Host University: Universität Zurich

Main Research Field (drop-down list): Health and welfare

Specified field, subject:
Neuroscience, Psychiatry, Pharmacology

Research project title:
Wnt-signaling alterations in attention-deficit hyperactivity disorder (ADHD) and methylphenidate effects using induced pluripotent stem cells (iPSC)

Possible starting month(s):
- [ ] Sep
- [ ] Oct
- [ ] Nov
- [ ] Dec
- [ ] Jan
- [ ] Feb
- [ ] Mar
- [ ] Apr
- [ ] May
- [ ] Jun
- [ ] Jul
- [ ] Aug

Possible duration in months:
- [ ] 1
- [ ] 2
- [ ] 3
- [ ] 4
- [ ] 5
- [ ] 6
- [ ] 7
- [ ] 8
- [ ] 9
- [ ] 10
- [ ] 11
- [ ] 12

Exact starting and end dates will be discussed between the supervisor and the student

Suitable for students in:
- [ ] Bachelor level
- [x] Master level

Prerequisites:
The project requires some knowledge in neurobiology, pharmacology and molecular biology, as well as some basic experience in cell culture and data analysis.

Restrictions:
None

Description (maximum 2,000 characters):
Attention-deficit hyperactivity disorder (ADHD), a neurodevelopmental disorder, is one of the most common psychiatric and behavioral disorders in children and adolescents with over 60% persistence into adulthood. Brain maturation delays up to 4 years compared to controls were observed, however the mechanisms is not yet known. Methylphenidate (MPH), most common treatment in ADHD, show improvement in brain maturation and function but even here its mechanism was not discovered. We could confirmed in vitro using several neuronal cells lines (PC12, SH-SY5Y, murine stem cells) the maturation effects of MPH at the cellular level, revealing that this was most likely due to activation of the Wnt-signaling - a central pathway important in growth maturation and maintenance of neurons. However, it is unknown whether this can be translated in ADHD patients. The aim of this project is to test the effect of MPH on the Wnt-activation in neural progenitor cells (NPCs) from ADHD patient and control, to elucidate whether MPH show different activation patterns in ADHD versus controls. This will be conducted using a personalized cellular model in a dish using the induced pluripotent stem cell (iPSC) lines from ADHD and controls created in our lab. NPCs from ADHD patients responding to MPH and healthy control will be transformed with Wnt-
Luciferase reporter system to enable quantitative measurement of Wnt-activation. Transformed cells will be treated with MPH, the positive control wnt-activator Wnt3a or LiCl, as well as the negative control Dkk1 followed by luminescence measurements. The results will facilitate in the understanding of the possible difference of MPH treatment effect on Wnt-activation in ADHD comparing to controls. This knowledge will provide a unique window of opportunity to develop preventive measures and possible new targets of therapy.
STudent REseArch Mobility Programme (STREAM)
Research Project proposal

Research laboratory:
Translational Molecular Psychiatry
https://www.kjpz.uzh.ch/de/translationale-molekularpsychiatrie.html

Faculty and/or Department:
Medical Faculty
Department of Child and Adolescent Psychiatry and Psychotherapy,
University Hospital of Psychiatry Zurich (PUK)

Deadline for nomination to reach host university:
Ongoing

Notification of admission given by the end of:
Within 4-6 weeks

Additional information:
Motivation and high interest in neurodevelopmental psychiatric research and cellular modelling, with interest in individual development into independence.

Contact person, including position:
Andrea Orbann, Head of Student Mobility

Contact email:
andrea.orbannoechslin@uzh.ch