

Research Project

NCCR phase 3, 3.10 Ribosomal protein paralog-dependent disease mechanisms

Third-party funded project

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Project Website <https://nccr-rna-and-disease.ch/>

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Status Active

RNA - the fundament of life: The origin of life on earth most likely relied on ribonucleic acid (RNA), and still today this versatile linear polymer is the central molecule in living cells. It can store and regulate genetic information and have enzymatic activity. Whereas less than 2% of the human genome codes for protein, up to 95% of it is transcribed into RNA, documenting the existence of an overwhelmingly large number of so far neglected non-coding (nc)RNAs with probably important functions. The discovery of small ncRNAs put research on RNA-mediated gene regulation and its potential for applications in medicine and biotechnology definitively on the center stage of the life sciences, but many physiologically important levels of RNA-based gene regulation still remain to be discovered and deciphered. Basic research on RNA biology therefore greatly advances our understanding of the molecular underpinnings of life, a prerequisite for understanding the molecular causes of disease. Indeed, research building on these new findings in RNA biology has already resulted in first therapeutic and diagnostic applications in medicine, and many more are expected to follow. Goals of the NCCR RNA & Disease: Research on RNA-related topics is carried out in a number of academic and industrial laboratories in Switzerland. A disproportionately large number of these research groups are internationally renowned for their outstanding work, in spite of the fact that individual laboratories often lack critical mass in addressing specific research problems with a comprehensive approach. A coordinated, interdisciplinary initiative that promotes visibility and facilitates rapid transition of new findings into medical applications does not yet exist. The NCCR initiative RNA & Disease therefore aims at consolidating and reinforcing the already strong position of Switzerland in RNA research.

Our main goals are:

our understanding of RNA processing and surveillance mechanisms involved in global regulation of messenger and non-coding RNA.

of disease mechanisms resulting from aberrant RNA function and development of possible therapeutic approaches for their cure.

a Swiss RNA research cluster that enhances and consolidates the role of Switzerland as an international leader in RNA biology.

Projected research activities: Research to achieve the first two goals is organized in three interlaced work packages (WPs) consisting of collaborative multidisciplinary projects: WP1 is aimed at investigating disease-associated alterations in specific ncRNA species and elucidating their biological functions and molecular mechanisms, WP2 will advance our current understanding of RNA metabolism, its reg-

ulation in health and disease, and the development of antisense-based therapeutic approaches, and WP3 focuses on the dissection of ribosome biogenesis pathways to reveal disease-associated errors, and on ncRNA-mediated regulation of translation. The NCCR RNA & Disease will be jointly hosted by the University of Bern and the ETH Zürich, with additional participating teams located in Basel (FMI and Biozentrum) and Lausanne (EPFL). Added value for the Swiss scientific landscape and society: The NCCR RNA & Disease will provide a platform for high-quality, interdisciplinary education of students and postdocs in the rapidly growing field of RNA biology, thereby meeting the rising demand of the Swiss pharmaceutical and biotech industry for scientists with such specific knowledge. Our initiative will structure existing activities as well as initiate new collaborative projects among 16 academic labs of the consortium and beyond, with the long-term strategy to gradually develop the results of basic research towards medical and pharmaceutical applications. Moreover, the planned establishment of new assistant professorships and financial support for additional up to 6 junior groups will significantly enhance innovative RNA research in Switzerland and ensure its perennity. We expect that novel disease-related, therapeutically relevant RNA targets will be discovered, offering opportunities for industrial partners or for launching start-up companies. Simultaneously, the visibility of this important field at the frontier of modern life sciences will increase and help Switzerland to promote its reputation of a lighthouse for groundbreaking science.

Financed by

Swiss National Science Foundation (SNSF)

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Specify cooperation partners

ID	Kreditinhaber	Kooperationspartner	Institution	Laufzeit - von	Laufzeit - bis
2834582	Zavolan, Mihaela	Mühlemann, Oliver, Prof	Department of Chemistry and Biochemistry, Universität Bern	01.05.2014	30.12.2025
2354689	Zavolan, Mihaela	Hall, Jonathan	ETH Zürich	01.11.2009	31.12.2035