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Press release
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Skin cancer research: from the lab to the clinic
Marshall Plan Fellowship for Med Uni student Denys Balandin

Graz, 12. September 2024: Malignant melanoma is a particularly dangerous and aggressive form of skin cancer and is one of the deadliest skin diseases worldwide. The number of cases globally is constantly increasing. Melanoma develops due to the uncontrolled growth of melanocytes, the cells responsible for producing melanin. The high mortality rate of this cancer is the result of its ability to spread to other organs. Despite intensive research, many aspects of how healthy cells become cancerous and form metastases have not been completely explained. The key lies in the complex signaling pathways that control communication within the cells.

New therapies for this type of cancer that employ molecular chemistry as well as cell culture models are the subject of intensive research at the Division of Medicinal Chemistry of the Medical University of Graz. The goal is to translate in vitro research into clinical practice. This "translation" is being driven by a group of students in Tobias Madl's research group. Denys Balandin, a key player in this group, has just been awarded a Marshall Plan Fellowship.

Cellular signaling pathways as the key to fighting cancer

In his work as part of Tobias Madl's research group, Denys Balandin identifies the substances that target molecules in the Wnt signaling pathway. This signaling pathway is essential for normal cell growth and the functioning and regeneration of tissues. When it is overactive, it can trigger uncontrolled cell growth and thus cancer. This pathway is controlled by transcription factors—proteins that decide whether a cell becomes cancerous. "Due to their complex and undefined structures, these proteins are difficult to investigate and combat with medication," explains Denys Balandin.

Progress in pharmaceutical development with NMR spectroscopy

Using nuclear magnetic resonance (NMR) spectroscopy, Denys Balandin observes the complex "movements" of these proteins, gaining valuable insight into their behavior and interactions. "This understanding has allowed us to develop the first drug candidate that specifically targets these elusive proteins," says Tobias Madl. The next step is to collaborate with the Weeraratna Lab at Johns Hopkins University in the USA as part of a Marshall Plan Fellowship in order to test the drug candidate and further investigate how the Wnt signal pathway influences the development of melanoma. By evaluating the effectiveness of the drug candidate in patient samples, the team hopes to develop new therapeutic strategies for controlling the cancer

Pioneering Minds - Research and Education for Patients' Health and Well-Being

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progression. "Since these target molecules also play a critical role in the development of other cancers and age-related diseases, we expect that we will be able to gain important insight into new therapeutic approaches beyond the treatment of melanoma," predicts Tobias Madl.

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Profile: Denys Balandin

Denys Balandin received a bachelor's degree in materials science and engineering from the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" in 2019. He specialized in novel methods for synthesizing titanium nanoparticles and alloys. He then earned an Erasmus Mundus Joint Masters degree in chemical nanotechnology with distinction from Aix-Marseille University (France), Tor Vergata University (Italy) and Wrocław University of Science and Technology (Poland). His master's thesis dealt with peptide synthesis, especially with nanomaterials obtained from self-assembling α,β -peptide foldamers. In 2021 Balandin started his doctorate at the Medical University of Graz in the PhD program Biomolecular Structures and Interactions (BioMolStruct). Since 2022 he has conducted structural and functional studies of the regulation and inhibition of TCF/LEF transcription factors at the Madl lab.

Profile: Tobias Madl

Tobias Madl studied chemistry and physics at the University of Graz. He started to deal with the topic of nuclear magnetic resonance (NMR) spectroscopy during his doctoral studies in chemistry, which he finished in 2007. Following postdoc research stays at the Technical University of Munich and Utrecht University, he started his own research groups at the Technical University of Munich and Helmholtz Center Munich in 2012. His doctoral and postdoc research was supported by a DOC Fellowship of the Austrian Academy of Sciences, a Schrödinger Fellowship of the Austrian Science Fund and an EMBO Long-Term Fellowship. Since January 2015 he has been the head of the Metabolomics research group at Med Uni Graz. Since 15 December 2023 he has been a Professor of Medicinal Chemistry at Med Uni Graz and the head of several pharmaceutical development programs at Med Uni Graz, including ones in the FWF Cluster of Excellence MetAGE.