

Doctoral study program: Biomedical Sciences

Form: *doctoral present*

Department: Department of Biology

Supervisor: Vladimir Rotrekl

Ph.D. position:

Modelling diabetic cardiomyopathy and gestational diabetes induced developmental defects using pluripotent stem cell derived diabetic cardiac model.

Annotation:

Patients with diabetes often develop structural and functional changes on the heart. Despite growing epidemic of diabetes, only limited knowledge is available on the mechanisms implicated in the pathogenesis of diabetic cardiomyopathy, from which calcium handling and metabolic changes may precede clinically manifested cardiac dysfunction. We have previously demonstrated that cardiomyopathy is in certain conditions associated with depletion of cardiac resident stem cell-like populations coinciding with elevated reactive nitrogen/oxygen species (RNS/ROS). We also described changes in major cellular signaling AKT/PI3K pathway in response to elevated ROS due to changes in glucose metabolism in stem cells and aberrant Ca²⁺ release from RyR2 upon RNS presence. The student will thus investigate the role of hyperglycemia on the pluripotent stem cells-derived cardiac model, remodeling, inflammation and cell survival.

Funding of the research:

Národní institut pro výzkum metabolických a kardiovaskulárních onemocnění je financován z „Programu podpory excelentního výzkumu v prioritních oblastech veřejného zájmu ve zdravotnictví – EXCELES“, který je financován z prostředků Evropské unie prostřednictvím Nástroje pro oživení a odolnost – Next generation EU. Registrační číslo projektu je LX22NPO5104.

Information on funding PGS positions:

The program requires that all PhD students have some means of financial support of min. 25 000 CZK per month. This is often a combination of various sources (grants, scholarship etc.)

Requirements for the student according to the Doctoral Board:

The student's minimum publication activity within the course of study is one first-author publication with an IF value above the median in the field or 2 first-author publications in journals with an IF value in the 3rd quartile in the field (Q3). A condition for successful completion of the studies is also a foreign internship of at least 1 month, which is an inseparable part of the studies. As part of their studies, students will also participate in the teaching.

Information about supervisor:

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Please quote the Reference Number in your reply.

Focus: Genomic stability and metabolism of human pluripotent stem cells; Heart failure modeling using pluripotent stem cells.

Vladimír Rotrekl has long standing experience with human embryonic stem cell and disease modeling using pluripotent stem cells. More than fifteen years lasting experience in human embryonic stem cells handling, derivation, expansion and human cell reprogramming resulted in foccus on stem cell based disease modeling and uncovering pathological processess on the cellular level. Dr. Vladimír Rotrekl's group published numerous works on cardiac imapirment in Duchenne muscular dystrophy, Becker dystrophy, Catecholinerpic polymorphic ventricular tachycardia and also numerous methodological works on standardization and phenotypic assays of cardiomyocytes.