

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

**Supervisor: Mgr. Bohumil Fafílek, Ph.D.** (fafilek@med.muni.cz)

**Title: The use of phosphodiesterases to therapeutically manipulate cartilage and bone cells**

**Brief annotation (max 200 words):** Cyclic adenosine monophosphate (cAMP) and cyclic guanosine monophosphate (cGMP) are used as secondary messengers in plenty of intracellular signaling cascades. In bone biology, cAMP is mostly involved in signaling cascade associated with the receptor of the parathormone and parathormone-related peptide (PTHrP) and cGMP is used in signaling triggered by natriuretic peptide C (CNP). Together they regulate proliferation of chondrocytes, remodeling of bones and endochondral ossification. Moreover, decreased level of cAMP in bone cells and synovium is linked to the development of arthrosis and rheumatoid arthritis. cAMP and cGMP cellular levels are regulated by phosphodiesterases (PDE), e.g. PDE4D and PDE3B that play an important role in bone growth and metabolism. There are plenty of approved PDE inhibitors – drugs (roflumilast, milrinon, cilostazol) that seem not to interfere with the bone growth and development. The aim of this project is to investigate which PDE types are produced in the bone tissue and joints and how the approved and experimental PDE inhibitors could be used for therapeutic manipulation of bone and cartilage cells.

**Funding:**

The PhD position has a grant support.

**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.

**Additional information on the supervisor:** <https://biology.med.muni.cz/en/phd-program/degree-requirements>

**Masaryk University, Faculty of Medicine**

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