UMESCIA - University Medicin Essen Medical Scientist Academy

Else Kröner Medical Scientist Kolleg for the Postdoc-Phase

University Medicine Essen (UME) Medical Scientist Academy (UMESciA) has identified the strong need to better facilitate and foster interdisciplinary research in university medicine. The complexity of innovative therapies together with rapid technological advances in patient care require intimately interacting Medical and Clinician Scientists. A supporting structural and organizational basis is urgently needed. UMESciA creates this institutional basis by supporting **"tandem research units" (TRUs) that connect distinguished Medical Scientists with Clinician Scientists** from existing UME programs. UMESciA aims to provide a **best practice model** for German University Medicine by acting within the internationally recognized UME focus research areas of Oncology and Immunology and by building on a strong translational expertise in **investigator-initiated trials** (IITs).

Speaker of the UMESCIA Program:

Prof. Dr. rer. nat. Sven Brandau

Chairman Graduate School of Biomedical Science (BIOME) & Head of the Research Division – Department of Otorhinolaryngology University Hospital Essen

Members of the UMESCIA Board:

Prof. Dr. med. Dirk Schadendorf

Director West German Cancer Center & Director Department of Dermatology University Hospital Essen

Prof. Dr. med. Selma Ugurel

Senior Physician Department of Dermatology University Hospital Essen

Prof. Dr. rer. nat. Anke Hinney

Vice Dean for Early Career Support and Diversity

Medical Faculty & Head of Molecular Genetics – Department of Child and Adolescent Psychiatry,

Psychosomatics and Psychotherapy, Medical Faculty University of Duisburg-Essen

Project Asssistance and Contact:

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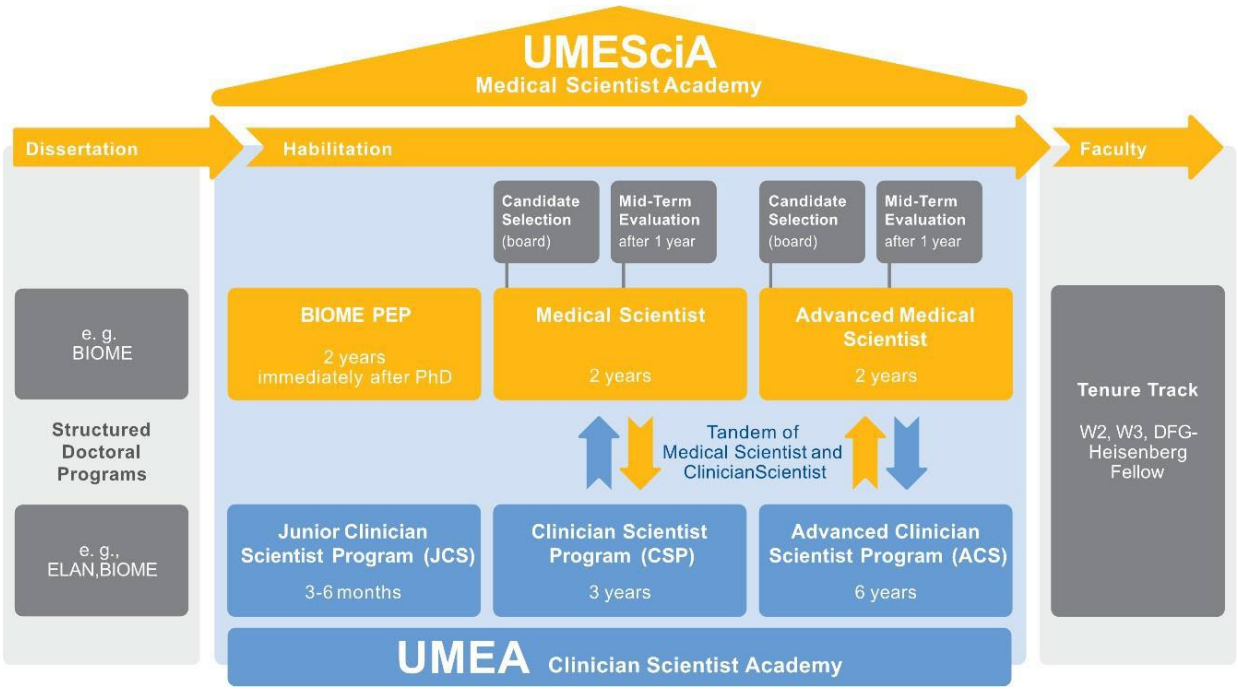

Organization and governance structure of UMESCIA. UMESCIA interacts with the successfully established Clinician Scientist program UMEA to form highly interactive tandem research units.

Benefits and career possibilities for UMESCIA scholars:

UMESCIA scholars will be part of a multi-disciplinary team.

Projects will deal with clinically relevant research.

Each scholar will be integrated into local and international networks.

Initial funding is for two years, possibility to qualify for second funding period exists, candidates will be selected based on scientific achievements and overall fit to the program.

Possibility to qualify for academic leadership position up to the professor (W) level – funded by medical faculty; University of Duisburg-Essen

UMESCIA offers an educational program with a seminar series:

Seminarreihe-UMESCIA_Termine_Verteilung_Titel_06.12.22.pdf (uk-essen.de)

Projects in UMESciA:

Following research groups are offering projects for UMESciA:

Characterization of hematopoietic and mesenchymal progenitors in brain tumors. (B. Scheffler, DKTK Translational Neurooncology,). We have identified unconventional populations of hematopoietic stem and progenitor cells in glioblastoma that are associated with unfavorable patient outcomes. We aim to characterize and dissect the interactions of these cells within the tumor microenvironment and to understand how they mechanistically underpin tumor progression and resistance to therapy.

