Bacterial Meltome Atlas
and its use in the assessment of bacterial sensitivity to temperature in the context of infectious fever

"Those diseases which medicines do not cure, iron cures;
those which iron cannot cure, fire cures;
and those which fire cannot cure, are to be reckoned wholly incurable."

Hippocrates

Microorganisms have fascinated scientist since the ancient times. On one hand they are considered to be an etiological agent of infectious diseases, on the other hand, they have been also recognized as a natural microsystem helping to reduce environmental pollutants or building up humans' immunity. In our laboratory, we want to utilize proteomics to focus on the microorganisms surveillance in the context of infectious fever by measuring their viability to heat and investigating the influence of heat on the bacterial proteins by proteomics approaches.

The main objective of this project is to develop the bacterial Meltome Atlas and to utilize the database resource to study the general mechanisms of temperature influence on bacterial proteins. In particular, we want to define the group of bacterial proteins that are prone to denature at temperatures between 37-43 °C, which is the range of human fever development. However, our new understanding of what is going on with bacterial cells under increased temperatures could help us to develop better approaches in fighting infection altogether. Besides the overall interest of the power of fever, many fundamental questions remain unsolved, some of which this research proposal wants to address.

Under the research of the project, we will evaluate the influence of hyperthermia on bacteria cell culture *in vitro*. Subsequently, we will investigate the influence of heat on bacterial proteins denaturation by proteomics and TPP (Thermal Proteome Profiling). In addition, we will assess the immune response to bacteria weakened by different temperature treatment in a range of 37-57 °C. Elevating body temperature by microbial infection and letting it run represents promising concept in anti-bacterial therapies and goes beyond standard pharmacological treatment by using fever reducing drugs and antibiotics. Confirming anti-bacterial properties of infection fever might be a crucial finding in the current state of excessive usage of antibiotics and fever reducing drugs in our society.

The general outcome and the result of our work will be the proteome/meltome database, which will constitute the extension for existing Meltome Atlas resource available already at [https://meltomeatlas.proteomics.wzw.tum.de/master_meltomeatlasapp/].