



University of Stuttgart

Stuttgart Research Center Systems Biology (SRC SB)

Systems Biology Seminar Talk

**„Multi-omics approaches to
understand and engineer
bacterial metabolism“**

Prof. Hannes Link

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and Infection Medicine,
Infection Biology, University of
Tübingen



Abstract:

Cells must control enzyme expression in their metabolic network, because high enzyme levels are costly and low enzyme levels can limit metabolic flux. In my talk, I will show how we created a CRISPR interference library to downregulate the expression of all 1515 proteins in the metabolic network of *E. coli*. We have studied the complete CRISPRi library with a pooled approach and measured the metabolome and the proteome of 304 CRISPRi strains. I will show how we integrate these multi-omics data to infer feedback mechanisms and to identify substrate-enzyme relationships. In the second part of the talk, I will show how we combine genomics, proteomics, and metabolomics to explore the mechanisms of antibiotic action in *E. coli*. For example, we measured the antibiotic resistance of 15 120 *E. coli* mutants, each with a single amino acid change in one of 346 essential proteins. Resistance mutations in essential genes were drug-specific and primarily affected metabolic enzymes. Most mutations that conferred resistance to the beta-lactam antibiotic carbenicillin occurred in genes associated with purine nucleotide biosynthesis, and I will show how we identified the mechanism of purine-mediated resistance.

CV:

Hannes Link received a Diploma in Chemical Engineering from the Technical University Munich in 2005 and a PhD in Biochemical Engineering from the same institution in 2009. He worked as a Postdoctoral Associate at the Institute of Molecular Systems Biology in Zurich (2010-2015) and as an Independent Research Group Leader at the Max Planck Institute for Terrestrial Microbiology in Marburg (2015-2020). Since 2020 he is Professor at the Interfaculty Institute of Microbiology and Infection Medicine of the University of Tübingen.

Wednesday

May 3, 2023

10 a.m. – 11 a.m.

Lecture Hall 0.106

Allmandring 31

Stuttgart