

Editorial



NCCR RNA & Disease

National Center of Competence in Research
The role of RNA in disease mechanisms

Since its inception five years ago, the National Center of Competence in Research (NCCR) RNA & Disease has worked towards its mission of a) establishing a Swiss RNA research focus that consolidates and reinforces the position of Switzerland in RNA biology by a coordinated, interdisciplinary research program, b) advancing our understanding of RNA processing and surveillance mechanisms involved in global regulation of mRNAs and ncRNAs, c) identifying disease mechanisms resulting from aberrant RNA function, and d) building bridges between basic and medical research to promote rapid transition of new findings into medical applications. Currently, the network consists of 25 full member groups and an additional 23 associated groups, representing nearly the entire community of researchers in Switzerland working in the rapidly developing field of RNA biology. The added value gained by interconnecting all these labs into a NCCR network structure is that the different expertise in partner labs enables investigation of research questions with a broader set of tools and methods. Regular exchange of preliminary results within the network creates often unforeseen opportunities for very fruitful collaborations. Most of these collaborations are still ongoing, with a fair number of these collaborative projects having already resulted in internationally widely recognized publications (see <https://nccr-rna-and-disease.ch>).

In this special issue of CHIMIA, we present a collection of eight review articles on relatively diverse research topics to give a glimpse of what the NCCR RNA & Disease is all about. Extracellular vesicles are important for cell-to-cell communication and the Mansuy lab (ETHZ/UniZH) provides insight into how microRNAs are transported *via* such vesicles between the soma and the germline. Staying with the topic of small regulatory RNA molecules, the Jullien lab (UniBE) summarizes our current knowledge about the different small RNA-mediated silencing mechanisms found in plants. The article contributed by the Hall lab (ETHZ) describes the variety of site-specifically modified RNA molecules that our NCCR's RNA synthesis platform can make and gives examples for its applications. While host cells have evolved different defense strategies against virus infections, including nonsense-mediated mRNA decay (NMD), viruses quickly learn to counteract or circumvent these defense mechanisms. The article contributed by the Thiel and Mühlemann labs (both UniBE) describes the role of stress granules and the NMD pathway in antiviral defense. Mutations in different RNA binding proteins are associated with neurodegenerative diseases and the article by the Polymenidou lab (UniZH) focuses on the role of TDP-43 in amyotrophic lateral sclerosis (ALS), frontotemporal dementia (FTD) and spinocerebellar ataxia (SCA). The use of *in vitro* synthesized mRNAs has become popular for research and therapeutic approaches and the article from the Pascolo lab (UniZH) explains current design principles and delivery methods. The article contributed by the Schneider and Polacek labs (both UniBE) reviews the complex biology of tRNAs in *Trypanosoma brucei*, a parasitic protozoan that branched from the rest of the eukaryotes early during evolution. Last but not least, the article by the Allain lab (ETHZ) guides us through a toolbox of innovative and powerful methods used to investigate protein-RNA interactions.

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