers: PD Dr. Daniel Mertens, Department of Internal Medicine III, PD Dr. Karsten Rippe, Research Group Genome Organization and Function, DKFZ Heidelberg,

Keywords: Leukemia | Epigenetic | Microenvironment | non-coding RNA | signaling

The Cooperation Unit “Mechanisms of Leukemogenesis” integrates research in the clinical environment of Ulm University with research at the German Cancer Research Center. It is ideally suited to translate basic research towards clinical application. Examples are:

i) The detailed functional characterization of epigenetic modifications of the DNA of leukemia cells. We expect these epigenetic marks to represent the history and functional wiring of cells. This would make them ideally suited to predict the response to treatment and the clinical outcome of patients. Part of this task will be addressed in the scientific network www.cancerepisys.org.

ii) The identification of compounds that target the interaction of leukemia cells with non-malignant cells that surround them. Intriguingly, leukemic cells cannot survive without non-malignant cells. Promising substances were identified by comparing the activity of all human genes in protected and unprotected leukemic cells. Preliminary results show the suitability of this approach, which will be exploited in a Virtual Helmholtz Institute (www.leukemia-net.de).

Both approaches are only possible through the bipartite setup of the Cooperation Unit, allowing translational projects that are not feasible in either research group alone.

Selected Publications:


Molecular Mechanisms of Aging and Age-associated Diseases
Hemato-Oncology

Helmholtz Virtual Institute:
Resistance to Apoptosis and Therapy in Leukemia

Funded by the Helmholtz Association
Speakers: Prof. Dr. Peter Lichter, Division of Molecular Genetics, DKFZ Heidelberg,
PD Dr. Daniel Mertens, Department of Internal Medicine III

Keywords: leukemia | resistance | microenvironment | small molecule screen | signaling

A major pathomechanism and obstacle for the treatment of malignant disease is the resistance of tumor cells against apoptosis and chemotherapy. We hypothesize that cell-intrinsic as well as cell-extrinsic mechanisms, mediated by the microenvironment and the functional interplay of these pathways, contribute to the escape from cell death and to drug resistance. In order to understand the molecular mechanisms of resistance and translate them into novel treatment strategies, we use chronic lymphocytic leukemia (CLL), the most common adult leukemia in the western world, as an ideally suited model system, and expect to identify general mechanisms contributing to cancer cell resistance. The proposed institute will have access to unique primary tissue biobanks as well as compound libraries. In addition, the combination of expertise in molecular biology, state-of-the-art technology and the clinical skills of the Helmholtz Virtual Institute will allow us to put forward biologically and clinically relevant questions and to translate biological findings into clinical application.

The epigenetic modification of DNA-methylation can remain stable in leukemic cells over time (left panel) or change (middle and right panel). Shown is the DNA-methylation level of 450,000 genomic loci at two different timepoints (x-axis vs y-axis) in three patients. These changes in DNA-methylation are correlated with the prognosis of patients and can therefore be used to predict the clinical course of the patients.

Ulm University
Department of Internal Medicine III
PD Dr. Daniel Mertens
Albert-Einstein-Allee 23
89081 Ulm, Germany
Tel.+49 (0)731 500 45870
daniel.mertens@uniklinik-ulm.de
www.leukemia-net.de
www.dkfz.de/en/genetics
www.mertens-lab.de

Selected Publications:
Molecular Mechanisms of Aging and Age-associated Diseases
Hemato-Oncology

Comprehensive Cancer Center Ulm (CCCU)
Funded by German Cancer Aid
Director: Prof. Dr. Hartmut Döhner, Department of Internal Medicine III
Deputy Director: Prof. Dr. Thomas Seufferlein, Department of Internal Medicine I
Secretary: Prof. Dr. Jens Huober, Department of Gynecology and Obstetrics
Keywords: Basic and translational research | Comprehensive Cancer Center | clinical trials | phase I unit

