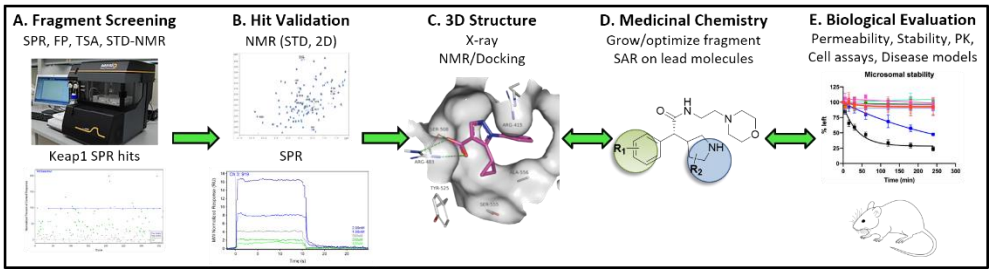
University of Copenhagen

Master Thesis Projects in Bach Group

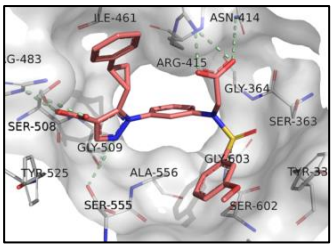


Are you interested in doing a master thesis project within drug discovery?

In the ***Bach Group*** we develop biological active small-molecule inhibitors against protein-protein interactions involved in oxidative stress and inflammation. For this, we use ***fragment-based drug discovery (FBDD)*** whereby we evaluate the druggability of selected targets, identify novel chemical probes useful for pharmacological studies, and potentially develop lead compounds for drug development.

We screen our libraries of fragments (small substructures of drug like molecules) by biochemical and sensitive biophysical methods (FP, SPR, ligand-based NMR). Promising hits are optimized into lead compounds by medicinal chemistry, X-ray crystallography, molecular docking, and pharmacological assays. We have projects within following areas:

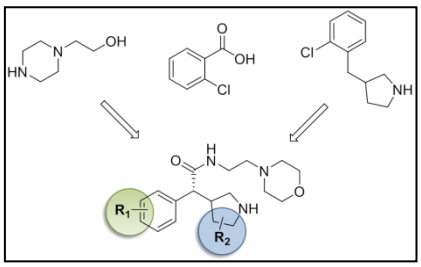
1. Fragment screening: Here, you will setup biochemical and biophysical assays such as fluorescence polarization (***FP***) and surface plasmon resonance (***SPR***), and screen our fragment library against the protein of interest. Following this you will validate the hits and characterize the binding-site and affinity, which is important for evaluating the hits as lead compounds for further drug design.



2. Biostructural studies (X-ray crystallography): With the aim of determining the three-dimensional structure of the fragment hits in the protein binding pocket, the compounds are tested using ***X-ray crystallography*** (e.g. crystal soaking). This will provide basis for optimization by fragment growing/linking in order to rationally design potent molecules.

- In these projects you will learn how to ***express and purify proteins*** and acquire experience with innovative ***biophysical techniques*** frequently used in drug discovery projects both in academia and industry.

3. Medicinal chemistry: Here, you will ***design and synthesize*** new small-molecules against our protein targets. You may work on fragment hits and optimize these into more potent molecules; or you could do ***structure-activity relationship (SAR)*** studies of known inhibitors. The aim would be to design potent compounds that are also able to enter the cell and perhaps the brain. Design is guided by X-ray crystallography and/or computational molecular docking studies.



- As a master student you will be part of the Bach Group and its on-going research. You will be guided by a postdoc or PhD student involved in the project. Depending on your interests and project status your project can comprise one or more of above topics.

- For more information, contact associate professor Anders Bach (Dept. Drug Design & Pharmacology, Medicinal Chemistry Research): anders.bach@sund.ku.dk
https://drug.ku.dk/disciplines/medicinal-chemistry/bach-group/