Laboratory of Cystic Fibrosis Pathogenesis

"Our goal is the development of an effective antibody prophylaxis of CF patients preventing their infections caused by P. aeruginosa and B. cepacia complex as well as the restoration of CFTR via administration of a stable mRNA. “

Offer

We can provide basic services in a general field of an antigen selection and immunogen preparation:

- *Pseudomonas aeruginosa* adherence assay using fluorescence labeled bacteria and lung epithelium cells
- The effect of prophylactic IgY against virulence factors of *P. aeruginosa* and complex can be examined
- We also provide molecular techniques, such as mRNA synthesis or cell transfection
- Currently, the mouse CF lung model is being developed

Know-how & Technologies

- Antigen selection and immunogen preparation: computer design of peptide antigens, peptide conjugation to carrier, purification of egg yolk antibody and its affinity purification (using our patent procedure)
- Animal treatment: aerosol inhalation (PARI nebulizer), intratracheal instillation (mouse)
- Cell culture handling: lung epithelium cell cultures (CuFi and NuLi) cultivation, cell transfection
- Developed assay: bacterial adherence assay using fluorescence labeled bacteria and lung epithelium cells – this procedure is currently employed in the development of antibacterial antibody prophylaxis
- Assays we used: ELISA, Western blotting, immunostaining with fluorescence microscopy, microplate ion efflux assay, luminescence determination (Tecan Infinite M200 Pro)
- Design of stable mRNA and its synthesis

Content of Research

- Administration of egg yolk antibody against virulence factors of bacteria as an excellent tool of prophylaxis of microbial infections that can prevent damage of lung epithelium of cystic fibrosis patients.
- Transfection of epithelial cells with synthetized stable CFTR mRNA that could restore CF airway function. The restoration of CF airway function is tested using a chloride ion channel activity determined by fluorescent microplate assay.

Key Research Equipment

- Spectrofluorometer (Tecan Infinite M200 Pro)
- Ultracentrifuge Optima XPN (Beckman Coulter)
- ELISA reader Sunrise (Tecan)
- Hydro Flex ELISA (Tecan)
- Microscop Nikon ECLIPSE TE2002-U (with IS-Elements AR 2.30 software)

Partnerships & Collaborations

Ademic Partners

Department of Pathology, 3rd Faculty of Medicine, Charles University | Department of Medical Microbiology, 2nd Faculty of Medicine, Charles University and University Hospital Motol | Department of Biochemistry, Faculty of Science, Masaryk University

Private and Public Sector

National Institute of Public Health in Prague | Institute for Clinical and Experimental Medicine (IKEM),Prague | Center for Cystic Fibrosis Patients, z.s

Main Projects

Coordinator of grants from the Grant Agency of Czech Republic: Centre of drug-dietary supplements interactions and nutrigenetics (GA CR P303/12/G163) and Grant Agency of Charles University (GA UK 1584814); collaborator of 16 grant projects from GA CR, 4 grants of the Grant Agency for Development of Universities and 3 grants GA UK

Achievements

- HODEK, P., TREFIL, P., ŠIMŮNEK, J., HUDEČEK, J., STIBOROVÁ, M.; *Optimized protocol of chicken antibody (IgY) purification providing electrophoretically homogenous preparations*. Int. J. Electrochem. Sci., 8, 113–124 (2013)
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- NOSKOVÁ, L., KUBÍČKOVÁ, B., VAŠKOVÁ, L., BLÁHOVÁ, B., WIMMEROVÁ, M., STIBOROVÁ, M., HODEK, P.; *Fluorescent cellular assay for screening agents inhibiting Pseudomonas aeruginosa adherence*. Sensors, 15, 1945–1953 (2015)
- VAŠKOVÁ, L., NOSKOVÁ, L., BLÁHOVÁ, B., WIMMEROVÁ, M., DŘEVÍNEK, P., KUBÍČKOVÁ, B., STIBOROVÁ, M., HODEK, P.; *Evaluation of anti-PAIIL lectin hen yolk antibody as an agent inhibiting Pseudomonas aeruginosa adherence to epithelial cells.* Monatsh. Chem.147, 889–896 (2016)
- KUBÍČKOVÁ, B., HADRABOVÁ, J., VAŠKOVÁ, L., MANDYS, V., STIBOROVÁ, M., HODEK, P.: *Susceptibility of airways to Pseudomonas aeruginosa infection: mouse neuraminidase model;* Monatsh. Chem., 148, 1993–2002 (2017)

Are you interested in this expertisa?

Please contact CPPT UK
Web: www.cppt.cuni.cz/
Mail: transfer@cuni.cz
Tel.: +420 224 491 255

Experts and their department

Prof. RNDr. Petr Hodek, CSc.
Department of Biochemistry
Web: https://twitter.com/konvalinka_lab