



UNIVERSITY  
OF APPLIED SCIENCES  
KREMS / AUSTRIA

# Research

Research generates innovation.  
And innovation keeps us  
a step ahead.

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# FOREWORD



The IMC University of Applied Sciences Krems is highly respected as a reliable research partner for companies and for many international research consortia.

Since its foundation in 1994, the IMC University of Applied Sciences Krems has been widely regarded as one of Austria's leading and most international Universities of Applied Sciences with one of the most extensive international partnership networks in the sector. It is a pioneer in its core areas – business, health sciences and life sciences – and strives to develop innovative and sustainable solutions. Top positions in various rankings, a number of national and international accreditations, as well as numerous quality certificates, are the result of a strict commitment to excellence.

We concentrate on research activities that provide answers to the most pressing questions of the society. Thus, we focus on applied research that is conducted in close partnership with the relevant industries. More than 40 applied research projects are presently carried out with numerous partners.

Current developments in the field of life sciences, health sciences, and business feed directly into research questions that are dealt with in research projects, in research groups, or in research institutes.

The research activities of IMC University of Applied Sciences Krems are funded by research grants or by companies. As an example for a research activity that is funded by a significant research grant for excellent research, the "Josef Ressel Centre for Personalised Therapy" shall be highlighted, while the "Research Institute for Applied Bioanalytics and Drug Development" concentrates primarily on contractual research for companies. In the Business Department, the research group "CSR and Innovation" is funded by a large research grant and is renowned internationally for outstanding results.

With our highly experienced team of researchers and our state of the art research infrastructure, the IMC University of Applied Sciences Krems is the ideal partner for your research projects.



**Mag.  
Ulrike Prommer**  
CEO



**Prof. (FH) Dr.  
Karl C. Ennsfellner**  
CEO



**Prof. (FH) Mag.  
Eva Werner, Hon.-Prof.**  
Rector





"A pioneering spirit creates a bright future Research and technology are essential drivers of development in Austria and crucial to maintaining the country's prosperity. IMC Krems is the source of a great deal of innovation. The university's researchers have gained a strong international reputation, thanks in particular to their work in health sciences, life sciences and business. Lower Austria fosters the pioneering spirit of the province's universities of applied sciences through programmes and subsidies, meaning that good ideas lead to the creation of new jobs."

**Mag. Johanna Mikl-Leitner**  
Governour of Lower Austria



"The high quality of the Lower Austrian healthcare system is the result of close ties between research, education and practice. The ultimate goal is evidence-based patient care, because ultimately research and practically-focused education must benefit the general public. This is the context in which IMC Krems has become a vibrant centre of science, research and education, and an indispensable partner of NÖ Gesundheits- und Sozialfonds. IMC Krems focuses on innovative key research topics and educates the next generation of health experts. This lays the foundations for meeting the challenges of the future and maintaining a cutting-edge healthcare system, ensuring that the people of Lower Austria receive top-quality care."

**Mag. Elfriede Riesinger**  
CEO, NÖ Gesundheits- und Sozialfonds (NÖGUS)



Foto: FFG/Klaus Morgenstern



"Science, Research and development are indispensable for maintaining the competitiveness of the Austrian economy. Innovative companies create jobs, especially in the regions. Austrian universities and universities of applied sciences make a vital contribution to the Austrian innovation system: scientific findings are the "raw materials" for innovation, and a sound education fosters new generations of researchers and engineers. FFG funding and services act as a catalyst by stimulating private research investment, sharing development risk and improving the structure of the Austrian innovation system. Several hundred institutes, such as IMC Krems, participate in projects funded by the FFG each year. Many of these projects are carried out in cooperation with partners from industry."

**Dr. Henrietta Egerth and Dr. Klaus Pseiner**  
Managing Directors, Austrian Research Promotion Agency (FFG)



Cooperation between NÖ Landeskliniken-Holding and academic partners such IMC Krems plays an important part in applications-based research projects on various aspects of health care. These relationships promote the build-up of knowledge that enables us to overcome the diverse range of challenges facing the health service and continue providing the people of Lower Austria with effective, high-quality health care.








# IMC UNIVERSITY OF APPLIED SCIENCE

*Top-ranked in Austria*



STATE OF-THE-ART RESEARCH, A PRACTICAL FOCUS,  
AN INTERNATIONAL OUTLOOK AND STRONG NETWORKS



# F S KREMS



## VISION

As a university with a strong international reputation, we aim to develop and implement innovative and sustainable solutions in our core subject areas.

## MISSION

We are an Austrian university with an international focus. We offer degree programmes with a strong practical element that are tailored to the needs of business and industry. Our programmes meet international higher education standards, ensuring that our students are fully qualified to assume high-level positions in business and society. We constantly integrate our graduates and partners into the university's ongoing development, resulting in continuous improvements in the quality of teaching and research.

## VALUES

We are a learning team. Our culture is built on:

- Commitment
- Fairness
- Mutual trust
- Embracing diversity
- Supporting personal advancement
- A strong sense of responsibility

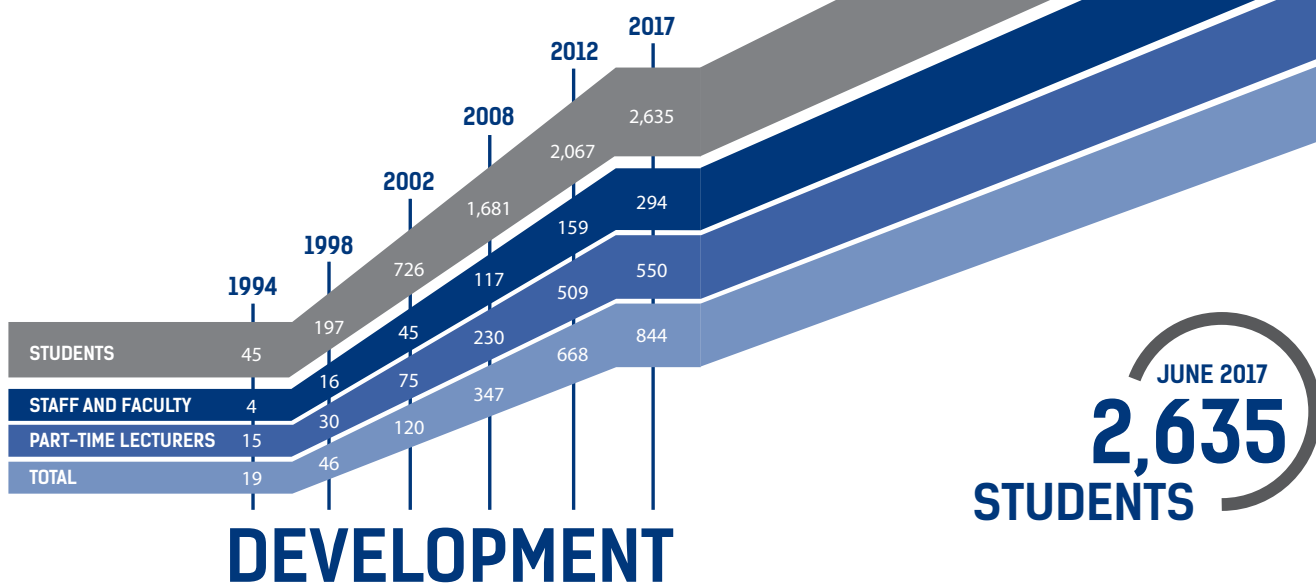
# FACTS AND FIGURES

IMC University of Applied Sciences Krems is a private limited company that operates on the basis of a public-private-partnership model.

## PERFORMANCE

In the past few years, the university has extended its excellent track record in evaluations of higher education institutions. In the CHE ranking, students gave top grades in the overall study situation, study organisation, teacher support and international orientation categories. The results underline IMC Krems' position as one of the leading higher education institutions in the German-speaking countries.

- Established in 1994
- 40% of study programmes in English
- More than 600 students enrolled in transnational programmes
- International faculty and staff, and 130+ partner universities worldwide
- Numerous research partners in business and industry
- Three locations/campuses (Campus Krems, Piaristengasse and the historic Gozzoburg)
- Awarded the seal of of EVALAG - authorised German Accreditation Agency for institutions of Higher Education
- Certified according to the ISO 9001:2000 quality assurance standard
- International Centre of Excellence in Tourism and Hospitality Education accreditation for the Tourism and Leisure Management bachelor and master degree programmes
- International accreditation seal of German agency ASIIN for Life Sciences degree programmes





# HIGH-QUALITY RESEARCH

IMC University of Applied Sciences Krems carries out applied research in the core subject areas of business, health and life sciences in collaboration with companies and other organisations. The university develops innovative solutions and brings high-potential products and processes to market. Our research-led teaching, application-driven research and groundbreaking expertise benefit both the economy and society as a whole.

## **JOSEF RESSEL CENTRE FOR ESTABLISHING PRINCIPLES OF PERSONALISED MUSIC THERAPY – RESEARCH INTO MUSIC THERAPY PROCESSES AND RELATIONSHIPS IN SELECTED AREAS OF NEUROLOGICAL REHABILITATION.**

This Josef Ressel Centre is dedicated to devising evidence-based scientific principles for personalised music therapy in selected areas of neurological rehabilitation. Many clinical case reports prepared in the course of the therapy process include descriptions of resonance experienced between the therapist and the patient. Such phenomena are difficult to comprehend scientifically, but are even described in accounts of music therapy treatment of patients with serious brain damage (e.g. traumatic brain injury, hypoxia, stroke, etc.).

## **RESEARCH INSTITUTE FOR APPLIED BIOANALYTICS AND DRUG DEVELOPMENT**

Founded in 2014, the research institute concentrates on developing potential new treatments, as well as identifying and optimising drugs aimed at cancer, and immune system and blood disorders.

## **CERTIFICATE OF COMPLIANCE WITH GLP**

New therapeutic molecules must meet the safety requirements of regulatory authorities (EMA, FDA) before they are launched to the market. One critical issue is the characterisation of adverse side effects and their negative impact on patients' health. We have started a long-term collaboration with research partners in the pharmaceutical industry to develop novel technologies and methods for the rapid and reliable testing of adverse side effects in preclinical models and in clinical samples. These technologies must meet the highest quality standards of "Good Laboratory Practice" (GLP), an internationally recognised quality assurance system for laboratory work, inspected by the scope of the Austrian national GLP monitoring programme.



# A DEPENDABLE RESEARCH PARTNER

## **STRONG INTERNATIONAL REPUTATION**

IMC Krams is recognised in Austria and abroad as a high-profile research partner with a strong reputation. It collaborates with businesses of all sizes – from SMEs to major companies – as well as tertiary education institutions, public bodies and other organisations. The university carries out one-off projects for companies, as well as multi-year research programmes financed by the Province of Lower Austria, the Austrian federal government and the EU. Research projects at IMC Krams are characterised by collaboration with all partners at every stage – from defining the focus of research questions to providing the relevant stakeholders with information on research findings.

## **INTERDISCIPLINARY APPROACH**

The diversity of the research projects carried out by the departments of Business, Health and Life Sciences ensures that there is enormous scope for interdisciplinary research. Their projects and findings generate economic, medical, pharmaceutical, technical and social benefits. These research activities also give rise to pioneering innovations that bring about changes in industry and society.

## **APPLIED RESEARCH AND RESEARCH DRIVEN TEACHING**

The university works closely with businesses and organisations to ensure that knowledge from the various fields of research feeds into day-to-day practice, and vice versa. Our researchers aim to integrate research findings into their teaching. Partnerships with research institutes and business partners in Austria and abroad, coupled with our lecturers' contacts with decision-makers and research groups at other universities enables IMC Krams to attract teaching staff for specialised courses, and also ensures that course contents are constantly up to date.

IMC Krams students are closely involved in application-driven research projects, and can write their bachelor or master thesis on a practical, topical subject related to the university's key research areas. Research-led teaching helps students to develop the skills required to handle day-to-day professional challenges. Our effectiveness in equipping students for their careers is reflected in outstanding levels of student satisfaction and strong demand from our research and business partners for IMC Krams graduates.

## **INTERNATIONAL NETWORK**

With 140+ partner institutions worldwide, IMC Krams is widely regarded as one of Austria's most international universities of applied sciences. This cross-border focus and our expertise have a positive impact on the university's research activities. Increasing numbers of international projects are being launched, and the findings as well as new trends and insights are published in the form of peer-reviewed academic papers and books, and also presented to the international research community and the general public at conferences and seminars. We direct our efforts towards steadily building up an international network of experts.



# DEPARTMENT OF BUSINESS







## BUSINESS SCIENCE

The Department of Business carries out work on a variety of specialist business topics, in each case focusing on interdisciplinary education, as well as research into modern management theories, the development of effective and innovative solutions and their direct implementation in companies, analysis of value added, and social research concentrating on corporate social responsibility. An interdisciplinary research network, and collaboration with corporate and academic partners as well as tertiary education facilities – with a strong international focus – expands the university's research portfolio and promotes the development and ongoing expansion of our research-related capabilities in the various research fields and topics.

Over the past 15 years, we have developed effective solutions for businesses and organisations as part of research projects such as:

- CSR and innovation
- Digital business transformation
- tourismFACTORY

These subjects addressed in these projects have become firmly established focus areas for long-term research.

## DIGITAL BUSINESS TRANSFORMATION

Digital transformation of companies and businesses goes beyond changes in the technological environment and technology application. Surviving in a digitalised economy is an entrepreneurial challenge. New business models and value chains, new industrial networks and new digital products are emerging, and digital technologies are changing business processes. The aim is to explore success factors and conditions behind successful digital transformation of companies, with a special emphasis on the shift from analogue to digital and digitalised business models. Leading companies in the region are working together with researchers and students to produce reliable evidence for long-term business success factors in the digital age. The aim is to strengthen the region's business and scientific competitiveness.

## CORPORATE SOCIAL RESPONSIBILITY AND INNOVATION

Sustainability and social responsibility are moving up the agenda at Austrian companies. Corporate social responsibility (CSR) is about companies making voluntary commitments to sustainable development that go beyond compliance with legal requirements. CSR encompasses more than just environmental issues and takes account of employees and other stakeholders in equal measure. Work on the key research topic of CSR and innovation focuses in particular on investigating the impact of a commitment to social responsibility by small and medium-sized enterprises (SMEs) – especially family businesses – as well as on the various phases of the innovation process, and developing suitable instruments, tools and recommendations to support these companies.



### Contact:

**Prof.(FH) DI Wolfgang Vrzal, MBA**

Head of Institute Business Administration and  
Management/Programme Director Business Administration

T: +43 2732 802 351

E: wolfgang.vrzal@fh-krems.ac.at

# GRUENRAUM: VALORIZATION OF GREEN SPACES

## BACKGROUND

Lower Austria is often referred to as “Austria’s Garden” due to its numerous gardens and the innovative approaches taken to garden tourism in the province. Members of the Gardens of Lower Austria association have a total of 127 gardens, which are open to the public. These gardens place a strong emphasis on ecological cultivation and maintenance. Many historic parks and gardens have also been recently revitalised in neighbouring Southern Moravia and Vysocina (Czech Republic) – a region with undiscovered potential and underutilised natural and cultural heritage. The gardens and parks in both of these areas need detailed information on various target groups and their specific requirements. There is also a need for new concepts to provide memorable experiences for their visitors.

## RESEARCH AIMS

The project is examining the revitalisation of green spaces to exploit their tourism potential, as well as ways to enhance the quality of the visitor experience with respect to natural and cultural heritage (both tangible and intangible) in gardens and parks in Lower Austria and Southern Moravia. It is analysing the profiles and requirements of the various garden visitor segments. Based on these findings, a manual with quality criteria for the use of the managers of these green spaces will be developed. The project will also develop and present to the market new joint, cross-border garden tourism propositions.

