Master Degree Project in Structural Molecular Biology

Tight regulation of intracellular metal ion concentrations is crucial for any organism's survival. The key players in prokaryotic metal homeostasis are metal-sensing transcription factors. These metal sensors regulate the expression of target genes encoding, for example, metal transporters, as well as genes involved in the oxidative stress response.

The goal of our research is to elucidate how these metal sensors distinguish between different metal ions and control the expression of target genes in response only to their target metal, as well as how they specifically recognize their DNA-binding sequence. We investigate the metal sensors in a prokaryotic model organism from the actinomycete family, *Saccharopolyspora erythraea*, using a combination of molecular biology, biochemical and biophysical techniques, including X-ray crystallography.

In this project you will study the peroxide sensor PerR of *S. erythraea*. Peroxide sensors react to peroxide when bound to iron, but can also bind manganese, and the iron- and manganese-bound forms regulate different genes. We want to establish the molecular basis for this intriguing dual function.

Aims of the project

1. Optimize the purification procedure for the protein.
2. Structurally characterize the protein by X-ray crystallography and/or small-angle X-ray scattering (SAXS).
3. Characterize the protein's metal-dependent DNA binding activity.

Methods

- Protein production in *E. coli*
- Protein purification
- Protein characterization by different biochemical/biophysical methods such as thermal shift and dynamic light scattering
- Protein crystallization
- X-ray crystallography

- SAXS
- Protein-DNA binding assays such as electrophoretic mobility shift assays (EMSAs)

Contact

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See **Griese lab** for more information about our research.