

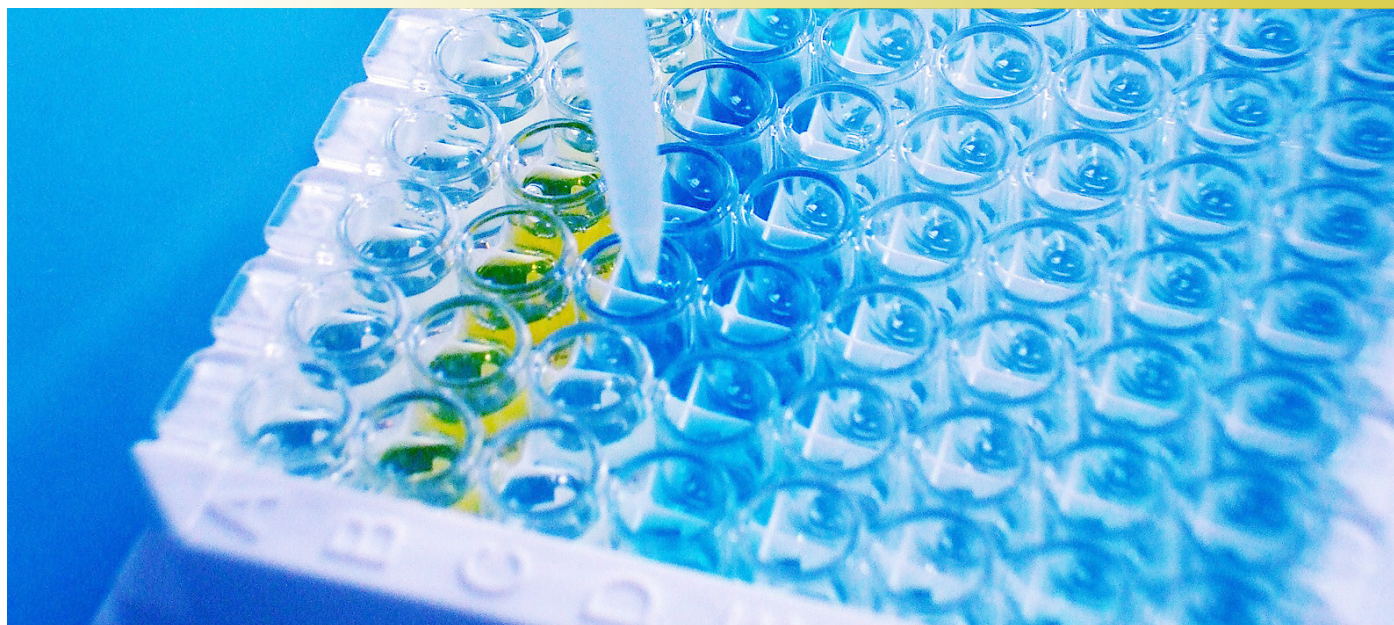


FACULTY OF PHARMACY
IN HRADEC KRÁLOVÉ
Charles University

WORKGROUP OF BIOLOGICAL AND MEDICAL SCIENCES

Department of Biological and Medical Sciences

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RESEARCH AREA & EXCELLENCE

- Research in the field of experimental atherogenesis.
- Study of the role of endoglin (CD105, TGF- β RIII) and its related signaling in atherogenesis.
- Testing of antimicrobial activity, simulation of host-pathogen interaction via tissue explants.
- Optimization of methodical procedures for drug-microbe interaction analysis.
- Analysis and identification of proteins expressed/transported from microbes after interaction with host cells.

Mission

- To reveal the role of endoglin and its soluble form in pathogenesis of endothelial dysfunction and atherosclerosis.
- Considering the role of soluble endoglin as a disease biomarker or possibly as an inducer of endothelial dysfunction in various cardiovascular diseases.
- Finding of new candidate molecules with antimicrobial activity.
- Better knowledge of molecular mechanisms of microbial pathogenesis.

KNOW-HOW & TECHNOLOGIES

Content of Research

- *In vivo* and *in vitro* research of TGF- β signaling in models of atherosclerosis and in endothelial cells.

- *In vitro* antimicrobial activity testing methods based on internationally accepted standard methods, implementation and optimization of methodical approaches for screening of antimicrobial effect on biofilm-forming microorganisms.
- Isolation, purification and analysis of secreted/secerned proteins from microbial agents.

Main Capabilities

- Cultivation of endothelial cells (especially HUVECs).
- Breeding of various knockout hypercholesterolemic mice – models of experimental atherosclerosis.
- Quantification of relevant proteins in cell cultures and sample tissues. Evaluation of tissue morphology. Assessment of mouse aorta function.
- Cultivation of microbes under different conditions, determination of minimal inhibitory concentration of antimicrobial compounds, testing of microbial metabolic activity, detection and quantification of biofilm formation.
- Microbial proteins isolation and purification.

Fields of Research

Pathology | Molecular Biology | Microbiology
Molecular Microbiology | Immunology

EXPECTATIONS & OFFERS

We are opened to a wide spectrum of collaboration with academic partners, partners from applied research and clinical partners.

EXPERTISE

- Histological and immunohistochemical analysis
- Genes and proteins analysis in tissues and cells
- Functional analysis of blood vessel contractility
- Testing of microbial and metabolic activity

KEY RESEARCH EQUIPMENT

- Histology and microscopy
- Light and fluorescent microscopy
- Western blot analysis
- Wire myograph technique
- Flow cytometry
- ELISA, qRT-PCR
- BSL₂ microbiological labs
- Analytical devices: fluorescent microscope, confocal laser scanning microscope, spectrophotometers, microbiological incubators, autoclaves, biohazard safety boxes

PARTNERSHIPS & COLLABORATIONS

Main Projects

- 2015–2017 GACR project GA15-24015S: "Tissue and soluble endoglin and their importance in endothelial dysfunction and atherogenesis *in vivo* and *in vitro*"

Endoglin study *in vivo* and *in vitro*:

- prof. Carmelo Bernabeu, Center for Biological Research, Spanish National Research Council (CSIC), and Biomedical Research Networking Center on Rare Diseases, Madrid, Spain



- prof. Jose Lopez-Novoa, University of Salamanca, Spain
- prof. Stefan Chlopicki, Jagiellonian Centre for Experimental Therapeutics (JCET), Krakow, Poland
- 2015–2018 AZV project NV15-29225A: "Study of vaginal microbiota and its relationship to recurrent vulvovaginal discomfort", principal investigator: Assoc. Prof. Vladimír Buchta

ACHIEVEMENTS

- Publications in respected international journals with impact factor
- Presentations in domestic and international congresses

