

Structural enzymology group, FBMM, University of Oulu, Finland

Our group's key goals are i) to understand how proteins and enzymes function, ii) to create knowledge necessary for potential drug discovery applications and iii) to develop enzymes with novel activities. We use our expertise on structural biology and biocatalysis to achieve these goals. One of our focus areas is on the enzymes and protein complexes involved in lipid metabolism of human as well as pathogenic organisms like *Mycobacterium tuberculosis*. It is important to understand and compare the lipid metabolism of human and *M. tuberculosis* as the pathogen is highly dependent on host lipids to survive in the latent stage of tuberculosis. This makes a number of lipid metabolizing enzymes of *M. tuberculosis* potential drug targets.

In a recent study, we identified and demonstrated the structure and function of an enzyme complex involved in human mitochondrial fatty acid synthesis (Venkatesan et al., *Nature Communications* 5:4805, 2014). In another study, we determined the structure of the 240 kDa beta-oxidation complex from *M. tuberculosis* (Venkatesan and Wierenga, *ACS Chemical Biology* 8, 1063–73, 2013). Currently we are pursuing studies to understand their catalytic mechanisms, substrate specificity and substrate channeling mechanisms.

In addition, a new project is being started on a particular set of mycobacterial proteins. These proteins are shown to be important for the entry of the pathogen into the mammalian cells and are virulent factors and therefore are potential drug targets. These membrane protein complexes are also shown to be lipid and cholesterol transporters.

We are looking for highly motivated students to work on these projects for ProGradu theses. The work will include one or more of the following methods depending on the project: molecular cloning, protein expression and purification, enzyme assays, biophysical characterization, protein crystallization and structure determination, bioinformatics and electron microscopy. For more information, interested candidates please feel free to contact me via email (rajaram.venkatesan@oulu.fi).