

INSTITUTE CONTACT



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<http://www.ibp.cz/en/departments/free-radical-pathophysiology/>

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THEMATIC RESEARCH FOCUS

RESEARCH AREA

- » Formation and reactions of free radicals in the body and the possibilities of modulating their effects with the aim of preventing selected diseases
- » Antioxidative and anti-inflammatory properties of drugs and natural compounds

EXCELLENCE

- » Formation of reactive oxygen and nitrogen species by phagocytes and its modulation by drugs and natural compounds

MISSION

- » Production of high quality publications in reputable journals
- » Collaboration with significant partners from hospitals and companies that will utilise our results

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

The aims of the department mainly involve the oxidative burst of phagocytes, interactions of phagocytes with endothelial cells, total antioxidant capacity as well as the contents of individual antioxidants in cells and body fluids, and the possibilities of oxidative injury prevention using drugs and dietary supplements.

MAIN CAPABILITIES

- » Medicine and cosmetics – new medicaments, methods, products
- » Nutrition – testing of antioxidative and anti-inflammatory properties of food constituents

FIELDS OF RESEARCH RESULTS APPLICATION

- » Health & Nutrition
- » Medical treatment

ALUMNI PROFILE

Highly qualified staff is skilled in luminometry, spectrophotometry, flow cytometry, hematology and other methods used in cellular and molecular biology.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF

3

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS):

8

KEY RESEARCH EQUIPMENT

LIST OF DEVICES

- » Luminometer Orion II (BERTHOLD Detection Systems, Germany) for chemiluminescence measurements in microtitre plates or strips in a temperature controlled chamber (20 - 37 °C)
- » ISO-NO Mark II potentiostat (World Precision Instruments) for the determination of nitric oxide synthesis
- » HPLC Agilent 1100 with diode array and electrochemical detectors
- » Flow cytometer FACS CALIBUR system (Becton Dickinson) and equipment for real time RT-PCR (Rotorgene) are shared and available at the Institute of Biophysics
- » ELISA photometer Spectra-Rainbow for spectrophotometric laboratory measurements



- » Multifunctional monochromator reader INFINITE M200 (TECAN) for fluorometrical analyses
- » Leica TCS SP5X inverted confocal microscope system (equipped with white laser and acousto-optical beam splitter)
- » High-speed sorter BD Aria II Sorp (equipped with 355, 405, 488 & 633 nm lasers)
- » Coulter Counter for cell number determination
- » High speed centrifuge for cell and protein separation (Jouan MR-22i).
- » All other standard laboratory equipment is also available

BUDGET ↘

TOTAL (MIL. CZK/ MIL. EUR)

6 / 0.24

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%)

5

PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%)

1

MAIN PROJECTS ↘

2008–2010: Effects of polyunsaturated fatty acids and their metabolites on the physiological functions of professional phagocytes (COST – MEYS OC08058, Ministry of Education, Youth and Sports)

2009–2011: Role of myeloperoxidase in the regulation of platelets physiology (AS CR M200040908)

2008–2012: The influence of L-arginine and its analogues on the generation of reactive oxygen and nitrogen species by professional phagocytes (GA524/08/1753, Czech Science Foundation)

ACHIEVEMENTS ↘

- » Ambrozova G, Pekarova M, Lojek A. (2011): The effect of lipid peroxidation products on reactive oxygen species formation and nitric oxide production in lipopolysaccharide-stimulated RAW 264.7 macrophages. *Toxicol In Vitro*. Feb;25(1):145-52
- » Číž M., Čížová H., Denev P., Kratchanova M., Slavov A., Lojek A. (2010): Different methods for control and comparison of the antioxidant properties of vegetables. *Food Control*. 21: 518-523
- » Denev P, Ciz M, Lojek A, Ambrozova G, Yanakieva I, Kratchanova M (2010): Solid-phase extraction of berries' anthocyanins and evaluation of their antioxidative properties. *Food Chemistry* 123:1055–1061
- » Klinke A, Nussbaum C, Kubala L, Friedrichs K, Rudolph TK, Rudolph V, Paust HJ, Schröder C, Benten D, Lau D, Szocs K, Furtmüller PG, Heeringa P, Sydow K, Duchstein HJ, Ehmke H, Schumacher U, Meinertz T, Sperandio M, Baldus S. (2011): Myeloperoxidase attracts neutrophils by physical forces. *Blood*, Jan 27;117(4):1350-8
- » Králová, J., Račková L., Pekarová M., Kubala L., Nosál R., Jančinová V., Číž M., Lojek A. (2009): The effects of H1-antihistamines on the nitric oxide production by RAW 264.7 cells with respect to their lipophilicity. *International Immunopharmacology*. 9(7-8):990-5
- » Kubala L, Schmelzer KR, Klinke A, Kolarova H, Baldus S, Hammock BD, Eiserich JP. (2010): Modulation of arachidonic and linoleic acid

metabolites in myeloperoxidase-deficient mice during acute inflammation. *Free Radic Biol Med*. May 15;48(10):1311-20

- » Lopez D, Pavelkova M, Gallova L, Simonetti P, Gardana C, Lojek A, Loaiza R, Mitjavila MT. (2007): Dealcoholized red and white wines decrease oxidative stress associated with inflammation in rats. *Br J Nutr*; 98(3): 611-9
- » Pekarova M., Kralova, J., Kubala L., Ciz, M., Lojek A., Gregor C., Hrbac J.(2009): Continuous electrochemical monitoring of nitric oxide production in murine macrophage cell line RAW 264.7. *Analytical and Bioanalytical Chemistry*, 394(5):1497-1504
- » Prachařová L, Okénková K, Lojek A, Číž M. (2010): Serotonin and its 5-HT(2) receptor agonist DOI hydrochloride inhibit the oxidative burst in total leukocytes but not in isolated neutrophils. *Life Sci*, 86 (13-14): 518 – 523
- » Rudolph V, Rudolph TK, Kubala L, Clauberg N, Maas R, Pekarova M, Klinke A, Lau D, Szocs K, Meinertz T, Boger RH, Baldus S. (2009): A myeloperoxidase promoter polymorphism is independently associated with mortality in patients with impaired left ventricular function. *Free Radical Biology and Medicine*, 47:1584-1590

MAIN COLLABORATING PARTNERS ↘

COLLABORATION WITH ACADEMIC PARTNERS

- » Masaryk University (Brno, CZ)
- » University of Turku (Turku, FI)
- » Institute of Experimental Pharmacology and Toxicology (Bratislava, SK)
- » University Hospital (Hamburg, DE)
- » University of Pecs (Pecs, HU)

COLLABORATION WITH COMPANIES

- » CPN, a.s. (Dolní Dobruč, CZ) and other companies in the Nanomedic cluster

EXPECTATIONS ↘

REQUIREMENTS

We are looking for long-term collaboration in the development and testing of drugs, nutritional supplements, cosmetics and food-processing substances.

OFFERS

- » Testing of functional properties of phagocytes, especially the formation of reactive oxygen/nitrogen species and expression and activation of enzymes involved in microbicidal mechanisms
- » Measurement of antioxidative properties of body fluids, drugs, chemical substances and extracts from food constituents
- » Participation in common research projects focused on the above described fields

04 / 2011