



Master's projects available in the Ellgaard lab

We have Master's projects available to work on these topics:

• **Structure, function and identification of molecular targets of conotoxins**

Conotoxins are key peptides of the venom produced by marine cone snails. Due to their high target specificity they have significant pharmaceutical potential. We have recently developed a synthetic biology approach to produce these disulfide-rich peptides. In the current project, we will produce a range of previously uncharacterized peptides and seek to identify their molecular targets. We will also aim to determine 3D structures of particularly interesting peptides.

• **Function and mechanism of non-lysine ubiquitination by Ube2J2**

Protein ubiquitination conventionally takes place on lysine side chains. However, recent work has shown that serine, threonine and cysteine side chains can also be ubiquitinated. In this project, we investigate the function of the ubiquitin-conjugating enzyme, Ube2J2, in serine/threonine ubiquitination. The aim is to determine the cellular and biochemical mechanisms of action for Ube2J2.

In our work we use a wide variety of cell biological and biochemical/biophysical methods. Thus, we often combine work in human tissue-culture cells with *in vitro* assays using recombinant proteins.

We can offer you a great work environment and interesting research topics. You should have a background in biochemistry, biology or molecular biomedicine, and be enthusiastic about your work.

If you are interested in hearing more about our work, visit us (Biocenter, building 3, 2nd floor, room 3.2.31) or send me an email (lellgaard@bio.ku.dk).

Lars Ellgaard, professor (<http://www.bio.ku.dk/staff/ellgaard>).

Recent relevant publications from our lab:

- McClellan, A.J. et al. (2019) Cellular functions and molecular mechanisms of non-lysine ubiquitination. *Open Biol.*, 9: 190147
- Nielsen, L.D. et al. (2019) The three-dimensional structure of an H-superfamily conotoxin reveals a granulin fold arising from a common ICK cysteine framework. *J. Biol. Chem.*, **294**, 8745-8759
- Safavi-Hemami, H. et al. (2018) Evolutionary Adaptations to Cysteine-rich Peptide Folding, pp. 99-128, *in* Oxidative Folding of Proteins: Basic Principles, Cellular Regulation and Engineering
- Ellgaard, L. et al. (2018) How are Proteins Reduced in the Endoplasmic Reticulum? *TiBS*, **43**, 32-43
- Timms, R.T. et al. (2016) Genetic dissection of mammalian ERAD through comparative haploid and CRISPR forward genetic screens. *Nat. Commun.* **7**, doi:10.1038/ncomms11786
- Safavi-Hemami, H. et al. (2016) Rapid Expansion of the Protein Disulfide Isomerase Gene Family Facilitates the Folding of Venom Peptides. *Proc. Natl. Acad. Sci. USA*, **113**, 3227-3232
- Safavi-Hemami, H. et al. (2015) Specialized insulin is used for chemical warfare by fish-hunting cone snails. *Proc. Natl. Acad. Sci. USA*, **112**, 1743-1748