The Comprehensive Cancer Center Ulm (CCCU) is a national interdisciplinary Oncology Center of Excellence
Board-certified consultants lead interdisciplinary teams to ensure the highest quality of patient care by
organizing tumor conferences, updating standard operating procedures, supporting patient organizations,
providing a consultation service for associated external partners (from private practice and hospitals), and by
implementing new treatment trials.
The CCCU is committed to multidisciplinary patient care, interactive and innovative clinical and laboratory
research, high activity in phase I-IV clinical trials, training for health professionals, community services as
well as cancer prevention. These activities are an integral part of various national and international research
networks and programs.
In addition to the research laboratories of the participating departments, the Institute of Experimental
Oncology was founded within the CCCU as a driving force to promote cancer research dedicated to translating
results from cancer biology into innovative therapeutic concepts. In order to establish a corporate identity of
translational cancer research under the umbrella of the CCCU, the “Preclinical Cancer Center Ulm” has recently
been founded.
Moreover, Ulm University has developed an international postgraduate online study program in Advanced
Oncology aimed at clinical oncologists as well as scientists to promote the increased level of excellence in
comprehensive care for cancer patients.

Interdisciplinary clinical tumor conference:
The CCCU promotes excellence in interdisciplinary patient care and innovative
treatments as well as basic scientific and translational research in order to develop
novel therapeutic approaches.

For publications please see the websites of the CCCU members.
www.ccc-ulm.de
Neural crest stem cells, shown here to differentiate, can give rise to neuroblastoma and its tumor stem cells.

Molecular Mechanisms of Aging and Age-associated Diseases
Hemato-Oncology

Research Consortium Tumor Stem Cells
Funded by German Cancer Aid
Speaker: Prof. Dr. Christian Beltinger, Department of Pediatrics and Adolescent Medicine
Keywords: Tumor stem cells | tumor-initiating cells | cancer

Most tumors are heterogeneous and many are organized in a hierarchical fashion with so-called tumor stem cells or tumor-initiating cells giving rise to more differentiated tumor cells. The Research Consortium “Tumor Stem Cells” was founded in 2005 and is a national consortium that aims to isolate and characterize tumor stem cells in solid tumors. This consortium, financed by Deutsche Krebshilfe (German Cancer Aid), is currently in its final funding period. A broad spectrum of solid tumors from different organs that spans embryonic tumors to cancers in old age is investigated by several groups in Germany. The common links between the projects are to develop generic methods to enrich and isolate tumor stem cells, to find molecular mechanisms shared by the tumor stem cells of these diverse tumor entities and to define therapeutic targets within the tumor stem cells.

Selected Publications:
Molecular Mechanisms of Aging and Age-associated Diseases
Rare Neurodegenerative Diseases

German Frontotemporal Lobar Degeneration Consortium: FTLD-C

Funded by the German Federal Ministry of Education and Research (BMBF)
Speaker: Prof. Dr. Markus Otto, Department of Neurology
Keywords: FTLD | Aphasia | Neuropsychology | dementia | biobanking

Frontotemporal lobar degeneration (FTLD) covers a whole spectrum of neurodegenerative disorders which principally affect the frontal and temporal lobes of the brain. Formerly, this group of diseases was referred to as Pick’s disease, but there have been frequent changes to the name and the classification of frontotemporal lobar degeneration because it has been a subject of consistent and strong debate.

Currently, the following disorders are grouped together under the overall title of FTLD: (1) frontotemporal dementia (FTD) as behavioural variant; (2) primary nonfluent aphasia (PNFA); (3) semantic dementia (SD) as language variants; (4) amyotrophic lateral sclerosis with frontotemporal dementia (ALS+FTD); (5) corticobasal syndrome (CBS); and (6) progressive supranuclear palsy (PSP).

As well as the two principal groups of symptoms (changes in behavior and difficulties with speech), various extra-pyramidal motor symptoms may also become apparent, especially in the case of corticobasal syndrome and progressive supranuclear palsy.

There are very few studies regarding the frequency of these disorders, with estimates ranging from three patients per 100,000 of the population via 15 per 100,000 up to over 40 per 100,000. What is beyond doubt, however, is that the group of illnesses described under frontotemporal lobar degeneration represents the second most frequent dementia in patients under 65 years of age.

In terms of etiology, there has been considerable progress in recent years, with neuropathology successfully identifying tau aggregates as well as TDP43 and FUS inclusions as contributing factors. Meanwhile, genetics has identified several genes which are risk factors. Among clinical practitioners, however, even symptomatic treatment of FTLD illnesses is controversial. One of this consortium’s central goals is to develop and evaluate parameters which will help clinicians to diagnose FTLD at an early stage and follow its progression, with the overall aim of developing effective objective targets for therapeutic strategies.

