

metaboCURE - Engineering synthetic gene circuits from bacterial metabolite-sensing operons for oncometabolic elimination of cancer

Initiative: Pioniervorhaben Exploration

Ausschreibung: Natur- und Lebenswissenschaften

Bewilligung: 17.12.2023

Laufzeit: 3 Jahre

As many modern cancer therapies fail or lead to a relapse, new strategies to treat cancer are required. Numerous types of cancer accumulate the so-called oncometabolites, by-products of metabolism that promote cancer growth. One example is D-2-hydroxyglutarate (D-2-HG), which accumulates more than 100- to 1000-fold due to a mutation in a gene called IDH. Oncometabolites have not yet been used as a therapeutic target as there are no suitable biological sensors. However, a natural D-2-HG sensor was recently identified in bacteria that regulates the metabolism of D-2-HG as a nutrient source. The aim of the project is to develop synthetic DNA switches that link the bacterial D-2-HG sensor to the induction of genes driving cell elimination. In this way, only IDH-mutated cancer cells producing unusually high levels of D-2-HG will activate these switches, leading to the elimination of the cancerous cell. The research team sees the potential to develop and establish a completely new therapeutic strategy against cancer.

Projektbeteiligte

Dr. Jonathan Kah Meng Lim

Universitätsklinikum Düsseldorf
Institut für Neuropathologie
Düsseldorf

Dr. Hannes Beyer

Universität Düsseldorf
Mathematisch-Naturwissenschaftliche Fakultät
Institut für Synthetische Biologie
Düsseldorf