## RESEARCH DESIGN

The project combines both qualitative and quantitative research. Best practices employed by successful gardens and parks worldwide are being identified by means of interviews with garden managers and analyses of their websites. Focus groups will reveal the different requirements of specific visitor segments, and a visitor survey is being conducted to investigate visitor preferences and experiences. The findings of the various studies will be incorporated into a manual containing

quality criteria for the use of gardens and green spaces open to the public. The project places a strong focus on experience quality for visitors to parks and gardens as well as innovative propositions.

## RESEARCH PARTNERS

- The Gardens of Lower Austria association (Die Garten Niederösterreichs)
- Tourist Centre Southern Moravia in the Czech Republic
- IMC University of Applied Sciences Krems

## FUNDING

The project is funded by the EU’s INTERREG V-A Austria-Czech Republic programme.



## STATUS

Ongoing

## OUTCOMES

- Handbook containing quality criteria for the use of administrators of gardens and green spaces.
- Joint network and knowledge exchange in relation to gardens/green spaces and tourism.
- Joint cultural and natural heritage propositions featuring cross-border story-telling and innovative concepts and campaigns.



**Contact: Prof.(FH) Mag. Claudia Bauer-Krösbacher, PhD**

Professor, Department of Business

T: +43 2732 802 394

E: [claudia.bauer-kroesbacher@fh-krems.ac.at](mailto:claudia.bauer-kroesbacher@fh-krems.ac.at)







# SCALE(UP) ALPS – ACCELERATE AND PROMOTE THE ALPINE START-UP ECOSYSTEM

## BACKGROUND

The economy of the 21st century is affected by digitalisation and accelerating innovation cycles. Start-ups seem to profit from the general economic development based on globalisation and digitalisation. While the Alpine Space programme provides for a growing and dynamic start-up ecosystem, many of the involved start-ups are facing obstacles when scaling up across Europe and beyond. The growing start-up community intends to link Alpine Space start-up hubs, foster business acceleration, bridge SME-investor policy markets, and involve actors in a community of opportunities. Eleven European Partners (Three from Italy, three from France, two from Slovenia, one from Germany and two from Austria) are working together in this EU-funded project.

## RESEARCH AIMS

SCALE(up)ALPS aims to ensure that initially the Alpine Space, then the EU Single Market, are the launch bases for global competition of Alpine start-ups. The main goals are to connect innovation actors and increase knowledge transfer, as well as to enhance the business innovation potential of Alpine Space key high-growth SMEs. The project will focus on defining a start-up integrated ecosystem growth-strategy and Alpine Space services to grow tech companies accessing new markets or disruptive businesses in existing markets.

## RESEARCH DESIGN

The project seeks to identify and cluster all the start-up ecosystem stakeholders in the Alpine region, based on a distinctive set of research methods including interviews, secondary data analyses as well as surveys. Based on this data collection process, a network analysis will be conducted to analyse the current status of the various regional ecosystems. Training schemes shall be developed for regional decision makers to strengthen the regional ecosystems and connect them at an Alpine level.

As a Work Package Leader within this consortium of eleven European partners, three aspects are especially relevant for the IMC University of Applied

Sciences Krems:

- Development of a policy model for local and Alpine ecosystem acceleration
- Mapping the current start-up ecosystem in the Alpine Space
- Developing a start-up ecosystem canvas as a tool for local leaders (e.g. regional policy makers) to map the current status of their local ecosystem
- Scale up action plan including modular training programme to foster start-up ecosystem development and an as ecosystem stakeholder conference
- Developing and implementing stakeholder training programmes (one for each region)
- Organising and holding an ecosystem conference
- Set-up an open platform for best practice exchange and a database to connect start-ups and established companies
- Building and promoting the platform and the database

## FUNDING

The project is funded by the Interreg Alpine Space programme, a European transnational cooperation programme for the Alpine region. It provides a framework to facilitate cooperation between economic, social and environmental key players in seven Alpine countries, as well as between various institutional levels within academia, administration, business, the innovation sector and policy making.



## STATUS

Ongoing



### Contact:

**Mag. Dr. Tina Gruber-Mücke**

Professor, Department of Life Sciences

T: +43 2732 802 193

E: [tina.gruber-muecke@fh-krems.ac.at](mailto:tina.gruber-muecke@fh-krems.ac.at)



# DIGITAL BUSINESS TRANSFORMATION

## BACKGROUND

Digital transformation of companies and businesses goes beyond changes in the technological environment and application – it affects the very nature of a company. Surviving in a digitalised economy is an entrepreneurial challenge.

- New business models and value chains, new industrial networks, new digital products (global by nature)
- Digital technologies change business processes and top-down and bottom-up organisational structures (people, markets, processes, leadership).
- Digital transformation is an entrepreneurial challenge.

## RESEARCH AIMS

The project aims to explore the success factors and conditions for the effective digital transformation of companies, and places a strong emphasis on the transformation from analogue to digital and digitalised business models.

The research focuses on established companies, including international firms, in the process of digitalising their business models. It seeks to identify the most transformative developments in their industries and why and how they are responding to these.

## RESEARCH DESIGN

Leading companies in the region are working together with researchers and students in order to produce reliable evidence to identify sustainable business success factors in the digital age. This should strengthen the competitiveness of business and science in the region. IMC University of Applied Sciences Krems is responsible for the project's scientific management.

Various key topics have been identified and will be incorporated into further research to ascertain specific digital business transformation paths to provide competitive advantage to companies. Examples of key digital topics are augmented

and virtual reality tools (AR/VR), collaborative robotics and blockchain technology.

The project will employ multiple case study research methods from Yin (2009) and carry out focus groups with business owners, managers and company experts.

## FUNDING

The project is co-financed by the Province of Lower Austria (Department K3 - Science and Research) and leading companies in the region.

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Ongoing



**Contact: Prof.(FH) Mag. Gerhard Kormann**

Professor, Department of Business

T: +43 2732 802 381

E: [cgerhard.kormann@fh-krems.ac.at](mailto:cgerhard.kormann@fh-krems.ac.at)





# CORPORATE SOCIAL RESPONSIBILITY (CSR) AND INNOVATION MANAGEMENT

## BACKGROUND

CSR can play a major role in companies' competitiveness. As a strategic and management approach, CSR can help businesses to exploit the opportunities for innovation presented by current and future social and environmental challenges. However, in practice CSR activities are still rarely – or only to a limited degree – linked with innovation management.

## RESEARCH AIMS GROUP

The project aims to illustrate the effects of CSR on the various phases of the innovation cycle, and to develop suitable instruments and tools for SMEs and family businesses. This will generate scientifically-based recommendations for ways in which SMEs and family businesses can optimise or implement innovation processes, on the basis of their CSR strategy and goals. The project website can be found at: [www.csrundinnovation.at](http://www.csrundinnovation.at) (German only)

The findings are mainly intended to enable Austrian companies in particular to achieve innovation advantages by means of stakeholder involvement. The goal is to develop product and service innovations, and promote innovative, resource-efficient business models geared towards entering new markets and boosting competitiveness. Another research focus is the evaluation of CSR-driven innovations, which will involve developing and adapting CSR-based management control tools.

## RESEARCH DESIGN

Expert interviews were conducted and company workshops were organised to identify the current challenges faced by businesses and highlight examples of good practice. Ten Austrian SMEs that had won numerous awards for their innovative CSR approaches were selected as case studies. When selecting the companies, the aim was to achieve a balance in terms of sector, size and geographic location. Information was gathered from semi-structured personal interviews and secondary data. Multiple case study research

methods from Yin (2009) were supplemented by focus groups with business owners. A model for developing sustainable innovations, developed to take account of the special characteristics of SMEs, was then implemented and evaluated at two companies. The research findings continue to be presented at conferences in Austria and abroad.

## FUNDING

The project is funded by the Austrian Research Promotion Agency under the fourth call for the "Aufbau" line of the COIN – Cooperation & Innovation programme (programme owners/sponsors: Federal Ministry for Transport, Innovation and Technology; Federal Ministry of Science, Research and Economy).



## STATUS

Ongoing



**Contact:**  
**Prof.(FH) Mag. Dr. Reinhard Altenburger**  
Professor, Department of Business

T: +43 2732 802 317  
E: [reinhard.altenburger@fh-krems.ac.at](mailto:reinhard.altenburger@fh-krems.ac.at)







# INNOVATIONS IN FAMILY BUSINESSES: CONTEXTUAL FACTORS, PROCESSES AND PERFORMANCE EFFECTS

## BACKGROUND

Innovation can be the key for the creation of competitive advantage and thus plays a central role in driving business performance and business growth. In family businesses, innovation behaviour is often largely shaped by the idiosyncrasies of the business family. For instance, the business family's desire to sustain the business over generations provides long-term capital (patient capital) to the business and prompts family managers to make far-sighted investment decisions. Family businesses also often form part of strong and trusting social networks with stakeholders, creating many opportunities to mobilise people for new ideas. However, despite the fact that family businesses retain a number of assets that are conducive to innovation, investigations comparing the innovation output in family businesses and non-family businesses show ambiguous results. These results suggest that family businesses are both more and less innovative. These inconsistencies may be due to paradoxical effects of family involvement, as the family not only constitutes a resource but also a liability for innovation. For instance, family businesses prefer to avoid projects associated with high risk because they do not want to gamble with the inheritance of family members. They prefer continuity which prompts them to rely on what is tried-and-trusted and adhere to family traditions, instead of trying new things. Empirical evidence also indicates that the innovative capacity of family businesses frequently decreases across generations. Thus, although family businesses often have great innovation potential, they are sometimes reluctant to make use of this. This phenomenon is also known as the ability-willingness paradox.

## RESEARCH AIMS

The question of how family businesses make use of their innovation capacity and why some family businesses are better innovators than others is therefore the focus of the current research project at the University of Applied Sciences Krems (in cooperation with the Research Institute for Family Businesses, Vienna University of Economics and Business).

## RESEARCH DESIGN

Building on the approach of "learning from the best", we aim to analyse five Lower Austrian family businesses that can be considered as best practice examples in terms of their level of innovation. More specifically, we focus on older family businesses that have preserved or recovered their innovative capacity and are exceptionally innovative. Each case will be analysed individually and finally contrasted with the remaining cases. This enables the development of "innovative role models" for family business practitioners.

## FUNDING

The project is co-financed by the Province of Lower Austria (Department K3 - Science and Research) and leading companies in the region.

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## DURATION

July 2016 – August 2017

## STATUS

Ongoing



### Contact:

**Prof.(FH) Mag. Dr. Reinhard Altenburger**

Professor, Department of Business

T: +43 2732 802 317

E: reinhard.altenburger@fh-krems.ac.at



# ERASMUS+ THE WINE LAB

## COOPERATION FOR INNOVATION AND THE EXCHANGE OF GOOD PRACTICES. ALLIANCES – PARTNERSHIPS BETWEEN THE WORLD OF WORK AND EDUCATION AND TRAINING INSTITUTIONS.

### BACKGROUND

Europe is a leading producer of wine, and the world's leading wine exporter: wine is part of our culture, shapes our landscapes, and provides employment to millions. Wine producers are mostly small and micro enterprises. The sector "is composed of an overwhelming majority of small producers, and is therefore extremely atomised in comparison with other food and drinks industries" (DG Agriculture). Small and micro wineries often also have to deal with sector-specific difficulties, related to the local conditions – e.g. small vineyards which are not always contiguous and often in terraces, are labour-intensive, and grow various grape varieties in small quantity. It is widely recognised that small wineries achieve better performance when they are networked or clustered, but often companies located in areas with disadvantages with respect to their geography also have difficulties in establishing relationships that are crucial for their survival. Isolation, limited access to learning opportunities in contrast to the need for a range of skills which are unrelated to production – as a small business is still a business – are factors that characterise management in the target group.

### RESEARCH AIMS

The aim of The Wine Lab is to create a knowledge alliance between universities with expertise in agriculture, oenology and related fields and small wineries located in areas with disadvantageous characteristics to stimulate knowledge flow, share problems and solutions, and jointly generate innovation in the wine sector. The Wine Lab creates the basis for a dialogue between research, business and regional communities. It is based on clustering and networking, and aimed at providing learning opportunities, applying action and experiential research and learning, and exploiting knowledge on a regional basis for the creation of new methods and approaches in policy planning.

### RESEARCH DESIGN

The Wine Lab knowledge alliance is aimed at establishing structured cooperation between universities and businesses, by promoting active stakeholder dialogue and joint initiatives in order to

1. generate innovative ideas for the sector to grow, incorporating new solutions to technical problems and particularly new approaches in the market (e.g. agribusiness and place branding)

2. promote exchange and mutual learning between producers and researchers
3. identify learning gaps, both in students' curricula and in lifelong learning for wine makers, in order to provide tailored training
4. foster an entrepreneurial mind-set in students on agriculture-related programmes
5. establish linked local innovation hubs across Europe

### This will be implemented by means of

1. traineeships and university work placements
2. joint tutoring
3. joint development of modules and courses to adapt academic curricula
4. joint development of courses for professionals in the wine sector (lifelong learning courses)
5. events, meetings and labs to foster both the local and European dimension

### FUNDING

The project is funded within the scope of the Erasmus+ framework under the Cooperation for innovation and the exchange of good practices. Alliances - Partnerships between the world of work and education and training institutions funding programme.



Erasmus+

### STATUS

Ongoing



### Contact: Dr. Albert Franz Stöckl

Programme Director, International Wine Business,  
Department of Business

T: +43 2732 802 338

E: [albert.stoeckl@fh-krems.ac.at](mailto:albert.stoeckl@fh-krems.ac.at)









# DEPARTMENT OF LIFE SCIENCES



## MEDICAL BIOTECHNOLOGY AND BIOPROCESS ENGINEERING

The Department Life Sciences acts as an international academic competence centre of interdisciplinary education and research and seeks to facilitate communication and interaction among a wide range of applied bio-medical research areas including cancer, immunological disorders, toxicology, drug discovery and advanced bioprocess technologies. The interdisciplinary team is optimally positioned to move rapidly from disease modelling to the identification and development of drugs and lead compounds.

In the last decade, we have developed four R&D core platforms with cutting-edge infrastructure and sustainable scientific expertise and know-how:

- Drug Discovery and Development
- Bioanalytics
- Personalised Medicine and Diagnostics
- Bioprocess-Technology and Production of Biopharmaceuticals

Moreover, we have established an international scientific network including universities, research institutes, small and medium-sized enterprises and global pharmaceutical players.

We have implemented quality management strategies (GLP) to meet the requirements of our industrial partners and promote an optimal level of translation of research into business. The R&D platforms are incubators for future scientific productivity and are likely to stimulate the launch of biotech start-ups in the region.

It is our mission to bring cutting-edge research to our students in a very personal and authentic manner. Relevant R&D topics are integrated into lectures and practical training on bachelor and master curricula. The research activities are instrumental for high quality education and for preparing the next generation of young scientists for careers in industry and academia.