Selected Publications:
Molecular Mechanisms of Aging and Age-associated Diseases
Rare Neurodegenerative Diseases

MND-NET – the German ALS Network

Funded by the German Federal Ministry of Education and Research (BMBF)

Speaker: Prof. Dr. Albert C. Ludolph, Department of Neurology

Keywords: ALS | motoneuron disease | biobank | patient registry

The disease course of ALS and other motoneuron diseases (MND) as well as the insufficient therapeutic options and numerous open questions regarding symptomatic, nutritive and psychosocial care for MND patients still require intensive investigations in large, meaningful and well-characterized study populations. In addition, patient registries necessary for efficient conduction of clinical trials and rapid evaluation of novel therapies are lacking. Furthermore, biosample collections established and based on standard operating procedures are urgently needed for the development of biomarkers and studies on molecular disease mechanisms.

The MND-NET is the clinical and scientific network of German motoneuron disease centers initiated and coordinated by the Department of Neurology of Ulm University. Our goal is to meet the above described needs and to improve patient care as the basis for clinical and basic research on this devastating group of diseases. The MND-NET comprises all large motoneuron disease centers across Germany and provides a valuable infrastructure for the improvement of motoneuron patient care and the advancement of motoneuron disease research.

Selected Publications:


Molecular Mechanisms of Aging and Age-associated Diseases
Rare Neurodegenerative Diseases

Helmholtz Virtual Institute: RNA Dysmetabolism in Amyotrophic Lateral Sclerosis and Frontotemporal Dementia

Funded by the Helmholtz Association
Speaker of the University partner: Prof. Dr. Albert C. Ludolph, Department of Neurology
Keywords: Amyotrophic Lateral Sclerosis | Frontotemporal Dementia | RNA metabolism

The Helmholtz Virtual-Institute “RNA Dysmetabolism in Amyotrophic Lateral Sclerosis (ALS) and Frontotemporal Dementia (FTD)” was founded in January 2013 and is an international research center embedded in the German Center of Neurodegenerative Diseases (DZNE). The DZNE has the overall goal of understanding the cause and risk factors of neurodegenerative diseases with the potential of developing new therapeutic strategies. The Virtual Institute investigates the pathomechanisms of newly identified mutations causative for ALS and FTD involved in RNA metabolism. To this end, research groups from the DZNE located in Dresden (Prof. G. Kempermann; Dr. A. Hermann; Prof. A. Storch), Munich (Prof. Ch. Haass) and Tübingen (Prof. P. Kahle; Prof. M. Neumann) collaborate with research groups at Ulm University (Prof. T. Böckers; Prof. Ludolph; Prof. Weishaupt; Dr. A. Witting; Dr. P. Weydt; Dr. K. Lindenberg; Dr. S. Putz; Dr. S. Liebau) and associated partners at the INSERM (Prof. L. Dupuis, Prof. F. René; Prof. J.P. Loeffler, University of Strasbourg, France) and Sweden (Prof. P. Andersen, Umeå University) in order to combine basic research facilities, clinical expertise, and access to biological samples.

Selected Publications:
Molecular Mechanisms of Aging and Age-associated Diseases
Rare Neurodegenerative Diseases

Charcot Foundation and ALS Research Center
Funded by the Charcot Foundation

Speakers: Prof. Dr. Albert C. Ludolph and Prof. Dr. Jochen Weishaupt, Department of Neurology
Keywords: ALS | motoneuron disease | neurogenetics | epigenetics | ALS epidemiology

The Charcot Foundation has existed since 1999 and promotes research on patient care, molecular mechanisms of pathogenesis, and novel therapies with regard to ALS and other neurodegenerative diseases. It represents the umbrella organization supporting the Center for ALS Research, which bundles several different ALS research activities. Among these activities is the Swabian ALS registry, one of the largest epidemiological ALS registries, which provides information about the incidence as well as environmental and other factors causing ALS. Furthermore, a professorship for neurodegeneration has been implemented and is financed by the Charcot Foundation to elucidate the cell biological basis of ALS and to identify novel therapeutic target molecules. This also includes the application of high-throughput sequencing techniques to discover so far unknown genetic causes for familial ALS cases.

An additional field of research is the development of biomarkers for a better diagnosis and evaluation of therapeutic trials in ALS.

