

Research profile for applicants

Name of DKFZ research division/group:	<i>Division of Molecular Embryology (A050)</i>
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Group homepage: <i>Visit this website for further information on current research and recent publications.</i>	www.dkfz.de/en/mol_embryology/index.php

RESEARCH PROFILE AND PROJECT TOPICS

Phase Separation & RNA Helicases in Wnt Signaling

The Wnt/ β -catenin pathway plays an eminent role in development and cancer and recent work indicates that signaling occurs in liquid droplets. Phase-separation into membrane-less organelles in general has gained significantly in interest over the past years, and it occurs in many cellular contexts between the cell nucleus to the plasma membrane. We found evidence that Wnt signaling is mediated by liquid phase separation involving dynamic liquid droplets and disordered protein domains. The lab has identified the DEAD-box RNA helicase DDX3 as effector of the Wnt- β -catenin network, where it acts as an allosteric activator of CK1 (Cruciat et al (2013); Fatti et al (2023) in liquid droplets. Both DDX3 and CK1 are oncogenes and hence their investigation is of relevance for the development of novel cancer therapeutics. In this project we aim to characterize this: How is phase separation induced and regulated? What are the key molecular players in the process? What are the consequences of phase separation for Wnt signaling? You will employ cutting-edge techniques used in this emerging field, including confocal fluorescence microscopy of live cells, photo-bleaching, superresolution and single-molecule microscopy, microfluidics, bioinformatics, gene-editing by CRISPR-Cas9, protein expression and in vitro aggregation assays. You will be embedded in a WNT-focussed Collaborative Research Center (<https://sfb1324.de>).

Applicants should hold a degree in chemistry/biology/life sciences with a background in cell or molecular biology, or biochemistry.



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