**Contact:**

**Prof.(FH) Mag. Dr. Harald Hundsberger**

Vice Rector/Head of Institute, Biotechnology/Programme  
Director, Medical and Pharmaceutical Biotechnology

T: +43 2732 802 521

E: [harald.hundsberger@fh-krems.ac.at](mailto:harald.hundsberger@fh-krems.ac.at)



# RESEARCH INSTITUTE FOR APPLIED BIOANALYTICS AND DRUG DEVELOPMENT

## BACKGROUND

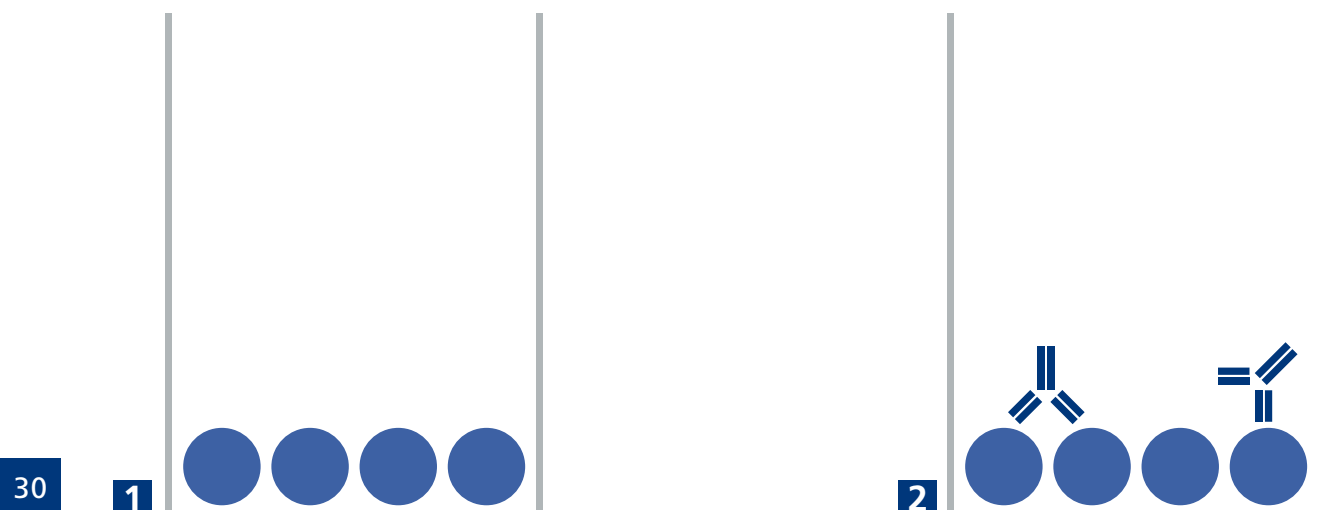
The pharmaceutical industry is currently outsourcing many areas of research and development to academic institutions. This trend has opened new opportunities and fields of activity in translational and applied biomedical research and development. In this regard, the Research Institute for Applied Bioanalytics and Drug Development operates as an internationally recognized Contract Research Organization (CRO) for the pharmaceutical industry and for small and medium sized biotech companies. Collaboration with the industry has fostered the establishment of sustainable scientific communication networks, databases, infrastructure, and novel innovative technologies. The research institute thus serves as an important incubator for emerging technologies at the Technopol Area Krems in Lower Austria.

## RESEARCH AIMS

The research institute focuses on identifying bioactive substances and biomolecules, their pharmaceutical optimization, and the preclinical and clinical monitoring of their therapeutic efficacy and safety. The identification and molecular characterization of adverse side effects that are potentially detrimental to health are critical issues within the scope of our research activities. Hence, our technologies and experimental strategies must meet the highest quality standards of Good Laboratory Practice (GLP), an internationally recognized quality assurance system for laboratory work. The research institute holds an accreditation for GLP issued by the Austrian Agency for Health and Food Safety (AGES) and possesses trained personnel for performing GLP and GCLP studies. Our work fully complies with the safety requirements imposed by regulatory authorities such as the European Medicines Agency (EMA) and the U.S. Food and Drug Administration (FDA).

Figure 1: Detection of antibody reactions against new drugs

**ELISA** (enzyme-linked immuno-sorbent assay) for the detection of specific anti-drug antibodies (ADA)



## RESEARCH DESIGN

Our current research projects primarily concentrate on the development of detection methods that help to assess the immunogenicity of biologicals. Notably, we are developing and validating test methods to identify, describe and quantify interactions of biological drugs with the immune system. We have formed long-standing partnerships with global biotech companies and the pharmaceutical industry to drive forward the development of state of the art technologies and methods for testing drugs and their safety in preclinical and clinical studies. This includes determining whether patients develop antibodies against a drug (anti-drug antibodies, ADA, see Figure 1) or whether changes occur in different parameters of the immune system, such as cytokine expression or activation of the complement system. Each individual drug or therapeutic agent requires the development of a customized set of validated test methods. All validations and studies meet rigorous quality criteria and fully comply with international GLP/GCLP guidelines.



**Contact: Prof.(FH) Priv.Do. Mag. Dr. Andreas Eger**

Head of Research Institute for Applied Bioanalytics and Drug Development / Professor, Department Life Sciences

T: +43 2732 802 369

E: andreas.eger@fh-krems.ac.at

## RESEARCH PARTNER

Pharmaceutical Industry, small and medium sized biotech companies, health care centers

## FUNDING

Contract research, national and international funding agencies

## STATUS

Ongoing

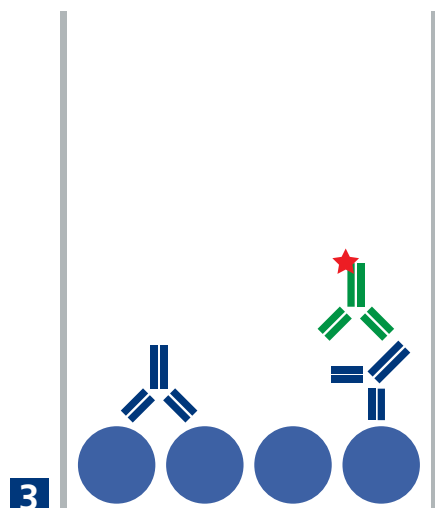


**Contact: Mag. Dr. Peter Allacher**

Head of Laboratory/Research Institute for Applied Bioanalytics and Drug Development

T: +43 2732 802 281

E: peter.allacher@fh-krems.ac.at



- 1 Therapeutic drug coated on a micro-titer plate
- 2 Incubation of patient serum – specific ADA bind to the therapeutic drug
- 3 Detection of bound ADA with an enzyme-labelled detection antibody; the enzyme converts a substrate into a quantifiable colour reaction



# ENGINEERING OF THERAPEUTIC PEPTIDES FOR CANCER AND REGENERATIVE MEDICINE

## BACKGROUND

Proteins and peptides are key molecules in all biological processes. Their unique chemical properties make them particularly well suited for use as therapeutic agents. They have high biological activity and specificity with comparably few toxic side effects, and can be used to produce a range of highly diversified compounds that are not subject to intellectual property restrictions. The market for synthetic therapeutic peptides is growing steadily, making it an increasingly attractive area for pharmaceutical companies.

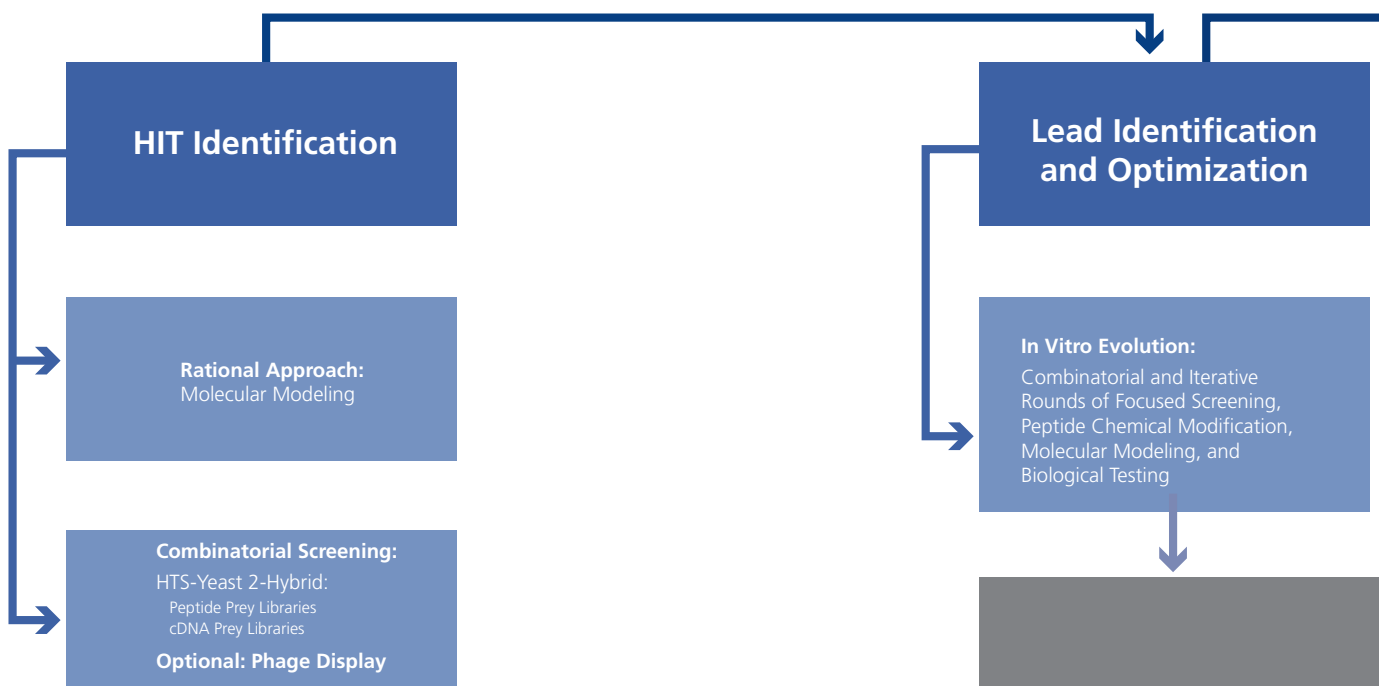
## RESEARCH AIMS

In this project, we aim to improve and extend our existing peptide drug discovery platform in close cooperation with Kamil Önder of the Paracelsus Medical University in Salzburg. The research project's specific focus is the development of peptides that modulate the activity of the epidermal growth factor receptor (EGFR). In many cancers, the EGFR signalling pathway is fundamental to the proliferation, survival, angiogenesis and metastasis of cancer cells. In addition peptide-mediated activation of the EGFR pathway might be

beneficial for tissue engineering and regenerative medicine. This project will foster the development of sustainable and cost-effective technologies for biopharmaceutical drug discovery, therapeutic apheresis, toxin neutralisation and tissue engineering. These areas are key fields of research for many biotech companies. The project will make an important contribution to the establishment of a local high-tech cluster for applied medical biotechnology, which in turn will support the launch of new start-ups in the region in the near future.

## RESEARCH DESIGN

This project combines rational design and experimental, high-throughput screening methods for therapeutic peptide development. The rational approach incorporates computer-assisted drug design methods (molecular modelling) to substantially minimise development costs, resources requirements and experimental work load. The high-throughput combinatorial screening involves yeast two-hybrid and phage display technologies. Both of these technologies have been optimised for the identification of peptide ligands. In the last few years our partner has developed a large number





of libraries (peptide, cDNA and full genome libraries, and ORFeom) which enable hit candidates to be rapidly identified. Using the latest recombinant DNA technologies and aided by molecular modelling, high-affinity lead peptides are generated in an iterative process known as in vitro evolution. As has been shown in recent years, the integration of experimental methods and computer-assisted modelling generates synergies and increases the chances of successful drug development.

#### RESEARCH PARTNER

■ Priv.Do. Dr. Kamil Önder  
Paracelsus Medical University Salzburg



#### Contact: Prof.(FH) Priv.Do. Mag. Dr. Andreas Eger

Head of Research Institute for Applied Bioanalytics and  
Drug Development / Professor, Department Life Sciences

T: +43 2732 802 369 E: andreas.eger@fh-krems.ac.at

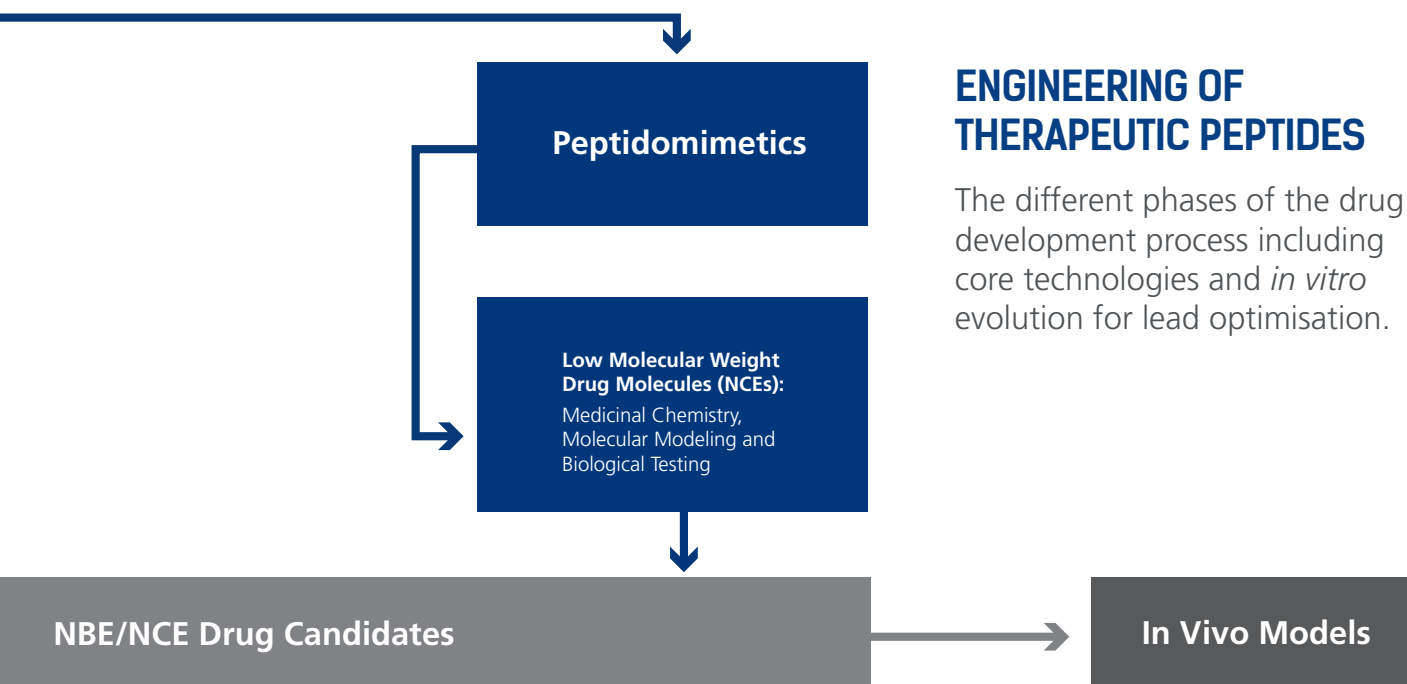
#### FUNDING

The project is funded by NÖ Forschungs- und Bildungsges.m.b.H. (NFB) and is part of their Life Science Call 2013 programme.



#### STATUS

Ongoing



# DEVELOPMENT OF COMPLEX EXTRACORPOREAL CARCINOMA MODELS FOR THE IDENTIFICATION OF PERSONALISED CANCER THERAPIES

## BACKGROUND

Intensive research into the molecular causes of cancer has led to the development of a range of innovative and targeted therapies which are used to selectively inactivate the molecular mechanisms responsible for tumour progression and the growth of cancer cells. These therapies can inhibit the proliferation of cancer cells and induce programmed cell death (apoptosis). They are not effective in all cancer patients due to the genetic heterogeneity of tumours. Personalised oncology aims to establish a direct link between tumour cell genotypes and sensitivity to bioactive substances, so that the patient first and foremost receives the targeted therapy with the maximum clinical benefit. The project is being carried out in close collaboration with the Lower Austrian university hospitals in Krems and Tulln operated by Niederösterreichische Landeskliniken Holding.