Selected Publications:
Molecular Mechanisms of Aging and Age-associated Diseases

Rare Neurodegenerative Diseases

CHDI (Cure Huntington’s Disease Initiative) – USA/(EHDN) European Huntington’s Disease Network

Funded by the High Q Foundation

Speaker: Prof. Dr. G. Bernhard Landwehrmeyer, Department of Neurology

Keywords: Databanking | Huntington’s Disease | international network | interventional studies | natural history

The European Huntington’s Disease Network (EHDN) is dedicated to Huntington’s Disease (HD), an inherited neurodegenerative disorder. EHDN provides a platform for professionals and people affected by HD, and for their relatives, and is sponsored by a not-for-profit foundation, CHDI Inc. (www.chdifoundation.org). EHDN’s Executive Committee is chaired by Prof. Dr. G. B. Landwehrmeyer. EHDN includes 157 sites in 20 European countries that take part in a natural history study, REGISTRY. Its scientific planning committee and clinical trial task force as well as 21 working groups aim to facilitate research activities and clinical trial design.

Recently, the transition has begun from REGISTRY to Enroll-HD, a global observational study with the aim of enrolling 20-30,000 participants worldwide. An example of its goals is to correlate clinical characteristics with genetic factors and biomarkers and to expedite the identification and recruitment of participants for future clinical trials. Enroll-HD is open to recruiting participants at all stages of HD and gene negative family members, carers and control participants from North and South America, Australasia and Europe.

Selected Publications:


• Observing Huntington’s disease: the European Huntington’s Disease Network’s REGISTRY. Orth M; the European Huntington’s Disease Network | Neural Neurosurg Psychiatry. 2011;82(12):1409-12.
Molecular Mechanisms of Aging and Age-associated Diseases  
Cardiometabolic Diseases (Diabetes and Obesity) 

Consortium „Adolescents with Extreme Obesity“ within the Competence Network Obesity (CNO) 

Funded by the German Federal Ministry of Education and Research (BMBF) 

Speaker: Prof. Dr. Martin Wabitsch, MD, PhD, Department of Pediatrics and Adolescent Medicine  

Keywords: adolescents with extreme obesity, body weight regulation, bariatric surgery 

Extremely obese adolescents are at a strongly elevated risk of early death, somatic comorbidities, 
psychiatric disorders, and social isolation, including unemployment, due to both functional impairment 
and stigmatization. Despite the dire implications of extreme obesity in adolescents and the frequently 
overt (e.g. orthopedic disorders) and non-overt (e.g. hypertension) comorbidity, these adolescents are 
difficult to reach and treat in medical terms. Thus, only a small percentage actively seeks treatment. 
The underlying reasons are poorly understood and may presumably be attributed to the young age, a 
predominantly low educational and socioeconomic status, as well as to functional impairment due to 
inactivity and psychiatric comorbidity. Unsuccessful attempts to lose weight on their own and/or within 
the medical system may have led to frustration with respect to their behavior in seeking treatment. 

In acknowledgement of this, we have developed the “Medical and psychosocial implications of extreme 
obesity in adolescents - acceptance and effects of structured care study,” which is known by its 
abbreviated title as: “Youth with Extreme obesity Study (YES).” YES aims at improving the medical care 
and social support structures for this so far widely ignored patient group. 

We focus on the identification of these subjects (baseline examination) and their acceptance of 
diagnostic and subsequent treatment procedures. In a randomized controlled trial we investigate 
the effectiveness of a low key group intervention by not focusing on weight loss but by aiming at 
the provision of obesity-related information, alleviation of social isolation, school and vocational 
integration, and improvement of self-esteem in comparison to a control group treated in a conventional 
way by focusing on weight loss. Interested individuals who fulfill current recommended criteria for 
weight loss surgery are provided with a structured preparation and follow-up programs. All subjects 
are subsequently monitored within a long-term observational study to elucidate the medical and 
psychosocial outcome. Results of this study will improve the medical care and social support structures 
for youths with extreme obesity in Germany. 