2. **Interplay of myeloid cells and T cells in cancer therapy of solid tumors.** (S. Brandau, Department of ORL and Head & Neck Surgery). Certain subsets of myeloid cells are important mediators of immunosuppression and often limit the efficacy of cancer immunotherapy. In a reverse translational approach, we will correlate phenotypes and spatial compositions of myeloid cells and T cells in tumor tissue with outcome and therapeutic response. From these data, we will identify prognostic markers and novel combination therapies, which will be tested in preclinical models.
Group Brandau - Klinik für Hals-Nasen-Ohren-Heilkunde, Kopf- und Hals-Chirurgie (uk-essen.de)

3. **Shared resistance mechanisms in immunotherapy and targeted inhibitor therapy of melanoma.** (A. Paschen & D. Schadendorf, Department of Dermatology). Patients with advanced melanoma can be effectively treated either with antibodies targeting immune checkpoints or inhibitors targeting MAPK signaling. However the majority of patients eventually dies from the disease due to therapy resistance. Since the efficacy of both targeted therapy and immunotherapy is dependent on the anti-tumor activity of adaptive T lymphocytes, we focus on the identification of shared resistance mechanisms enabling tumor cells to escape from T cell surveillance.
https://hautklinik.uk-essen.de/

4. **Resistance to immunotherapy in Merkel cell carcinoma (MCC).** (S. Ugurel & J.C. Becker, Department of Dermatology and Translational Skin Cancer Research, German Cancer Consortium DKTK). MCC is a very aggressive, but also highly immunogenic skin cancer. Thus, immunotherapy with PD-1/PD-L1 checkpoint inhibitors is an efficient treatment for patients with advanced MCC, but resistance is common. This project will apply single cell and spatial transcriptomics to unravel the molecular mechanisms contributing to the primary and secondary resistance of MCC to immunotherapy focusing on adaptive T cell responses identified by their T-cell receptor repertoire usage.
https://dktk.dkfz.de/en/sites/essen-duesseldorf/core_facilities
https://dktk.dkfz.de/en/research/dktk-researchers/jurgen-becker
https://pubmed.ncbi.nlm.nih.gov/?term=ugurel_S+or+Becker_JC&sort=date&size=50

5. **Biomarkers in Sarcoma** (H.U. Schildhaus, Inst. of Pathology, S. Bauer and J. Falkenhorst, Medical Oncology)
https://tumorforschung.uk-essen.de/index.php?id=3222
www.sarcoma.eu
www.sarkomtour.de
www.husarc.org

6. **Relevance of biological factors to outcome of chemo(radio)immunotherapy combinations.** (V. Jendrossek, Dept. of Molecular Cell Biology, Institute of Cell Biology (Cancer Research)). Chemo(radio)immunotherapy has improved clinical outcomes in patients with advanced non-small

lung cancer (NSCLC), but most patients eventually relapse or suffer from severe immune related adverse effects. We will investigate T cell subsets, macrophages, and neutrophils in pre-therapy blood and tumor tissue samples. The obtained results will be used to define candidate biomarkers for patient stratification and modulation of tumor response and adverse effects.
https://www.uk-essen.de/zellbiologie/forschung/arbeitsgruppe-molekulare-zellbiologie/

7. **Targeted therapy of aggressive lymphomas.** (H.C. Reinhardt, Dept of Hematology & Stem Cell Transplantation,). Through recent genome sequencing efforts, a molecular taxonomy of aggressive lymphomas was developed. Using these genomic data, we developed next generation autochthonous mouse models of aggressive lymphomas, which, together with clinically annotated patient samples, serve as a pre-clinical platform to devise and validate novel, genotype-stratified therapeutic intervention strategies for aggressive lymphomas. We treat approximately 200 newly diagnosed diffuse large B cell lymphomas per year, as well as a similar number of relapsed/refractory cases. The vast majority of these patients consents to the use of their biopsy and blood samples for scientific analyses.

8. **Near-infrared laser-based photothermal therapy of cancer-associated cells using rationally designed and molecularly functionalized gold nanorods** (S. Schlücker, Center for Nanointegration Duisburg-Essen (CENIDE)).
Gold nanorods are particularly attractive for photothermal therapy (PTT) due to their tuneable optical properties in the red to near-infrared (NIR) spectral region and their high absorption cross section, leading to the efficient generation of heat by using light with a high penetration depth. In collaboration with the group of S. Brandau (Department of ORL and Head & Neck Surgery) we aim at selectively addressing immune cells in the tumor microenvironment rather than the tumor cells themselves. Cellular studies are performed with available custom-made optical instrumentation for PTT in conjunction with biochemical/molecular biology techniques for comprehensive downstream analyses.

9. **Exploiting the proteotoxic stress burden of cancer cells and the resulting hypersensitivity against inhibitors targeting the constitutive and the immune-proteasomes.** (M. Ehrmann, Center of Medical Biotechnology (ZMB),). In collaboration with the Depts. of Hematology and Dermatology, as well as the Institute of Pathology, this project will determine the levels of proteotoxic stress of cancer cells of different origin by using molecular and physiological markers and correlate those to IC_{50} values of various proteasome inhibitors. Subsequently, we will test synergistic effects with other therapeutic agents with the aim of reducing drug concentrations.