

## Research Details, Gabriele Fuchs

Ribosomes are found in all organisms and are essential for survival and growth. They are large complexes composed of RNA and protein molecules, and translate the mRNA sequence into a protein sequence.

Until recently it was thought that all ribosomes within one organism were identical. However, mass spectrometry analysis revealed that ribosomes within one organism, even within one single cell differ in posttranslational modifications and ribosome-associated proteins. Although many ribosome modifications have been identified, the impact these modifications have on protein biosynthesis is not clear.

My lab is interested in the following questions:

- How is ribosome composition altered in cells during stress and during a viral infection?
- How does ribosome composition regulate how much and which proteins are synthesized?
- Are ribosomes in cancer cells different from ribosomes in healthy cells?
- Can we use ribosome modifications to identify novel biomarkers for early cancer detection?

My lab uses cellular and molecular biology, biochemistry, virology as well as biophysical tools to decrypt the ribosome code. We use mass spectrometry to identify ribosome modifications. To manipulate ribosome modifications and investigate how they alter translation of specific mRNAs we deplete known and putative modifying enzymes using siRNAs. Lastly, in addition to biochemical methods my lab will use single-molecule techniques to study how these modifications affect the function of the ribosome.