Selected Publications: 
• M. Wabitsch, A. Mass, T. Reinehr, S. Wiegand, W. Kiess, A. Scherag, R. Hall, R. Holle, and J. Hebebrand. Medical and 
  psychosocial implications of adolescent extreme obesity – acceptance and effects of structured care short: 

Project registration numbers: 
www.clinicaltrials.gov: 
  NCT01625325, NCT01703273, NCT02062164, NCT01662271, NCT01632098. 
  www.germanctr.de: 
  DRKS00004172, DRKS00004195, DRKS00004196, DRKS00004198, DRKS00004197.
Molecular Mechanisms of Aging and Age-associated Diseases
Cardiometabolic Diseases (Diabetes and Obesity)

Join the Healthy Boat – Program for Health Promotion in Primary Schools

Funded by Baden-Württemberg Foundation
Speaker: Prof. Dr. Dr. h.c. Jürgen M. Steinacker, Department of Internal Medicine II
Keywords: Health promotion | children | life style | school-based | physical activity

The statewide program, Join the Healthy Boat, promotes an active and healthy lifestyle for primary school children by offering healthy lifestyle choices in order to increase their physical, mental and emotional abilities. Based on the results of the URMEL-ICE Intervention trial, this program was started in 2009 in Baden-Württemberg. It has been developed, implemented and evaluated by a research team at Ulm University together with experienced teachers and is integrated into the school curriculum. So far, more than 2,000 primary school teachers have been trained and this corresponds to approximately 50,000 children.

Evaluation was performed in a randomized cohort study within a control group of 1,904 primary school children in 157 classes in Baden-Württemberg over a three-year period. The study showed positive intervention effects on body composition (waist circumference and skin folds), endurance (six minute run), quality of life and cost effectiveness. During the follow-up it was also shown that weight gain was associated with low physical activity, lack of active transport and lack of a regular breakfast. Waist-to-height was more predictive than BMI for the negative effects of obesity on quality of life and illness.

Selected Publications:
Trauma Research (physical and psychic)/Musculoskeletal Research

Collaborative Research Center CRC1149

Funded by the German Research Foundation (DFG)

Speaker: Prof. Dr. Florian Gebhard, Department of Orthopedic Trauma, Hand, Plastic, and Reconstruction Surgery
Coordinators: Prof. Dr. Markus Huber-Lang, Dept. of Orthopedic Trauma, Hand, Plastic, and Reconstruction Surgery
Prof. Dr. Anita Ignatius, Institute of Orthopedic Research and Biomechanics

Keywords: Trauma | Disturbance Factors | Regeneration | Inflammation

Trauma affects a vast number of people worldwide at any time from birth to death. The trauma-triggered danger response induces potent regeneration and healing processes. However, significant complications, e.g. systemic inflammation and organ dysfunction, may develop post trauma, particularly in the presence of disturbance factors. The underlying pathophysiological mechanisms are complex and so far poorly understood. Focusing on common injury patterns, major disturbance factors, and regenerative mechanisms, this CRC initiative aims to provide a profound pathomechanistic understanding of the trauma response for transfer into effective therapeutic strategies.

The projects aim to elucidate:
(A) the acute cellular and molecular danger response after trauma;
(B) the perturbation of the posttraumatic response by relevant co-morbidities and substance abuse in regard to healing processes;
(C) the regenerative mechanisms, focusing on the role of inflammatory mediators and stem cells to modulate healing after severe trauma.

The close interaction of basic, translational and clinical research realized in this CRC will substantially contribute to a better understanding of trauma pathophysiology under “real-life” conditions, and to an improved clinical management for trauma patients.

Selected Publications:
Musculoskeletal injuries represent a lifetime danger for any human being and often result in severe acute and chronic disorders. Despite advances in trauma management and a better understanding of the underlying complex pathophysiology, the uncontrolled inflammatory response post injury remains a scientific and clinical challenge. Therefore, the KFO 200 investigates the danger and inflammatory response early after trauma. Based on various tissue trauma models and translational in trauma patients, research is mainly focused on the lungs as the "engine" of the inflammatory reaction, and on bone and cartilage tissues with their so far rather unrecognized immune potential. On a molecular level, the role of the “serine protease system” (complement-coagulation cascade) as the central fluid phase innate defense system is defined in trauma. Furthermore, to extend the concept of injury pattern- and time-adapted surgical "tissue damage control,” the KFO 200 aims to monitor more precisely the immune response in order to develop an innovative and highly specific immune control to improve molecular, cellular and organ function early after trauma, and thereby the outcome for the patient.