## RESEARCH AIMS

In the current project an experimental approach is being developed to complement diagnostic biomarker studies. We plan to develop organotypic cancer models that enable the direct testing of the clinical efficacy of cancer therapies in cell and tissue cultures (in vitro). A large number of potential cancer therapies, which are often combinations of targeted drugs and conventional chemotherapeutic agents, could be quickly tested for their clinical efficacy on a personalised basis.

## RESEARCH DESIGN

New types of extracorporeal – in other words, performed outside the body – and patient-specific experimental tests of cancer therapies are being intensively investigated around the world. However, the technologies and materials are still at a very early stage of development. This project, devised at the IMC University of Applied Sciences Krems, is aimed

at the development of innovative tissue and cell culture technologies, which can be used to preserve the complex anatomy and physiology of a tumour for prolonged periods of time in cell culture. Part of the tumour tissue obtained after resection is sliced into microscopic fragments using microtome or vibratome technologies. Special culture techniques are then employed to preserve the original biological features of the tissue in culture. Alternatively, we isolate primary cancer and stroma cells from the tumour and generate customised organotypic co-cultures to study paracrine cell communication on the molecular level. The contribution of the tumour stroma (the cells and connective tissue surrounding the cancer cells) to the effectiveness of cancer therapies can be investigated using these new cancer models. As has been shown in recent years, the composition of the tumour stroma can significantly influence the aggressiveness of cancer cells and consequently the cancer therapy. Together with tissue- and cell-based test methods that are being developed in parallel, the effect of the drug on the tumour and stroma cells can be accurately analysed and quantified.

## RESEARCH PARTNER

- The university hospitals in Krems and Tulln operated by Niederösterreichische Landeskliniken Holding

## FUNDING

The project is funded by Niederösterreichische Forschungs- und Bildungsges.m.b.H. (NFB) through its Life Science Call 2011 programme.



## STATUS

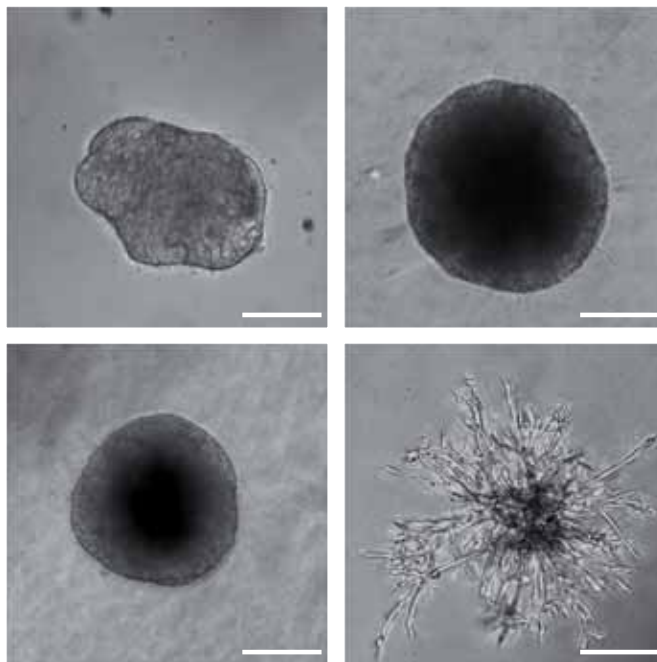
Ongoing



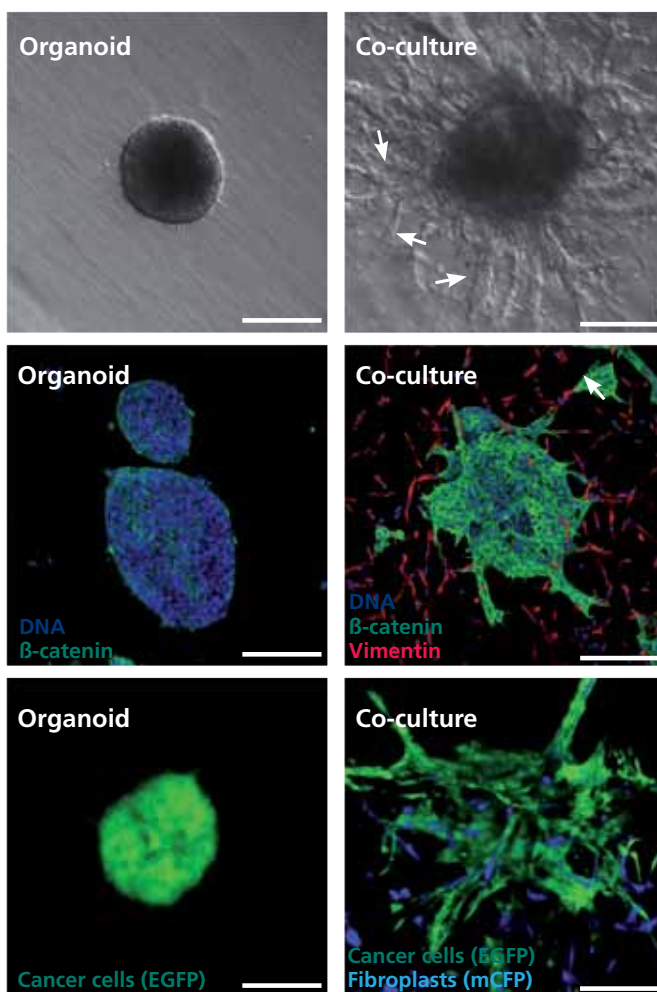
**Contact: Prof.(FH) Priv.Doiz. Mag. Dr. Andreas Eger**

Head of Research Institute for Applied Bioanalytics and  
Drug Development / Professor, Department Life Sciences

T: +43 2732 802 369 E: andreas.eger@fh-krems.ac.at



Different organotypic lung cancer models embedded in natural extracellular matrices. The miniaturised tumours consist of lung carcinoma cells that were engineered to form 3-dimensional cultures in vitro. The microtumours represent ideal tools to study drug efficacy, genotype-drug response relationships and oncogene addiction. Scale bar: 200µm.



Complex organotypic and multicellular cancer models. Lung cancer cells and cancer-associated fibroblasts (CAFs) were co-embedded in natural extracellular matrices. The cells were visualised by interference modulation contrast (top panel), immunofluorescence microscopy using antibodies against beta-catenin (green, cancer cells) and vimentin (red, CAFs) (middle panel). Cells were also labelled by ectopic expression of green fluorescent protein (EGFP, green, cancer cells) and cyan fluorescent protein (mCFP, blue, CAFs) (bottom panel). Note that in the co-cultures the cellular crosstalk between cancer cells and surrounding CAFs induced cancer cell invasion and microtumour dissemination. The complex multicellular models can accurately predict clinical drug efficacy. Scale bar: 200µm.



# THE ROLE OF NRF2 IN MELANOMA PROGRESSION – INSIGHTS INTO THE MECHANISM OF METASTASIS

## BACKGROUND

Melanoma is one of the most frequent tumours in young adults. Even though it only accounts for 4% of all cases of skin cancer, melanoma is responsible for 79% of all skin cancer-related deaths. Despite the progress that has been made in the treatment of melanoma (e.g. with BRAF inhibitors), patients finally succumb due to resistance mechanisms acquired by the tumour. Many lines of evidence have shown that especially a metastatic melanoma exhibits a strong metabolic turnover, which is required to fuel cell proliferation and anabolic pathways. This increased cellular turnover also results in an increased demand to maintain the redox homeostasis. Here we propose analysing this high metabolic and therefore also ROS (reactive oxygen species) generating stress as a possible Achilles heel of melanoma. One of the major regulators of stress response in cancer is NRF2. It plays a central role in the protection of cells against oxidative and xenobiotic stresses.

## RESEARCH AIMS

The inhibition of NRF2 or its target genes might re-establish the sensitivity of melanoma to apoptosis driven by ROS. This mechanism could also prevent resistance mechanisms frequently observed in metastatic melanoma and may eliminate the frequently observed activation of endothelial cells, which surround tumour cells. It is highly likely that a combination of state of the art melanoma treatment with compounds that inhibit the generation of ROS scavengers potentiates the effectiveness of the current treatment regimens. Here we will use CRISPR-based methods as well as pharmacological inhibition to elucidate the mechanistic role of NRF2 in melanoma cells and on endothelial cells. We will also transfer

knowledge gained from our model by closely cooperating with clinicians who routinely care for melanoma patients. We propose that eliminating the antioxidative response by suppressing NRF2 directly, or its targets, will be an effective weapon in the battle against metastatic melanoma.

## RESEARCH DESIGN

1. Profiling of 15 melanoma cell lines for NRF2 activity and CRISPR-mediated knockout of NRF2. Tumour specific consequences of NRF2 loss will be evaluated.
2. Combination of state of the art melanoma kinase inhibitors with NRF2 inhibition and screening for synergistic effects.
3. Paracrine effects of NRF2 modulation in melanoma. Functional consequences on endothelial cells.
4. Validation of NRF2 and its targets as novel markers for melanoma progression.

## FUNDING

The project is funded by NÖ Forschungs- und Bildungsges.m.b.H (NFB) under its Life Science Call 2014 programme.



## STATUS

Ongoing



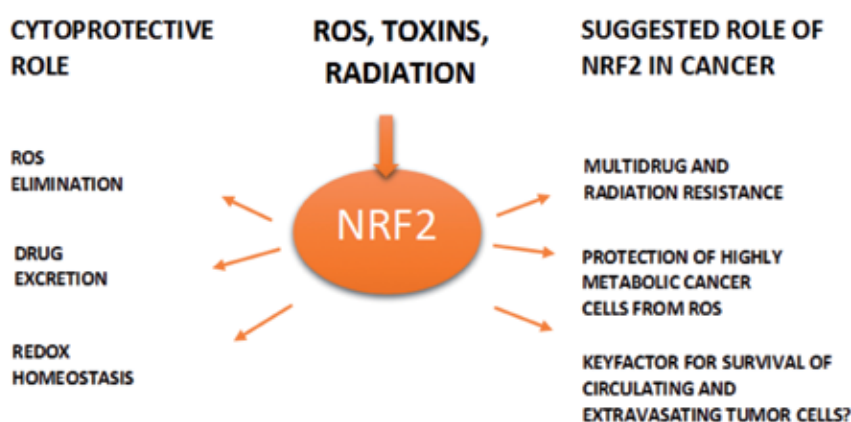
### Contact:

**Prof.(FH) Mag. Dr. Harald Hundsberger**

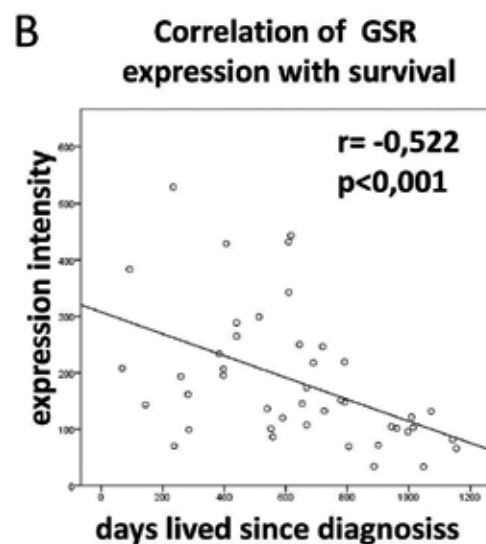
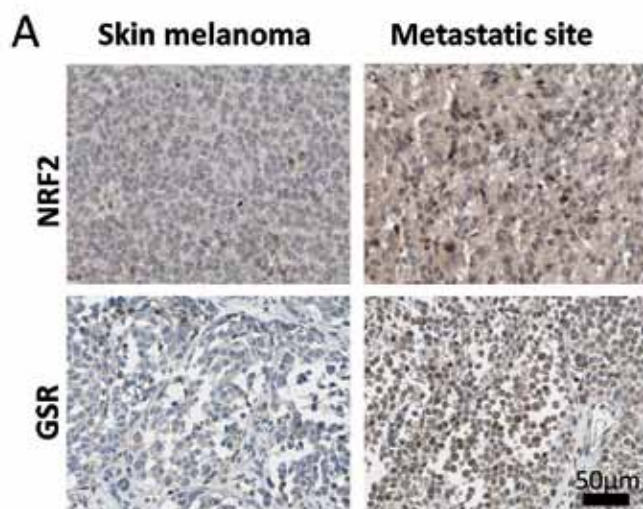
Vice Rector/Head of Institute, Biotechnology/Programme  
Director, Medical and Pharmaceutical Biotechnology

T: +43 2732 802 521

E: harald.hundsberger@fh-krems.ac.at



Summary of the cytoprotective roles of NRF2 on normal cells and hypothesised impact on cancer cells. We hypothesise that up regulation of NRF2 associated target genes is a key event in generation of highly metastatic cancer cells in relation to survival, energy supply, extravasation and adaption to new environment.



We were able to detect strong NRF2 staining in metastasising melanoma samples. Interestingly, NRF2 localises predominantly to the nucleus in metastatic samples (see top panels of figure A) and positive staining corresponds with strong glutathiondisulfid reductase (GSR) expression in sections from the same patient (see bottom panels of figure A). Positive staining is indicated by brown color (DAB), nuclei are stained in blue (hematoxylin). Correlating the NRF2 target GSR with patient survival time after the time of metastasis diagnosis, revealed a strong negative correlation ( $r = 0.522$ ) with  $p < 0.001$  (Pearson). Calculated with SPSS, data derived from GSE19234(1) (see figure B).

# DEVELOPING A DESIGN PIPELINE FOR INNOVATIVE PROTEIN-PROTEIN INTERACTION INHIBITORS

## BACKGROUND

The functioning of living organisms is to a large extent dependent on the interplay between the biomolecules they are composed of. Protein-protein interactions (PPIs) are a basic mechanism that regulates this interplay. Consequently, in the past few years the search for active compounds that have a therapeutic influence on protein-protein interactions has been intensified. In most cases these compounds are inhibitors of these interactions.

## RESEARCH AIMS

The aim is to use a bacterial enzyme system in order to develop a new prototypical work flow for the generation of hit structures for the inhibition of PPIs. Inhibitor peptides are generated and their binding conformations subsequently determined on the basis of nuclear magnetic resonance (NMR) studies. Finally, the NMR conformations of the peptides are used to identify potential small molecule inhibitors (hits) by means of molecular modelling. In the best-case scenario, the project will identify antibiotic substances, as well as arriving at a prototypical work flow for generating PPI inhibitors.

## RESEARCH DESIGN

Our multi-disciplinary approach is based on three key technologies:

(1) The ORFormer technology patented by our corporate partner generates peptides that inhibit protein-protein interactions; the peptides are produced by means of directed in vitro evolution.

(2) NMR methods deliver atomic-level structural restrictions and dynamic parameters for interaction-related, receptor-bound conformations of inhibitor peptides in solution.

(3) This information is used to generate pharmacophore models with the help of molecular modelling. Pharmacophores provide abstract descriptions of molecular features based on general characteristics (e.g. hydrogen bond donors or acceptors, hydrophobic or charged groups, etc.). These can then be used for virtual screening designed to identify small organic hits for the inhibition of PPIs.

## RESEARCH PARTNERS

- Johannes Kepler University, Linz
- Procomcure Biotech GmbH, Salzburg

## FUNDING

The project is funded by the Austrian Research Promotion Agency under the 15th call for the BRIDGE 1 programme line.



