ARE YOU LOOKING FOR A CHALLENGING PROJECT WHERE YOU CAN HELP US UNCOVER NEW INFORMATION ON RARE, DEADLY HUMAN DISEASES?

We are looking for motivated, enthusiastic individuals who are capable of working independently. We have several exciting projects in the laboratory suited to undergraduate students. Students seeking credit for research or who would like to complete their Master’s thesis or Baccalaureate, or those who want to learn about basic research are all welcome.

Have a look here at some basic information on the projects, then email Dr Hickey to find out more.

WHO IS THE PROJECT LEADER?

Dr Miriam Hickey, Assistant Professor in the Department of Pharmacology in the Institute of Biomedicine and Translational Medicine in the University of Tartu. She has many years of successful experience working with undergraduate students.

WHAT EXPERIENCE DO I NEED?

None!

Dr Hickey has extensive experience teaching undergraduate research students. Most did not have research experience when they started, but all contributed valuable data, much of which has been published.

WHAT WILL BE THE BENEFIT?

Research skills, communication skills, new friends, new experiences, CV points, publications, networking… Good research is difficult to do but very rewarding!

HOW MANY HOURS PER WEEK WILL BE REQUIRED?

Our primary goal is to obtain good quality, reproducible data. Your primary goal is to graduate! Therefore, we work together, around your schedule.

You have a test/an exam? No problem. Just let us know in advance that you need some time.

Typically, students work for about 6-10 hours per week, in blocks of 3-4 hours. Students come to lab between 9am and 6pm and you don’t need to worry about weekends!

WHERE IS THE LABORATORY?

Department of Pharmacology, Biomeedikum (Ravila 19).

WHAT ARE THE PROJECTS?

Wolfram syndrome (WS) is a very rare, hereditary disease that first manifests in very young children as optic atrophy and diabetes mellitus. The disease progresses to include diabetes insipidus, deafness, olfactory impairment and renal impairments. Unfortunately, the disease is fatal, typically by the age of 30. For more information on the human disease itself, have a look here and here.
Dr Hickey is interested in the neuropathology of WS. Because the disease is so rare, we use a very good mouse model of the disease to uncover novel aspects of WS neuropathology. Our collaborator in the Dept. Physiology, Dr Eero Vasar, created this mouse model. We have already found novel changes in the brain of these mice (several University of Tartu undergraduates have been working on this project!) and we are pursuing more. We need your help here!

**WHAT TECHNIQUES WILL I LEARN?**

There are several different projects and for all, you will gain a detailed knowledge of the brain. Some projects involve magnetic resonance imaging (to help us view brain anatomy *in situ*, in detail), others will involve stereological techniques (this is a technique used to count cells in the brain), cytochemistry and immunofluorescence (these techniques help us examine cell morphology and cell protein expression). Have a look at these images, taken from student work in the laboratory.

Left: Example magnetic resonance image from a mouse brain. This image is from the caudal (back) part of the brain, at the brain stem (BS) and cerebellum (Cb). Middle: Example image from a section of mouse brain that was stained with cresyl violet, a classic histological stain, and photographed using a light microscope. The student has outlined areas of interest for analysis. Right: Example image of a section of mouse brain probed using a specific antibody and visualised using immunofluorescence (the image is in black and white to provide more contrast). The student has outlined an area of interest.

Other projects involve work with cells in vitro, and here you will learn sterile cell-culture technique, transfection, image analysis and confocal microscopy.

A confocal image of a live cortical neuron, in culture, transiently expressing a marker of lysosomes (green, left) and of mitochondria (red, middle). You can see that some mitochondria are within the lysosomes (right), i.e., they are undergoing recycling/degradation.

Additional projects involve analysis of different mouse behaviours and imaging of in vivo fluorescence. Have a look at some more images below.
So – we will find something to fit your interests! We want you to enjoy what you are doing, but also to challenge yourself and learn something new.

**ANYTHING ELSE THAT I NEED TO KNOW?**

Well, your spoken English needs to be reasonable.

Don’t worry – several students were not so confident in the beginning but it was never a problem and all improved dramatically with practice!

**HOW DO I APPLY?**

Send an email to Dr. Hickey: miriam.ann.hickey@ut.ee

I look forward to meeting you!