Enhanced programmed cell death (apoptosis) rate of lung epithelial cells after severe tissue trauma. The depicted cellular blebbing of lung epithelium represents an early sign of apoptosis.
Trauma Research (physical and psychic)/Musculoskeletal Research

FOR 793 – Mechanisms of Fracture Healing and Bone Regeneration in Osteoporotic Bone

Funded by the German Research Foundation (DFG)

Speakers: Prof. Dr. Michael Amling, University Medical Center Hamburg-Eppendorf and Prof. Dr. Anita Ignatius, Institute of Orthopedic Research and Biomechanics

Keywords: Osteoporosis | bone | fracture healing | wnt signaling in bone

Osteoporosis predominantly affects postmenopausal women and is characterized by an imbalance between bone formation and resorption. The resulting bone loss is associated with fragility fractures, which frequently involve the spine and metaphyseal bone at the hip and wrist. Osteoporotic fractures are often associated with complications that lead to disability, increased mortality and socioeconomic burden. Complications are caused by poor primary stability of the fracture fixation in the fragile bone, which results in unfavorable mechanical healing conditions. Furthermore, the osteoporotic bone itself possesses reduced healing capacity. The underlying pathomechanisms are under extensive research with the aim of developing effective treatments to improve bone healing in osteoporotic patients. The research unit includes groups from the universities of Hamburg (Prof. M. Amling), Würzburg (Prof. F. Jakob) and Munich (Prof. W. Mutschler, Prof. E. Wolf). We are particularly interested in the role of Wnt/β-catenin and estrogen receptor signaling pathways in bone regeneration. Further projects deal with the central regulation of bone healing or with the dysfunction of stem cells in osteoporotic bone.

Selected Publications:


Trauma Research (physical and psychic)/Musculoskeletal Research

Collaborative Project CANMANAGE:
Case Management in Child Abuse and Neglect

Funded by the German Federal Ministry of Education and Research (BMBF)

Speaker: Prof. Dr. Dipl.-Psych. Lutz Goldbeck, Department of Child and Adolescent Psychiatry/Psychotherapy

Keywords: Case management | child abuse and neglect | evidence-based interventions | trauma-focused interventions.

Implementation of Managed Mental Healthcare for Children and Adolescents after Abuse and Neglect

Victims of child abuse and neglect (CAN) are at risk of developing chronic mental disorders. Although there are evidence-based treatments for this section of the population, the implementation, dissemination and utilization of these treatments are still insufficient. The consortium CANMANAGE has the primary objective of pursuing the improvement of mental healthcare for children and adolescents exposed to child abuse and neglect (CAN). At five German study sites, regional networks of care have been established and expanded. Children and adolescents between four and 17 years of age with a history of CAN are identified in cooperating institutions of the child welfare system or in the clinics of the study sites. They are asked to participate in a comprehensive psychological assessment. Those with unmet needs for treatment, together with their caregivers, receive recommendations and support to access the appropriate evidence-based treatments. Multiple outcomes are evaluated during regular follow-up assessments. Three projects have been implemented: 1. a randomized controlled trial of a case-management intervention; 2. resilience after CAN; and 3. migration, culture and CAN.

Selected Publications:
Trauma Research (physical and psychic)/Musculoskeletal Research

Collaborative Project TRANS-GEN: My Childhood – Your Childhood

Funded by the German Federal Ministry of Education and Research (BMBF)

Speaker: Prof. Dr. Jörg M. Fegert, Department of Child and Adolescent Psychiatry/Psychotherapy

Keywords: Childhood maltreatment | resilience | transgenerational cycle

“TRANSGEN: Meine Kindheit – Deine Kindheit” is funded by the Federal Ministry of Education and Research (BMBF) and investigates mothers and their infants during the first year of life. Mothers with adverse experiences in their own childhood are at increased risk of maltreating their offspring, but the majority of them do not continue this “transgenerational cycle of maltreatment.” The underlying dynamic process promoting the maintenance of a child’s mental health in the face of severe adversity during the mother’s lifetime is called resilience. We recruit mothers who have given birth in the maternity clinic of the University Hospital Ulm. They are followed up after three and twelve months. We also investigate the psychological development of infants at twelve months and identify psychological, biological and social factors which especially promote resilience during the first year of the developing mother-infant dyad. A parallel animal model allows a deeper understanding of the biological underpinnings of resilience in a transgenerational context. Empirical data on this issue would enable professionals and social systems to target and offer much more effectively adequate services to mothers and children at risk.
The effects of traumatic brain injury on the neuronal cross-talk are investigated by the research groups of T. Bückers and M. Huber-Lang.