## STATUS

Ongoing



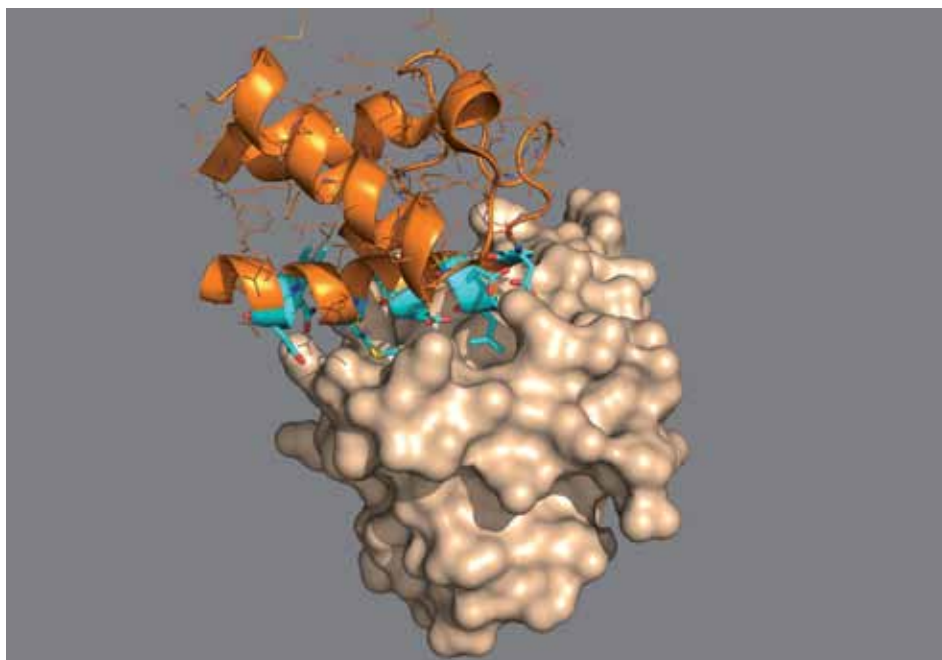
### Contact: Dr. Christian Klein

Professor, Department of Life Sciences

T: +43 2732 802 522

E: christian.klein@fh-krems.ac.at





Molecular Modelling:  
The interaction between ACP-  
ACPS (Acyl Carrier Protein - Acyl  
Carrier Protein Synthase) serves  
as a model system in the PPI  
project. The Figure above shows  
the ACP-ACPS interaction as  
derived from an X-ray structure  
(PDB Code: 4DXE)

# IN VIVO RNA INTERFERENCE STRATEGIES AGAINST ADENOVIRUSES

## BACKGROUND

Patients with an impaired immune system, such as HIV-positive patients and recipients of solid organ and particularly hematopoietic stem cell transplants, are at high risk of life-threatening infections with human adenoviruses. Among stem cell transplant recipients with systemic infections, mortality rates of almost 80% have been reported. The efficacy of commonly used drugs to treat adenovirus infections is limited and frequently associated with toxicity. Alternative drugs are still under investigation. In light of the fact that numbers of solid organ and hematopoietic stem cell transplant recipients are constantly rising, there is a pressing need for alternative treatment options.

## RESEARCH AIMS

Short interfering RNAs (siRNAs) and artificial microRNAs (amiRNAs) are a class of artificial small RNAs that can bring about the inactivation of cellular and viral genes via the RNA interference (RNAi) pathway. In a previous project led by the investigators, highly potent siRNAs and amiRNAs with activity against components of the adenoviral DNA replication machinery that can effectively inhibit the replication of human adenoviruses in cell culture experiments were developed and characterised.

The project is aimed at investigating if adenovirus infections can be inhibited by these RNAi-triggering small RNAs in vivo.

## RESEARCH DESIGN

The project will investigate which of the two approaches (i.e. siRNA versus amiRNA) is more effective. RNAi-based inhibition of adenoviruses will be assessed in the Syrian hamster model which is able to mimic adenovirus infections in humans. The project also aims to investigate if concomitant introduction of a particular gene into adenovirus-infected cells can enhance the RNAi-based inhibition of adenovirus multiplication.

## RESEARCH PARTNERS

- University of Veterinary Medicine, Vienna
- University of Vienna
- University of Natural Resources and Life Sciences, Vienna

## FUNDING

The project is funded by the Austrian Science Fund (FWF)

**FWF**

Der Wissenschaftsfonds.

## STATUS

Starting in May 2017



**Contact: Priv.-Doz. Dr. Reinhard Klein**

Professor, Department of Life Sciences

T: +43 2732 802-883

E: Reinhard.Klein@fh-krems.ac.at





# VIRAL AND FUNGAL INFECTIONS

## BACKGROUND

The world-class standard of medical care in Austria means that many patients are now surviving in areas where previously treatments did not exist or were not widely available. This is thanks in no small part to developments in intensive care and transplantation. But one consequence, in particular of the advances in transplantation, has been a steep rise in the number of immune-deficient patients with a considerably increased risk of otherwise harmless infectious diseases, such as infections with adenoviruses. These types of infections can prove fatal for people in this patient group. While bacterial infections can for the most part be effectively controlled using antibiotics, treatment options for viral infections are unsatisfactory, and the persistently high mortality rate is clear evidence of the need for action in this area. It is no longer the original illnesses that are responsible for the death of immune-deficient patients, but rather the infections described above. We must therefore accelerate development in this area and find ways to identify new drug targets.

## RESEARCH AIMS

The aim of this research project is the systematic and scientific development of potential drug targets in the setting of infections in immune-deficient patients. The analysis of data obtained from in vitro models will afford new insights into the interplay between adenoviruses and human cells, which could lay the groundwork for further studies and the development of more effective therapies.

## RESEARCH PARTNERS

- Health University of Applied Sciences Tyrol
- fh gesundheit, fhg – Zentrum für Gesundheitsberufe Tirol GmbH



## FUNDING

The project is funded by the Austrian Research Promotion Agency under the sixth call for the “Aufbau” line of the COIN – Cooperation & Innovation programme (programme owner/sponsor: Federal Ministry of Science, Research and Economy)



## STATUS

Ongoing



**Contact: Priv.-Doz. Dr. Reinhard Klein**

Professor, Department of Life Sciences

T: +43 2732 802-883

E: Reinhard.Klein@fh-krems.ac.at



# SYNTHESIS AND INDUSTRIAL APPLICATION OF HYDROXYTYROSOL

## BACKGROUND

Olive oil is well-known for its health-promoting properties. The natural antioxidant hydroxytyrosol has been identified as source of these positive effects. Numerous scientific studies confirm the medicinal properties of hydroxytyrosol which efficiently reduces cell damaging oxygen radicals in human cells. Several syntheses of hydroxytyrosol have been presented in recent years. However, most of these routes are problematic when carried out on an industrial scale. While biotechnological procedures deliver the product with low efficiency and yield, chemical protocols utilize of hazardous materials or reactions which are a high environmental burden when carried out in industrial scale.

## RESEARCH AIMS

During the course of this project, an alternative synthesis of hydroxytyrosol will be developed. This new route aims for a higher yield of the important natural product by combining the advantages of biotechnological procedures and modern chemical reactions. Additionally, in collaboration with our industrial partner, a new and highly promising application of hydroxytyrosol in textile industry will be evaluated. Summarizing, the following goals can be defined:

- Establish whole cell oxidation (dihydroxylation of aromatics) as innovative and future-oriented methodology at the University of Applied Sciences Krems. By means of this environmentally benign protocol, fine chemicals and pharmaceuticals are accessible from organic waste.
- Synthesis of hydroxytyrosol, an important natural antioxidant with a wide range of applications in food industry, cosmetic industry, and pharmaceutical industry.
- Evaluation of a newly developed analytical instrument to measure the metabolic activity of various bacteria.
- Development of a new method for the mild and gentle selective bleaching of denim and related textiles.

## RESEARCH DESIGN

The project efficiently combines fundamental and applied research.

The aromatic portion of hydroxytyrosol will be prepared via whole cell oxidation of aromatic halides with soil bacteria. A variety of substrates will be employed in the fermentation process with different strains of bacteria. Based on the measurement of impedance of the fermentation broth, we aim to gain information on the metabolic activity of bacteria. After the successful biocatalytic dihydroxylation of aromatic compounds, hydroxytyrosol will be prepared by means of a short sequence of chemical reactions. Together with our industrial partners, all steps will be optimized in respect to their application in large scale synthesis and reagents and conditions will be adjusted to minimize the overall costs of the synthesis.

## RESEARCH PARTNERS

- Acticell
- Sylab
- University of Natural Resources and Life Sciences (BOKU)

## FUNDING

The project is co-financed by the Province of Lower Austria and the European Regional Development Fund (ERDF).



## STATUS

Ongoing



**Contact: Prof.(FH) DI Dominik Schild**

Professor, Department of Life Sciences

T: +43 2732 802 501

E: dominik.schild@fh-krems.ac.at





# DEPARTMENT OF HEALTH SCIENCES



The Health Sciences Department at IMC Krems carries out research into therapeutic and nursing care as well as procedures on and in conjunction with patients. These can be interventions that are systematically developed at the department, or existing interventions that are systematically tested. Suitable outcome measures and measurement instruments, which may be specially developed, are an important part of the implementation and evaluation process. The department's research projects are interdisciplinary and focus on practical application, covering health promotion, prevention, curative care and rehabilitation, and encompassing the entire course of a person's life from birth to professional end of life care. Chronic illness is another theme that projects address.

A major priority in our research is consideration of the diverse perspectives and needs of all stakeholders, from patients and their relatives to different kinds of health professionals. We also place a particular emphasis on involving patients and medical practitioners in evaluation. The objective is to bring practice and research closer together.

Our degree programmes address specially designed curative, rehabilitative and preventive patient pathways and related procedures in the following fields:

**Advanced Nursing Practice:** complex issues facing nursing and care professionals, as well as the development of care techniques and problem-solving approaches

**General Nursing:** Nursing theories, nursing process, nursing diagnoses and health care based on scientific knowledge, evidence based nursing and evidence based practice in different settings

**Midwifery:** pre-pregnancy and prenatal care, childbirth, postnatal and infant care

**Music therapy:** the ways in which music, therapeutic relationships and creativity can influence an individual's condition during periods of good health, illness and recuperation

**Occupational therapy:** occupational performance in everyday life, as well as environmental, personal and occupational factors which have influence on it

**Physiotherapy:** development, restoration and preservation of everyday practical skills, and the musculoskeletal structures required



**Contact:**  
**Prof.(FH) Priv.-Doz. Mag. Dr. Gerhard Tucek**  
Head of Institute of Therapeutic Sciences/  
Head of Josef Ressel Centre

T: +43 2732 802 367  
E: gerhard.tucek@fh-krems.ac.at



# JOSEF RESSEL CENTRE (JRC) – HORIZONS OF PERSONALISED MUSIC THERAPY IN NEUROREHABILITATION

## BACKGROUND

Over the last decade, the term “personalised medicine” has become increasingly important in the areas of pharmacogenetics, pharmacogenomics, clinical diagnostics and in particular in chrono-pharmacology, which is concerned with the optimum time for administering medication. In other words personalised medicine is about developing optimal therapies primarily based on patients' genetics.

The Josef Ressel Centre (JRC) takes a humanistic stance, approaching personalisation at a more communicative and psychophysiological level. Austrian law describes music therapy as “...an interaction between one (or more) therapist(s) with one (or more) patient(s)”. (2008 Austrian Music Therapy Act, as amended). So the legislation recognises the importance of human interaction in the context of a therapeutic relationship.

As a consequence, the JRC carries out research into music therapy and not just into the effects of music. Recognising that the “effects of (performing or listening to) music in the context of a therapeutic relationship” are very complex, the issue of personalisation of therapy is the JRC's overriding research topic.

The use of “depersonalising” manuals and guidelines for the design of music therapy is becoming more and more popular. This has to be viewed critically, as this approach does not respond to the complexity of the actual bedside situation involving patient and therapist. For instance, there is a danger of ignoring the patient's specific needs which are crucial for her/his compliance (Duncan, Miller, Wampold, Hubble 2011). However, there is no doubt about the necessity for “good evidence in clinical practice” – which goes beyond single case reports. The JRC's new approach is geared towards personalisation and therefore combines research in the following two main areas.

1. Focus one: research on the psychophysiological disposition of the patient and the therapist and its influence on appropriate times of a therapy intervention for particular patients

2. Focus two: research on empathy-based therapeutic relationships in the light of selected psychophysiological correlates

## RESEARCH AIMS

The overall aim of the JRC is to develop a model for personalised therapeutic processes. We are investigating the hypothesis that the (subjectively) experienced daily phenomenon of resonance within a therapeutic process, which can be described at an anthropological level, also has a physiological analogy. We have selected EEG and EKG as these physiological descriptors. The development of routines and procedures is planned.

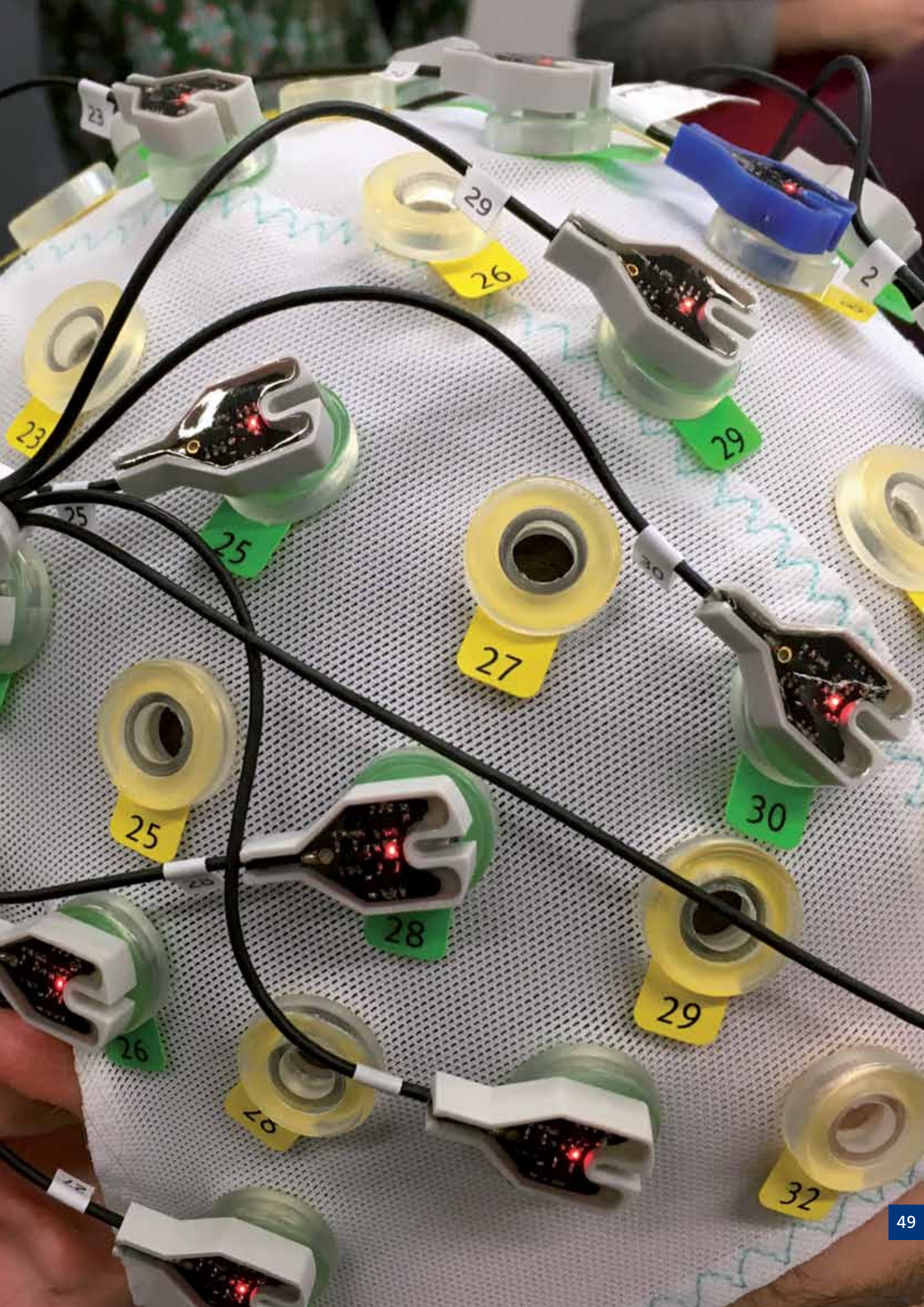
In years one and two we will develop routines and procedures according to the therapeutic processes which need to be developed first, and then test the specific questions and solutions resulting from this. In-depth case studies with clinical patients will follow during years three to five.

The overriding goal is the development of a personalised and evidence-based approach to music therapy in the clinical field of neuro-rehabilitation which focuses on the power of empathetic human relationships that are modulated through music. This is of interest to researchers, therapists and hospital operators.

The JRC's main theoretical framework focuses on investigating the resonance phenomenon between patient and therapist at various levels. We have therefore selected biometric and psychometric approaches as well as video-data rating and qualitative approaches, which are based on established theory, in order to contextualise events that are the focus of analysis.

The main focus of the JRC is not on outcome research (as it is done in RCTs) but on research into individualised (music) therapeutic processes in order to establish an inner perspective of functioning. For this reason, we will not collect data on a homogenous group to study a dependent variable with sufficient power.







## RESEARCH DESIGN

Within the scope of focus one (right moment research) we are looking for a possible link between chronobiological conditions and relational now-moments (Stern). We will identify the best possible chronobiological window for clients to receive therapies. Relational data will be authentic and collected in contexts as close to authentic music therapy practice as possible. These relational processes will be researched within a framework of social neuroscience in order to describe authentic data. This is based on qualitative principles of interaction analysis, but applied to physiological data in combination with qualitative behavioural data within an authentic clinical setting.

Inspired by the ideas of the experimental anthropologist Xygalatas (2014) "Rather than taking 'subjects' out of context and moving them into sterilized laboratory settings where they become 'objects' of experimentation, we attempt to take the laboratory into context by moving it into the field."

Focus two involves research on students and health professionals to find out how they develop and improve their empathetic skills (as evidenced for instance by oxytocin levels and HRV measurements) in order to resonate with their patients. We expect that in both focus areas we will make relevant new findings which will contribute to the development of personalised music therapy as a science-based discipline.

## FUNDING AND SCIENTIFIC PARTNERS

The project is funded by Josef Ressel Centre Programme of the Christian Doppler Research Association, by NÖGUS and by s-team solutions GmbH.



s-team IT solutions GmbH



Anglia Ruskin University, Cambridge UK



Health University of Applied Sciences Tyrol  
fh gesundheit, fhg – Zentrum für Gesundheitsberufe Tirol GmbH



fh St Pölten Big data experts/data mining



## STATUS

Ongoing



### Contact:

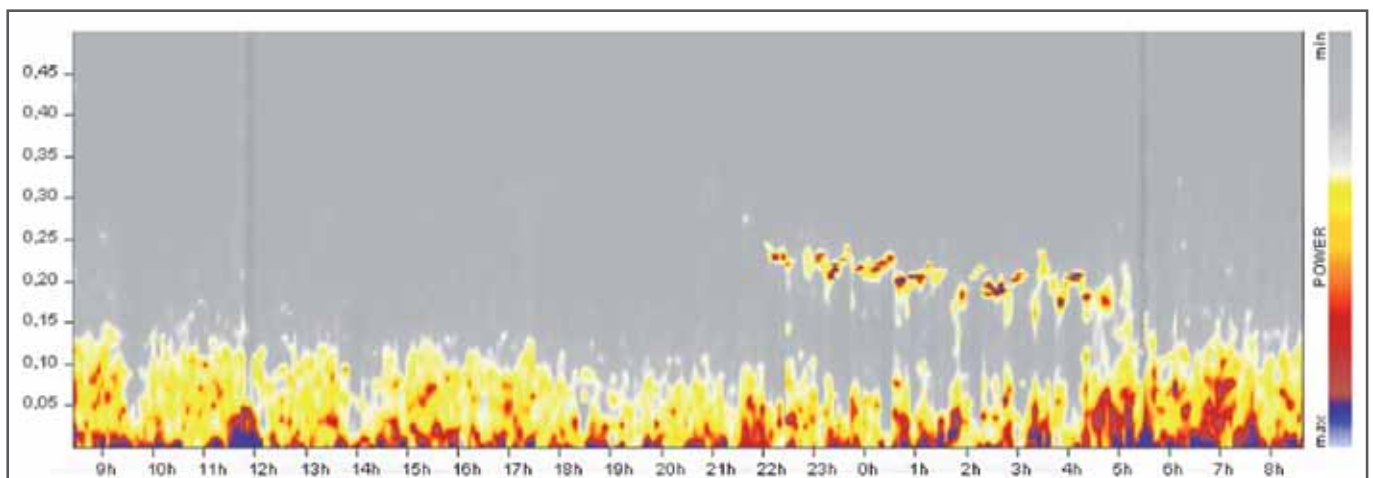
**Prof.(FH) Priv.-Doz. Mag. Dr. Gerhard Tucek**

Head of Institute of Therapeutic Sciences/  
Head of Josef Ressel Centre

T: +43 2732 802 367

E: gerhard.tucek@fh-krems.ac.at





### Power spectrogram

A large amount of sensitive health data is expected, so the development of reliable technical and organisational general framework requirements for safe data collection, processing, transfer and consolidation is essential. This is being provided by s-team IT solutions GmbH.

A very ambitious goal is data consolidation at a content-based analytical level. Data management and analysis will therefore be done on both levels.

In the course of possible future projects following the JRC, our findings may also be transferable to other therapeutic disciplines (e.g. physiotherapy, occupational therapy and logotherapy), as suitable therapy times and the objectification of the therapeutic relationship parameter are also relevant to these groups.

# THE OCCUPATIONAL BALANCE PROJECT FOR INFORMAL CAREGIVERS (TOPIC)

## BACKGROUND

It is estimated that in one in four families in Austria there is someone caring for another family member or a friend or acquaintance. Informal caregiving can lead to changes in lifestyle and living environment, including organisational challenges and physical and psychological burdens, and necessitate adaptation of the caregiver's daily routines to accommodate the needs of the dependant. These changes and adaptations can in turn impact the caregiver's health and wellbeing. The monotony of activities can restrict a healthy variety of activities. In occupational therapy and occupational science this mix of different activities is referred to as occupational balance. Until now caregivers' occupational balance has not been systematically investigated.

## RESEARCH AIMS

This research project aims to describe caregivers' occupational balance and other health-related factors to explore possible associations between caregivers' occupational balance and health and wellbeing based on the analysis of reliable and valid measurements.

The purpose of this project is also to give students the opportunity to gain research experience and therefore contribute to connecting the areas of research, education and clinical practice and to strengthen the cooperation between the IMC University of Applied Sciences Krems, the respective university clinics and hospitals of the NÖ Landeskliniken-Holding and the Karl Landsteiner University of Health Sciences.

## RESEARCH DESIGN

Within a multicentre study with a cross-sectional design, self-reported questionnaires will be used and their reliability and validity will be explored. Furthermore, we will determine caregivers' occupational balance, anxiety, burden, stress,

social support, caregivers' effort and subjective health and identify potential associations between occupational balance and the other health-related factors. Data will be entered into an SPSS file and used for statistical analysis. The study has been approved by the ethical committee of the Province of Lower Austria.

## OUTLOOK

The description of caregivers' occupational balance and health and wellbeing will afford first insights into the daily lives of informal caregivers in Lower Austria. The findings have potential for use as a basis for development of healthcare and the promotion of caregivers' health and wellbeing in Austria.

## RESEARCH PARTNERS

Karl Landsteiner University of Health Sciences, University Clinic Krems, St. Pölten, Tulln and Wiener Neustadt hospitals of the NÖ Landeskliniken-Holding

## FUNDING

Niederösterreichischer Gesundheits- und Sozialfonds, (NÖGUS)



## STATUS

Ongoing



### Contact: Mona Dür, PhD, MSc

Professor, Department of Health Sciences/Postdoctoral Research Fellow Josef Ressel Centre

T: +43 2732 802 344

E: mona.duer@fh-krems.ac.at





On the following pages we show a selection of our completed projects.

# DEPARTMENT OF BUSINESS

## COMPLETED PROJECTS

### CULTURAL (GARDEN) HERITAGE AS A FOCAL POINT FOR SUSTAINABLE TOURISM – CULTTOUR

#### BACKGROUND

Demand is growing for cultural tourism, a segment that stands out for its enormous variety of attractions on offer. However, very little research has been conducted in many areas of cultural tourism, including garden tourism. Parks, gardens and other landscaped, green open spaces are now seen as important cultural attractions for tourist destinations, and are increasingly being developed to cater for tourists. Such locations also provide leisure opportunities for the local population, and can make a contribution to an area's cultural identity and sustainable regional development.

Project website: [www.culttour.eu](http://www.culttour.eu)

#### RESEARCH AIMS

The project was a response to the growing need for professional garden tourism attractions in Central and Eastern Europe, and for suitable employees trained to international standards. It aimed to develop strategies for maintaining and revitalising the cultural heritage of Europe's parks and gardens. These strategies were to be rooted in the principles of sustainability and support for the local economy, in order to ensure successful implementation. In addition, workshops were held with local tourism stakeholders, and a concept was drawn up for a hotel management school.

#### RESEARCH DESIGN

In the course of the three-year project, strategies and concepts were developed for preserving public and privately owned parks, gardens and other open spaces, and for their use in tourism. Feasibility studies were also conducted. A strategic management tool – the CultTour analysis tool – was developed to support parks and gardens managers in making their sites attractive to visitors and securing long-term income from tourism, while also taking account of environmental, economic and sociocultural sustainability.

#### RESEARCH PARTNERS

Municipality of Avrig, Astra National Museum Complex, Samuel von Brukenthal Foundation, University of Natural Resources and Applied Life Sciences Vienna, Veliko Tarnovo Municipality, Municipality of Alexandroupolis, Apulia Regional Department for Cultural Heritage, Berlin University of Technology

#### FUNDING

The project was funded by the South East Europe Transnational Cooperation Programme and co-funded by the European Regional Development Fund (ERDF) (2007-2013).



#### STATUS

Completed

#### OUTCOMES

- Generic process model for revitalising parks and gardens
- CultTour analysis tool with guidelines and management recommendations for parks and gardens
- Feasibility studies and utilisation concepts for the four pilot regions
- Workshops on cultural tourism, sustainability and historic building conservation in the four pilot regions
- Online university course in Garden Heritage and Conservation
- Development of "garden routes" in the four pilot regions
- Concept for a hotel management school and a business plan for the Municipality of Avrig



**Contact: Prof.(FH) Mag. Claudia Bauer-Krösbacher, PhD**

Professor, Department of Business

T: +43 2732 802 394

E: [claudia.bauer-kroesbacher@fh-krems.ac.at](mailto:claudia.bauer-kroesbacher@fh-krems.ac.at)







# DEPARTMENT OF LIFE SCIENCES

## COMPLETED PROJECTS

### DEVELOPING NEW IMMUNOREGULATORY PEPTIDES AND GENDER-SPECIFIC ORGANOTYPIC CELL MODELS FOR HUMAN SEPSIS

#### BACKGROUND

Sepsis is one of the most frequent causes of death worldwide, including in Austria and Germany. Depending on the stage of the illness, between 25% and 60% of patients die despite receiving the maximum available treatment. In cases of sepsis, the human immune system produces a hyperinflammatory response to an infection that has entered the blood stream, and this overreaction can lead to cardiovascular failure. This hyperinflammation is followed by immunosuppression – an attempt initiated by the immune system itself to counter this overreaction. Due to the reduced attentiveness of the immune system, many patients die from serious secondary infections during this phase. Owing to the complex progression of the disease, available sepsis therapies focus predominantly on tackling symptoms and are unfortunately ineffective in many cases.

#### RESEARCH AIMS

Peptides that modulate immune responses are currently regarded as promising new drug candidates for the treatment of sepsis. In this project, we aimed to develop and test new peptides that neutralise TRAIL/TNFSF10, one of the key immune regulators. Animal studies had suggested that inactivation of TRAIL/TNFSF10 is likely to reduce morbidity and mortality among patients suffering from sepsis. In addition, a gender- and cell-culture-based model for human sepsis was created, meaning that gender-specific differences (e. g. hormone status) could be taken into account when developing and validating potential new sepsis therapies.

#### RESEARCH DESIGN

Three approaches to the development of therapeutic peptides were adopted in this project: two screening methods – phage display and yeast two-hybrid screening – and one rational approach under which peptides were designed on the basis of known crystal structures. For the cell-based sepsis model, mononuclear cells from peripheral blood were isolated, followed by an examination of their reaction to bacterial substances. Primary tissue-specific cells were cultivated and analysed in order to simulate organ damage. The question of gender-specific differences was addressed by examining the influence of hormones on the different immune responses.

#### RESEARCH PARTNER

■ Priv.-Doz. Dr. Kamil Önder, Procomcure Biotech GmbH

#### FUNDING

The project was funded by the Austrian Research Promotion Agency under the first call for FEMtech research projects in 2011 (programme owner/sponsor: Austrian Ministry for Transport, Innovation and Technology).



