

**Doctoral study program:** Pharmacology **Specialization:** Experimental and applied pharmacology **Form of study:** doctoral combined **Department:** Dept. of Pharmacology, Faculty of Medicine, Masaryk University, **Supervisor:** Jan Juřica, assoc. prof., PharmD., Ph.D.

**Ph.D. position:** Clinical use and pharmacological effects of caffeine in neonatology

**Annotation:** The aim of this dissertation is a detailed verification of the potential of caffeine in neonatology. Although caffeine has long been used off-label in neonatology, in accordance with clinical recommendations as a respiratory stimulant in preterm infants, its detailed pharmacological characterisation in neonates is not well defined. The effects of caffeine are due to its action on several molecular targets: i) it blocks adenosine receptors, which has a stimulatory effect on the CNS and the CNS and interferes with pain perception. ii) inhibits phosphodiesterase, leading to relaxation of vascular and bronchial smooth muscle iii) affects calcium channel activity, affecting cell excitability and neurotransmission (and potentially affecting pain perception) iv) modulates GABA-A receptor activity, which again may lead to its stimulatory effects. Although caffeine is a long and well-known substance, its use in adult medicine is scarce. In contrast, in neonatology, caffeine use is well-established on a daily basis. However, its use in neonatology brings specific considerations, especially regarding its safety and its effect on the cardiovascular system and pain perception. Very little is known about these effects in the neonatal population (at least from the literature). This project aims to investigate how caffeine affects neonatal organism in the context of pain perception, respiration, cardiovascular system, and CYP1A2 metabolic activity. Thus, the project aims to understand further the pharmacological effects of caffeine in neonates in relation to its metabolism and salivary levels and to provide new insights for its routine therapeutic use in neonatology.

**Funding for the research**

Currently, the proposed work is not included in any grant project; funding from a specific research project is expected. The project is clinically oriented; data will be collected at a clinical site and generate only minimal costs. The supervisor will apply for AZV MH or GAČR grant projects

**Information on funding of the Doctoral Position:** Not planned for the combined form of the study.

**Requirements for the student** Publishing activity within the PhD study presents one review article in a peer-reviewed journal and one original article in a journal with IF over the median of the field, both related to the dissertation topic. A condition for successful completion of the study is also an internship abroad of at least one month, which is an integral part of the doctoral study. The student will apply for internship funding in the form of ERASMUS programs. As part of their studies, doctoral students also participate in teaching the subject of pharmacology in bachelor's and master's degree programs.

**Supervisor:** The supervisor successfully led three students to defend the dissertation. Currently, he is supervising another 3 PhD students. Author or co-author of more than 80 records on WOS, he also participated in the preparation of several teaching materials (textbook, textbook) by a reviewer of a national textbook of pharmacology and several e-learning materials. H-index = 12, the total number of citations more than 550. The supervisor was the principal investigator of the IGA Ministry of Health Czech Rep. grant project, currently is the principal investigator of the ongoing AZV project and Ministry of Industry and Trade of the Czech rep. and has participated in several grant projects provided by the Ministry of Education and Science and the GACR. He is a member of international or national professional societies and five Branch committees for doctoral studies (Faculty of Medicine and Pharmacy, MU, Faculty of Medicine Charles University). In case of questions, you may contact the supervisor: [jurica@med.muni.cz](mailto:jurica@med.muni.cz)