Ulm University
Department of Orthopedic Trauma-, Hand-, Plastic-, and Reconstruction Surgery
Center for Biomedical Research
Helmholtzstraße 8/2
89081 Ulm, Germany
Tel. +49 (0)731 500 54716
Fax +49 (0)731 500 54718
markus.huber-lang@uniklinik-ulm.de
www.biomechanics.de/kfo200

Ulm University
Institute of Orthopedic Research and Biomechanics
Center of Musculoskeletal Research
Helmholtzstraße 14
89081 Ulm, Germany
Tel. +49 (0)731 500 55301
Fax +49 (0)731 500 55302
anita.ignatius@uni-ulm.de

The Research Center focuses on the danger response and regeneration after musculoskeletal trauma which is a topic of the highest scientific, clinical and socio-economic relevance. Any trauma results in local tissue damage that, depending on the extent of the trauma impact, may lead to severe morphological and functional defects. Furthermore, any severe trauma can trigger a systemic danger response of the whole body that involves not only primarily injured organs but also the development of remote organ injury. The systemic and local posttraumatic reactions are exceedingly complex and are so far not fully understood. Therefore, the research consortium of the Innovation Fund Medicine (Perspektivförderung Trauma) investigates the cellular and molecular mechanism of the postraeumatic danger response in clinically relevant models of tissue damage (traumatic brain injury, fracture, thorax-, soft-tissue-, and poly-trauma). In translational approaches, the danger response and regeneration processes are also elucidated in trauma patients on an organ, cellular and molecular level with the aim of developing improved therapeutic strategies for severely injured patients in order to improve the acute and long-term outcome and quality of life after trauma.

Selected Publications:
Child abuse and neglect have attracted much public interest in recent years and have also entailed the development of new initiatives and research projects in this field. In the medical field especially, it is of utmost importance to raise awareness and to improve the treatment of those affected. General standards for diagnostic procedures are necessary and the training of physicians on the topic of child protection needs to be improved. To address these concerns, the Competence Center Child Abuse and Neglect (www.comcan.de) was founded in Ulm in 2013 in cooperation with the university hospitals in Heidelberg and Freiburg and is sponsored by the Baden-Württemberg Ministry of Science, Research and the Arts (MWK). The competences of the disciplines of child and adolescent psychiatry, pediatrics and forensic medicine have thus been brought together. The aim of the center is to improve the basic and advanced training of medical professionals in Baden-Württemberg on matters of child protection. One important step will be the establishment of a curriculum for medical students. Furthermore, research and translational activities are additional important aims of the new competence center.
Cross-sectional Centers

GSC 270 – International Graduate School in Molecular Medicine

Funded by the Excellence Initiative of the German federal and state governments

Speaker: Prof. Dr. Michael Kühl, Institute of Biochemistry and Molecular Biology

Keywords: Graduate School | Scientific excellence | Internationality | PhD | Double degree

Scientific excellence depends on excellently trained young researchers. The training of such researchers is the aim of the International Graduate School in Molecular Medicine Ulm founded in 2006. Today, as of October 2014, more than 300 PhD students are or have been members of the Graduate School and more than 90 students have successfully finished the program. The PhD training offered is organized in thematically focused Research Training Groups representing the research topics of the Medical Faculty: (i) Development, Aging and Regeneration, (ii) Signaling Networks in the Hematopoietic System and Oncology, (iii) Cardio-metabolic Disorders, and (iv) Host-Microbe Interaction. Each PhD student is supervised by a Thesis Advisory Committee consisting of the main supervisor, a scientist from another institute of Ulm University and an international external reviewer from academia or industry. Students are actively integrated into the scientific community by giving scientific talks and poster presentations at international meetings. In addition to curricular seminars and lectures, a large variety of optional activities, such as key competence seminars, is offered. Graduates can choose between the international degree of PhD or the German degree Dr. rer. nat. The Graduate School offers double degrees with either the University of Padua (Italy) or the BioCenter Oulu (Finland). The maintenance of our high standards is guaranteed through the accreditation of our PhD program, regular advice from our international Scientific Advisory Board and a yearly evaluation by the PhD students. The Graduate School is funded by the Excellence Initiative of the German federal and state governments and represents another endorsement of our high scientific and educational quality and profile.