#### STATUS

Completed



**Contact: Mag. Dr. Elisabeth Hofmann**

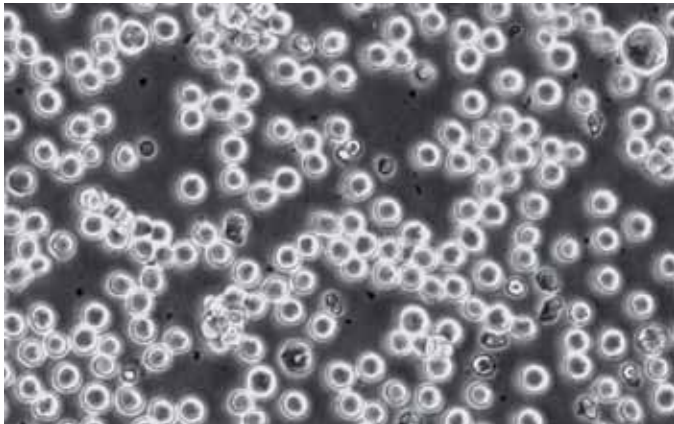
Project Manager, Department of Life Sciences

T: +43 2732 802 543

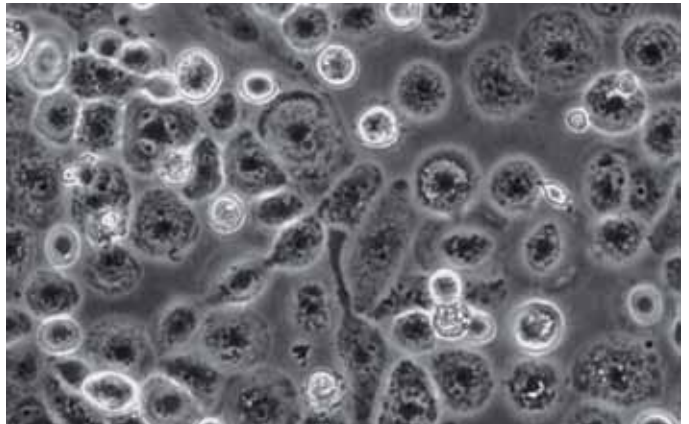
E: elisabeth.hofmann@fh-krems.ac.at



## Cells of the innate immune system

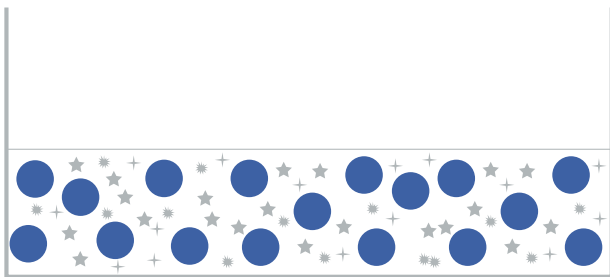


Undifferentiated THP-1 monocytic cell line

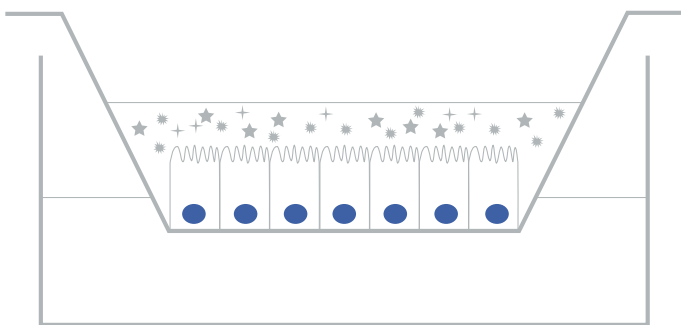


PMA-differentiated THP-1 macrophage-like cells  
(PMA: phorbol 12-myristate 13-acetate)

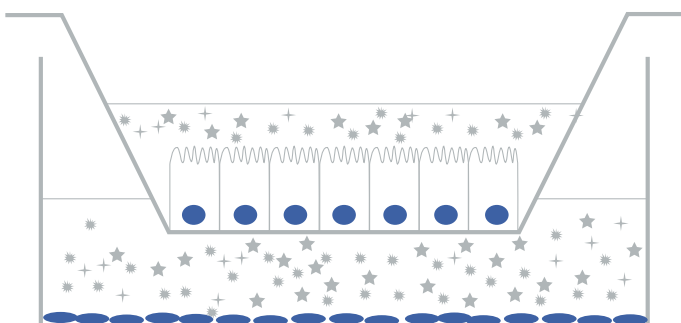
## Mimicking sepsis-mediated tissue destruction in vitro



**A** Peripheral blood mononuclear cells (PBMCs, blue circles) from female and male donors are stimulated with lipo-polysaccharide (LPS), a cell wall component of Gram-negative bacteria.



**B** The supernatants of the activated immune cells containing soluble inflammatory mediators (stars) are transferred to the epithelial cell monolayers (lung, colon, kidney).



**C** Macrophages are differentiated from male and female PBMCs. Epithelial monolayers (lung, colon, kidney) are co-cultivated with the macrophages (flat, blue ovals). Together they are stimulated with LPS.

# DEPARTMENT OF LIFE SCIENCES

## COMPLETED PROJECTS

### BIOPHARM – ISOLATION OF BIOACTIVE COMPOUNDS FROM CYANOBACTERIA

#### BACKGROUND

The pharmaceutical industry is increasingly focusing its attention on the wide variety of natural substances developed in the form of secondary metabolites in microorganisms. Marine algae in particular contain a significant, untapped resource in the shape of chemical structures with the potential to play a major part in the development of innovative medications.

#### RESEARCH AIMS

As part of a European Union-funded project, scientists from IMC University of Applied Sciences Krems and the Czech Academy of Sciences in Trebon, South Bohemia, examined potential applications of constituents of blue-green algae in medical research on the treatment of chronic inflammations and cancer.

#### RESEARCH DESIGN

The project involved purification of secondary metabolites from cyanobacteria using state-of-the-art chromatography processes and characterisation by means of mass spectrometry. The different fractions were then examined using human cell-culture models to identify their impact on inflammation processes and on cancer.

#### FUNDING

The project was co-financed by the European Union through the European Regional Development Fund.

#### STATUS

Completed

#### OUTCOMES

The collaboration with our partners on the Biopharm project led to the development of modern methods for the isolation and biological characterisation of secondary metabolites from blue-green algae. A network of lasting relationships between Trebon and Krems was established and five peer-reviewed scientific articles were published. The results of the project were also presented at different international conferences (including in Finland and at the Life Science Meeting in Krems). The research team submitted the methodology for consideration for the Lower Austrian Innovation Award and received a certificate of recognition. The newly developed method has also been incorporated into courses on the Medical and Pharmaceutical Biotechnology degree programmes.



EUROPEAN UNION  
European Regional  
Development Fund



#### Contact:

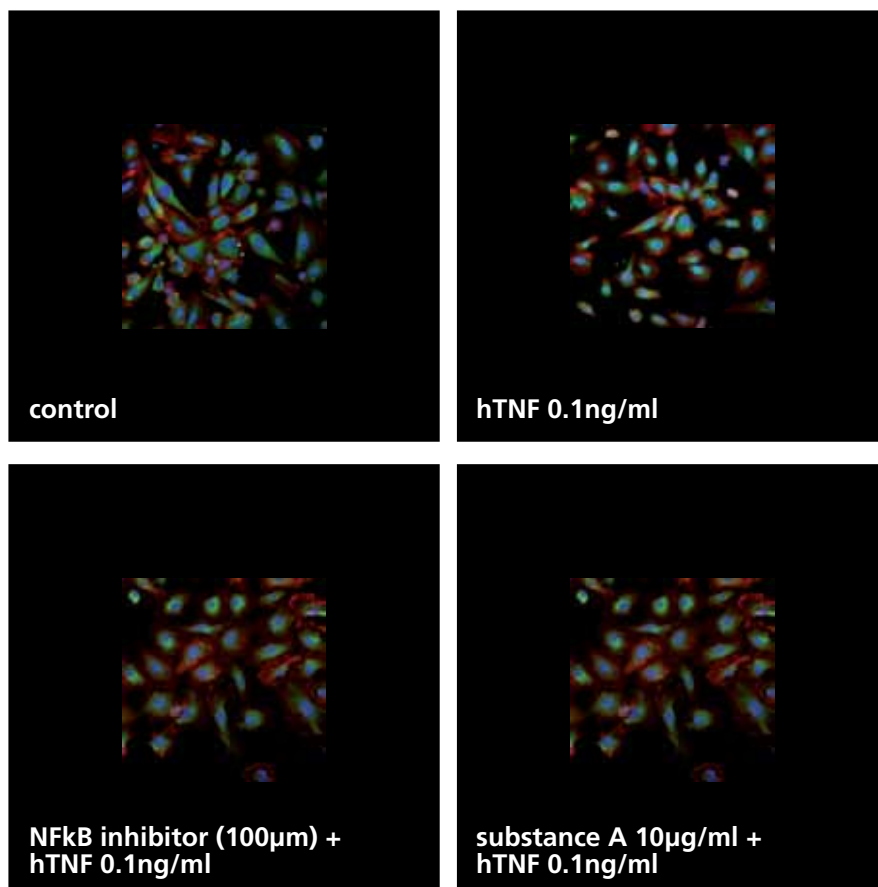
**Prof.(FH) Mag. Dr. Harald Hundsberger**

Vice Rector/Head of Institute, Biotechnology/Programme

Director, Medical and Pharmaceutical Biotechnology

T: +43 2732 802 521

E: [harald.hundsberger@fh-krems.ac.at](mailto:harald.hundsberger@fh-krems.ac.at)



Inhibition of the pro-inflammatory transcriptional regulator nuclear factor kappa B (NFκB) by anti-inflammatory substances

Localisation of NFκB in human umbilical vein endothelial cells. NFκB (green) and actin filaments (red) were visualised using immunofluorescence microscopy. The nucleus (blue) was labelled with DNA intercalating dyes (DAPI). NFκB resided in the cytosol in untreated control cells (upper left panel). Upon stimulation of the cells with human tumour necrosis factor (hTNF), a pro-inflammatory cytokine, NFκB was translocated into the nucleus (upper right panel). Treatment of the cells with an established NFκB inhibitor prevented hTNF-induced nuclear translocation and activation of NFκB (bottom left panel). Defined cyanobacteria extracts exhibited similar anti-inflammatory properties and interfered with NFκB activation (bottom right panel).



Cultivation of cyanobacteria

Our partners in Trebon cultivated the cyanobacteria in glass test tubes. Dense cultures were lysed and secondary metabolites isolated using chromatographic methods.



# DEPARTMENT OF LIFE SCIENCES

## COMPLETED PROJECTS

### CO-CULTIVATION OF MICROORGANISMS

#### BACKGROUND

Fermentation is an increasingly important area of the pharmaceutical industry. Until now, academic research and industry have focused mainly on monocultures. However, it has been observed that many microorganisms only realise their full biochemical potential in tandem with others. As a result, co-cultivation has become a key pharmaceutical research topic in the field of biotechnology.

Working in cooperation with a partner from the Sultan Qaboos University in Oman, we identified a number of organisms with strong potential for use in areas such as production of active ingredients for pharmaceuticals, as well as activities that impact the environment, including oil production.

Research in this area concentrates on identifying potential co-cultures and establishing a fermentation process that harnesses the products and capabilities of microbial communities for drug discovery and industrial applications.

#### RESEARCH AIMS

The project represented an initial feasibility study of whether it is possible to identify conditions under which two selected microorganisms can grow separately from one another, and also of whether a stable co-culture can subsequently be established. The co-cultures were then analysed in terms of their ability to produce new substances.

#### RESEARCH DESIGN

In the course of this project, possible growth media for monoseptic cultivation were tested using a multi-factor experimental design. The media that promote the growth of both organisms separately were then selected, and used as media for co-cultivation. The inoculation ratios were chosen and the stability of the co-cultures examined on the basis of the observed growth rates of both microorganisms in the monoseptic cultures. The cultures were then classified as growth-inducing, neutral or growth-inhibiting. The detailed analysis of the metabolome of the various co-cultures will be

Co-cultivation of two different microorganisms in an Eppendorf New Brunswick BF 510 bioreactor under controlled conditions after the preparation of both organisms as monocultures. The inoculation is carried out under aseptic conditions providing a defined ratio of both organisms.



carried out in follow-up projects. These studies will focus on examining the molecular make-up of the monocultures and co-cultures using high-performance liquid chromatography/mass spectrometry (HPLC-MS).

## RESEARCH PARTNERS

■ SeaLife Pharma (Tulln), Sultan Qaboos University (Oman)

## FUNDING

The project was funded by the Province of Lower Austria and the European Regional Development Fund (ERDF).



## STATUS

Completed

## OUTCOMES

The project forms the basis for a more comprehensive collaboration with national (University of Natural Resources and Life Sciences, Vienna) and international partners (Slovak University of Technology in Bratislava and Sultan Qaboos University), which in the long term should result in the identification of novel bioactive molecules and environmental technologies. In this project co-cultures were developed between *Halomonas gomseomensis* and *Dunaliella salina*. During the project a co-culture in a bioreactor of the algae and the bacterium could be established. This system was also expanded to several other organisms combinations including *Synechocystis* sp., *Micrococcus* sp. and *Bacillus subtilis* sp. For all combinations fermentation processes were successfully defined. In all combinations, including photoautotrophic, organisms were involved. No further carbon source was necessary to supply growth for the heterotrophic partner. The analysis showed different patterns with respect to the substances produced. The identification of the new substances will be done in a follow-up project, as this exceeded the scope of this one.



### Contact: Prof.(FH) DI Dominik Schild

Professor, Department of Life Sciences

T: +43 2732 802 501

E: dominik.schild@fh-krems.ac.at



# DEPARTMENT OF HEALTH SCIENCES

## COMPLETED PROJECTS

### POSITRON EMISSION TOMOGRAPHY (PET) AND MUSIC THERAPY PILOT STUDY

#### BACKGROUND

Traumatic brain injury (TBI) is one the most common neurological disorders across the globe. Due to Austria's unique emergency care procedures, more and more people in the country are surviving acute brain injury. Patients first receive intensive medical care, which is then followed by neurological rehabilitation treatment.

Brain injuries bring about a variety of physical and psychological complaints. The site and severity of the brain lesion is always a decisive factor for the patient's outlook in terms of disability.

Additionally, damage to the pathways between the brain centres can cause dysfunction in communication between them, and therefore secondary functional loss and processing problems. This results in neurological disorders such as poor concentration, attention and alertness.

Music therapy can establish new communication paths in the brain and is therefore a promising form of therapy for rebuilding communication structures between brain centres. This process is of central importance in every course of neuro-rehabilitation therapy.

IMC Krems carried out a pilot study to investigate the effectiveness of music therapy in this area, which included work that formed part of three master theses and a doctoral thesis.

#### RESEARCH AIMS

The primary aim of the research was to determine the changes in brain activity (frontal lobe, hippocampus and cerebellum) and behaviour that can be brought about in vegetative state patients by means of music therapy. The project also examined if there are any links between changes in brain activity and behaviour.

A second Master thesis work carried out in parallel also investigated changes in the vegetative state using heart rate variability (HRV) measurements.

A third Master Thesis work evaluated video data of this project using qualitative analysis methods.

A University of Vienna anthropology project for a doctoral thesis accompanied this study of the effects of music therapy on vegetative state patients, examining them from a neuro-anthropological perspective (currently in progress).

#### RESEARCH DESIGN

The project's central research questions were:

1. Which areas of the brain are activated by music therapy in patients with neurological damage?
2. Can similarities in brain activity between patients be identified (networks for music processing and music therapy)?
3. Can a change in brain activity (PET), data relating to the vegetative state (HRV) and video data be observed over the five-week course of therapy?

PET was used to record brain activity, behaviour was observed by means of video analysis, and HRV was employed to gather psychophysiological data.



#### Contact:

**Prof.(FH) Priv.-Doz. Mag. Dr. Gerhard Tucek**

Head of Institute of Therapeutic Sciences/

Head of Josef Ressel Centre

T: +43 2732 802 367

E: [gerhard.tucek@fh-krems.ac.at](mailto:gerhard.tucek@fh-krems.ac.at)



## OUTCOMES

The pilot study showed an increase in the brain activity of the music-therapy group participants in all three of the observed brain regions, which can be interpreted as having a beneficial impact on the neurorehabilitation. There was an average increase of 34% in activity in the frontal lobe and hippocampus, and of 39% in the cerebellum. In contrast, activity in the brains of the control-group participants decreased significantly.

No reliable conclusions with respect to changes in the vegetative state could be made on the basis of the heart rate variability (HRV) data.

The micro video analysis showed that individual vegetative state patients benefit from music therapy in a wide variety of ways. This supports the personalised approach to music therapy which is a feature of teaching in the subject at IMC Krems.

## RESEARCH PARTNERS

- Landeskrankenhaus Hochegg and
- Landeskrankenhaus Wiener Neustadt

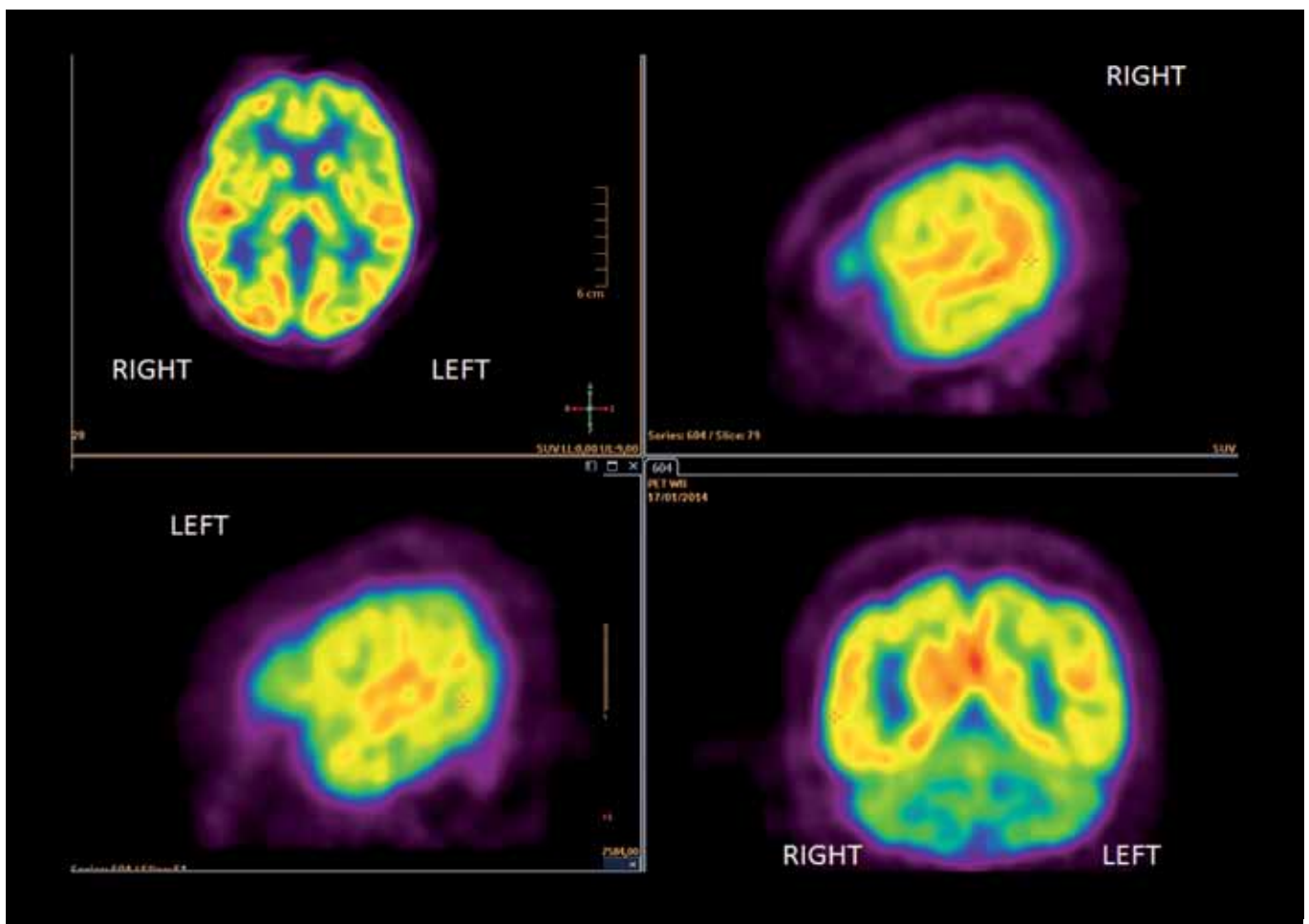
## FUNDING

The project was co-financed by Niederösterreichischer Gesundheits- und Sozialfonds (NÖGUS)



## STATUS

Completed



# DEPARTMENT OF HEALTH SCIENCES

## COMPLETED PROJECTS

### THE RIGHT MOMENT – PILOT STUDY ON THE REPRESENTATION OF CIRCADIAN AND ULTRADIAN RHYTHMS OF PATIENTS IN PHASE C NEUROREHABILITATION BY MEANS OF HEART RATE VARIABILITY

#### BACKGROUND

Over the last decade personalised medicine has become increasingly important in the fields of pharmacogenetics, pharmacogenomics, clinical diagnostics, and in particular chronopharmacology, which is concerned with the optimal point in time for drug delivery. However, with respect to therapeutic interventions (in a clinical context), there has been virtually no inquiry into the most beneficial time to give therapy in relation to a patient's chronobiological rhythms. This project focused on the question of the ideal time to administer therapy in relation to individual biological rhythms, measured using heart rate variability (HRV).

#### RESEARCH AIMS

The primary aim was to establish how individual circadian and ultradian rhythms could be represented most effectively by means of HRV analysis. Further objectives were:

- to determine which measurements and how many intraindividual measurements were required to achieve a reliable baseline for the subject's chronobiological oscillations.
- with respect to ascertaining the optimal time for therapy from a chronobiological standpoint, to establish the empirical basis for the development of a tool (video analysis) which would have applications in clinical practice, teaching and research.
- to play an active role in the pioneering phase of the development of scientific standards (parameters and data analysis) for the representation and characterisation of circadian and especially ultradian rhythms using HRV.
- and on this basis, to develop an interdisciplinary evaluation method for the determination of the optimal time for therapeutic interventions.

#### RESEARCH DESIGN

This research question required an interdisciplinary approach encompassing areas of neurobiology, medicine, anthropology, psychology and music therapy.

In this mixed-methods study, designed as basic research on the basis of pragmatic questions at the interface with practical application (translational research), physiological (vegetative) parameters were triangulated with qualitative (psychosocial) data in order to represent and correlate the biological and subjective levels of observation.

#### OUTCOMES

A data preparation method was developed which, in comparison to other common approaches, significantly improved the graphical representation of oscillations in heart rate and heart rate variability with circadian- and ultradian-phase duration. This will facilitate a significant reduction in observer interpretation variability in the visual analysis of long-term heart rate variability measurements. In addition, a Matlab-based tool developed in collaboration with the department of media and digital technology at St. Pölten University of Applied Sciences enables almost fully-automated data processing and graphical representation of long-term heart rate variability measurements. The tool is an initial prototype and has high development potential. The ultimate goal is fully-automated data evaluation based on pattern recognition. Significant categories that indicate activity or recovery phases were defined on the basis of analysis of empirical video data consisting of expert interviews and other video material. Caution is advisable with some of the categories, as context plays a crucial role in the therapeutic process and must always be taken into account in the assessment of the subject under observation. Analysis of the scale-based personal and peer evaluations used to gather data on the subjects' activity and recovery phases during therapy sessions showed the measurement method employed is not sufficiently valid. Therefore the tool would have to be revised for use in a follow-up project. (Combining the results of the heart rate measurement with the video analysis would not produce any valid results.)

## RESEARCH PARTNERS

■ Landesklinikum Mauer

## STATUS

Completed

## FUNDING

The project was financed by the Science and Research Department (K 3) of the Province of Lower Austria.

KULTUR  
NIEDERÖSTERREICH



### Contact:

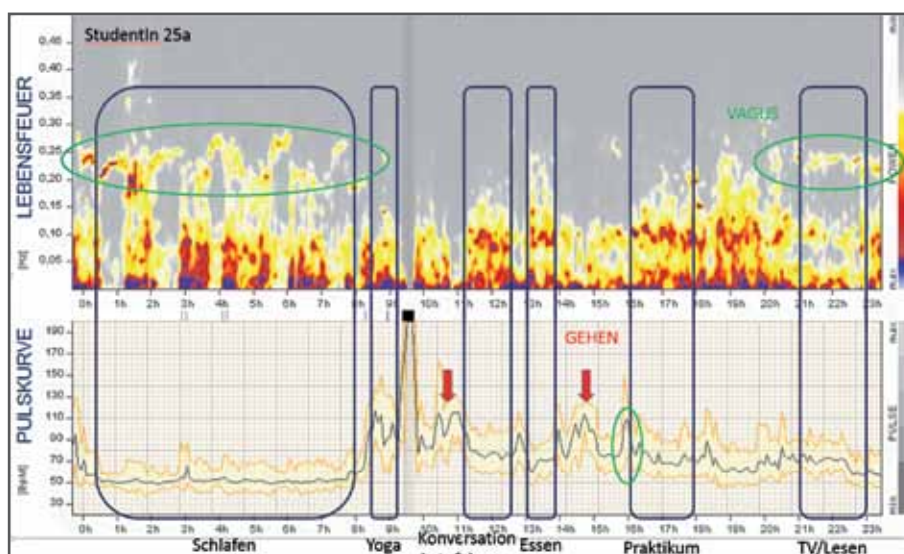
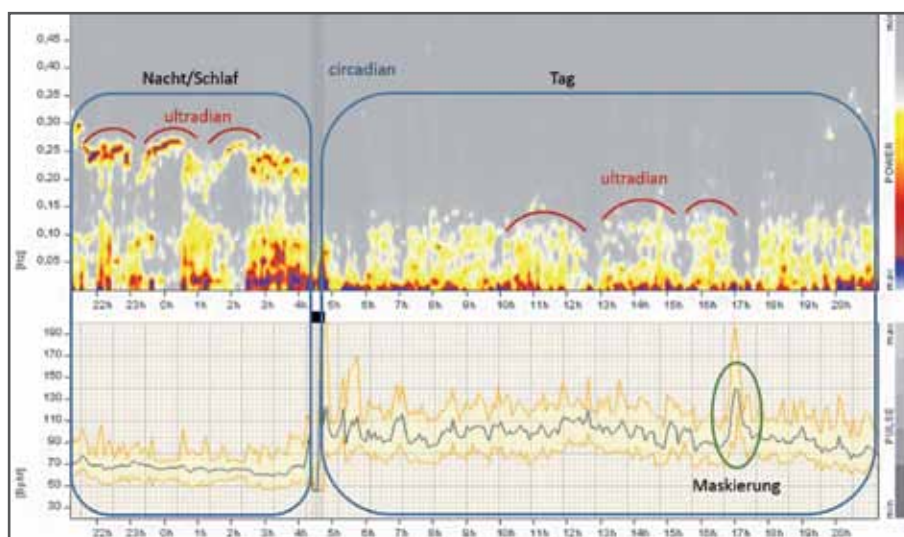
**Prof.(FH) Priv.-Doz. Mag. Dr. Gerhard Tucek**

Head of Institute of Therapeutic Sciences/

Head of Josef Ressel Centre

T: +43 2732 802 367

E: gerhard.tucek@fh-krems.ac.at





# IMC UNIVERSITY OF APPLIED SCIENCES

## RESEARCH IN COLLABORATION WITH BUSINESS PARTNERS

IMC Krems carries out targeted research projects with regional, national and international research partners with the aim of making findings available to our partners and integrating them into the university's research-led teaching for the benefit of students.

## WIDE-RANGING PARTNERSHIP OPPORTUNITIES

- Application-driven research activities focusing on our key research topics
- Privately assigned and publicly funded projects
- Organisation of numerous meetings and conferences to promote dialogue between members of the scientific community
- Involvement of bachelor and master students in course-related and research projects

## HIGHLY QUALIFIED STAFF AND ADVANCED INFRASTRUCTURE

IMC Krems places special emphasis on establishing and continually developing the seven key research topics in our three departments: Business, Health and Life Sciences. The university's highly qualified faculty members work on numerous research projects that involve students on an ongoing basis. Projects range in duration from a few weeks to five years, and modern facilities promote high-quality research outcomes.

## FUNDING AND FUNDING PROVIDERS

- APPEAR – Austrian Partnership Programme in Higher Education and Research for Development - Austrian Development Cooperation (ADA)
- Athenoe-eCall project submission platform, Province of Lower Austria
- Austrian Science Fund (FWF)
- Austria Wirtschaftsservice Gesellschaft mbH (AWS)
- Bridge (FFG)
- Christian Doppler Forschungsgesellschaft/ Christian Doppler Research Association (CDG)
- COIN/COIN Aufbau (FFG)
- Competence Headquarter (FFG)
- Erasmus programme (EU)
- Erasmus+ programme (EU)
- European Regional Development Fund (ERDF)
- European Territorial Cooperation (ETC)/Interreg
- FEMtech (FFG)
- FH Plus (FFG)
- General Programme (FFG)
- Innovationsscheck/Innovation Cheque EUR 5,000 (FFG)
- Innovationsscheck Plus/Innovation Cheque Plus EUR 10,000 (FFG)
- Interreg Alpine Space (EU)
- Lifelong Learning Programme (EU)
- Province of Lower Austria (direct funding/co-financing)
- NÖ Forschungs- und Bildungsges.m.b.H. (NFB) calls
- NÖ Gesundheits- und Sozialfond
- NÖ Landeskliniken-Holding
- S-team IT solutions GmbH
- Talents Regional/internships (FFG)
- The World Bank



# KREMS – YOUR RESEARCH PARTNER

## SELECTED RESEARCH PARTNERS

Accademia Europea Bolzano  
AIT Austrian Institute of Technology GmbH  
Anglia Ruskin University, Cambridge  
Armenian State University  
Associazione Seed  
Bournemouth University Higher Education Corporation  
Chambre de Commerce et d'Industrie Nice Côte d'Azur  
Chamber of Labour of Lower Austria (AKNÖ)  
Città Metropolitana di Torino  
Cologne Business School  
Danube University Krems  
Die Gärten Niederösterreichs  
ecoplus. The Business Agency of Lower Austria  
Ekopsychology Society  
Erasmus Universiteit Rotterdam  
European Certification and Qualification Association (ECQA)  
Fachhochschule Dortmund  
Fresenius Medical Care AG & Co. KG  
Gaisberg Consulting GmbH  
Helsingin Yliopisto  
Institutio Superior de Psicologia Aplicada, CRL (ISPA)  
International Organisation "Information Centre Green Dossier"  
Johannes Kepler University Linz  
Jožef Stefan Institute  
Karl Landsteiner University of Health Sciences  
La Tana Libera Tutti/Le Mat  
Medical University of Vienna  
Microsoft Corporation  
Molecular Devices (Austria) GmbH  
National Association for Mountains Rural Development  
National University of Ireland Galway  
Natur im Garten  
NÖ Gesundheits-  
und Sozialfonds/Lower Austrian Health and Social Fund  
NÖ Landeskliniken-Holding  
Ö.T.E. Ecological Tourism in Europe  
Paracelsus Medical University Salzburg  
ProComCure Biotech GmbH Linz  
Regional Agency for Innovation and  
Internationalization of Companies  
Research Institute for Family Business,  
Vienna University of Economics and Business  
respACT – austrian business council for  
sustainable development  
Ricoh Austria GmbH  
Ricoh Hungary  
Sophia R&I  
SRH University Heidelberg  
s-team IT solutions GmbH  
St. Pölten University of Applied Sciences  
Sveučiliste U Zagrebu Filozofski Fakultet  
Tbilisi State University  
Technical University Kaunas  
Technische Universität Berlin  
Technology park Ljubljana  
The Czech Academy of Sciences  
Torino Chamber of Commerce  
Tourismuszentrale Südmähren  
United Nations Environment Programme Vienna  
Universidad Autonomia de Madrid  
Universita di Bologna  
University of Natural Resources and Life Sciences, Vienna  
University of Applied Sciences Tyrol  
Universität Duisburg-Essen  
Universität für Bodenkultur  
Universiteit Gent  
University of Brighton  
University of Macerata  
Veneto Innovazione  
Verein - Die Gärten Niederösterreichs  
Wirtschaftsuniversität Wien  
ZOI Environment Network



**FH KREMS**  
UNIVERSITY OF APPLIED  
SCIENCES / AUSTRIA

**IMC University of Applied Sciences Krems**

Piaristengasse 1  
A-3500 Krems – Austria

**IMC Research services**

T: +43 2732 802-397

E: [forschung@fh-krems.ac.at](mailto:forschung@fh-krems.ac.at)

I: [www.fh-krems.ac.at](http://www.fh-krems.ac.at)



Version: 12/2017