

**Affiliation:** Masaryk University, Faculty of Medicine  
**Study program:** PhD program Biomedical Sciences  
**Specialization:** Biochemistry and Molecular Biology  
**Workplace:** Department of Biology, Faculty of Medicine  
**Form of study:** Full-time

**Supervisor:** Vladimír Rotrekl, vrotrekl@med.muni.cz

**Title: Metabolic regulation of pluripotency and pluripotent stem cell fate determination in health and pathology**

**Brief annotation (max 200 words):**

Human pluripotent stem cells are known to live on glycolytic metabolism even in presence of atmospheric concentration of oxygen. An important epigenetic regulation of pluripotency is mediated by acetylation of histones in hPSC genome. Majority of acetyl moiety for such pluripotency maintenance is coming from acetyl coenzyme A created from pyruvate by pyruvate dehydrogenase (PDH). The supervisor's laboratory has recently shown that basic fibroblast growth factor (FGF2), a major mitogen used to maintain hPSC pluripotency in vitro, regulates activity of PDH via reactive oxygen species (ROS) mediated activation of phosphatase PDP1 and that this regulation is mirrored by histone H3 panacetylation status. Student's task will be definition of changes of epigenetic stem cell regulation in response to changes in cell metabolism. Student will also use hPSC model of Duchenne muscular dystrophy, where the supervisor's laboratory recently shown the change in stem cell fate determination due to elevated ROS. Results of the work should shed the light on the regulation of differentiation process which might help to define new specific media for differentiation and will contribute to the understanding the modulation of cell fate in DMD patient tissues.

**Funding**

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**Requirements:**

Requirements to successfully obtain a PhD degree in the Biomedical Sciences PhD program:

- Have at least one first author publication in an international research journal with an impact factor above the median IF in the field or have two first author publications with the IF in Q3. Importantly, the affiliation to the Faculty of Medicine, Masaryk University must be listed.
- Gain a set of minimum credits (240 ECTS in 4-year study period), pass 4 faculty-wide courses + an English language course and 4 field-specific courses.
- Pass the doctoral state exam.
- Take an active part in teaching.
- Participate in the annual PhD conference.
- Present research outcomes at least once at an international conference (poster, presentation).
- Spend at least one month abroad on an internship.

**Masaryk University, Faculty of Medicine**

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Please quote the Reference Number in your reply.

**Additional information on the supervisor:** <https://biology.med.muni.cz/en/research/vladimir-rotrekl-group/about>