Selected Publications:


For a long time, elucidating human consciousness has been a task restricted to philosophers. In recent years, however, investigators of the neurosciences and psychology have used approaches to explain and gain a better understanding of this state of mind. Our research network aims at solving the riddle of consciousness from a cognitive neuroscientific perspective. In eleven research projects, general mechanisms governing conscious and unconscious visual perception are identified, both at a functional behavioral and at a neural level. This research network investigates how conscious differs from unconscious visual processing and identifies the mechanisms responsible for the selection and integration of visual information that contributes to conscious visual perception. It determines how these selection and integration mechanisms are implemented in the brain and specifies through which neural structures attention modulates conscious and unconscious perception. More specifically, we propose that conscious visual perception depends on recurrent activation within the visual system that leads to a consolidation of representations and a subsequent encoding of these representations into prefrontal working memory circuits. To address these important questions of consciousness research, classical psychological behavioral measures as well as neurophysiological measures of brain activity (event-related potentials; functional magnetic resonance imaging) are applied.
Additional Topics

Center of Excellence for Rare Diseases Baden-Württemberg

Funded by the State of Baden-Württemberg
Speaker: Prof. Dr. Dr.h.c. Frank Lehmann-Horn, Division of Neurophysiology
Keywords: stem cell therapy | collagen disorders | dentition difficilis | Duchenne dystrophy | rare disease

Nearly 5% of the German population suffers from a rare disorder. Because of this low prevalence, rare diseases remain unrecognized by resident physicians and there is a lack of information regarding diagnosis and treatment possibilities. In order to address this issue, centers for the study of rare diseases have been established at all five medical centers in Baden-Württemberg (Freiburg, Heidelberg, Mannheim, Tübingen and Ulm). Together they comprise the Center of Excellence for Rare Diseases Baden-Württemberg which has been established to create an integrative structure incorporating education, research and care. Research focuses on four main areas: 1. stem cell therapy in hereditary bone marrow diseases; 2. therapy of genetic disorders of skin and collagen, including scleroderma and vasculitis; 3. dental disorders, including dentitio difficilis; and 4. treatment strategies for Duchenne muscular dystrophy. In addition, the center is developing a database for expert profiles of rare diseases using webcrawler strategies which update automatically.

Selected Publications:
The Center of Medicine and Society

Additional Topics

Center of Medicine and Society
Funded by the State of Baden-Württemberg
Speaker: Prof. Dr. Heiner Fangerau, Institute of the History, Philosophy and Ethics of Medicine
Keywords: Interdisciplinarity | Networking | Prevention of Child Abuse | Research on Health Provision | Medical Humanities | Research Innovation

In the field of biomedical sciences, responsible future-orientated research can only be realized in a dialogue with society and under the consideration of historical, theoretical and ethical basic principles of medical research and action. In this respect, the Center of Medicine and Society intends to offer an interdisciplinary and multiperspective approach. Sixty one scientists and researchers from all academic fields are engaged in the projects of the Center of Medicine and Society.

The duties of the Center of Medicine and Society are:
1. The establishment of research groups focused on central points of intersection between medicine and society.
2. Accomplishment of profiled events and symposia.
3. Crosslinking initiatives of Ulm University in medical research fields of societal relevance.
4. Crosslinking of research in medical care that includes the fields of health economics and economic science.

Between 2013 and 2014, the center was able to fund and organize funding for the following multidisciplinary symposia:
The mechanization of old age – ethical, legal, social and medical aspects of assisting systems for senior citizens in need of care (Summer School, July 2013, BMBF).
The Center of Medicine and Society was of significant importance in the coordination and organization of the following successfully funded projects:
- Preventive decisions: The interaction of science, politics and the public in the implementation of national prevention programs for children and adolescents (2013-2016, MWK).
- Child well-being as a boundary object? Description and analysis of basic terms in child care in order to establish a culture of transparency in debates about child abuse in pedagogical institutions (H. Fangerau (Speaker), U. Ziegenhain, R. Tippelt, V. Viehöver, D. Birnbacher (2013-2016, BMBF).

Selected Publications: