MediAim – new therapeutic and drug development strategies

Prague, 23 June 2020 **– To understand the essence of diseases of affluence and improve their treatment… Such is the goal of the MediAim consortium, which brings together three centers of excellence in science, research, and clinical practice. The Institute for Clinical and Experimental Medicine (IKEM) and two institutes of the Czech Academy of Sciences – the Institute of the Organic Chemistry and Biochemistry (IOCB) and the Institute of Physiology (IPHYS) – have joined forces to seek out new strategies for treating cardiovascular, viral, neurodegenerative, and oncologic diseases as well as diabetes and obesity.**

Weight loss, mitigation of the manifestations of diabetes, and significant slowing of neurodegenerative processes – collaboration between the three Czech institutions focusing on lipidized peptides is in the stage of preclinical studies on experimental models and has indicated very good therapeutic potential for type 2 diabetes using new drugs. This is the first real success of the research teams at IKEM, IOCB, and IPHYS, and more are certain to follow.

"IOCB joins the collaboration with an offer to work together on research into the causes of the diseases and the design of new therapies. Our strengths in the fields of medicinal chemistry, biology, structural biology, virology, and others are well matched to the expertise of our partners from leading centers in the fields of physiology and clinical research. After all, we've already seen how productive and successful our collaboration has been so far," explains Dr. Zdeněk Hostomský, director of the Institute of Organic Chemistry and Biochemistry of the Czech Academy of Sciences.

"The Institute of Physiology has at its disposal mouse and rat models of the diseases together with special methods and expertise. That makes us an ideal partner for characterizing the effects of new potential drugs developed at IOCB. The ability to validate new therapies in animal models is important for the collaboration with IKEM, and recently so are methods we've developed for comprehensive analysis of the composition of tissues and biological fluids. This expands findings obtained in costly clinical studies on patients," says Dr. Jan Kopecký, director of the Institute of Physiology of the Czech Academy of Sciences.

"The Institute for Clinical and Experimental Medicine is the only clinical center in the Czech Republic combining the full spectrum of therapies, from various pharmacotherapies and standard invasive interventions to transplantation therapy for organ failure, to treat diabetes, diseases of the heart, kidneys, and digestive system, and different types of inflammatory diseases. Intensive clinical, experimental, and translational research is being conducted in all these areas. Within the newly formed consortium, therefore, IKEM is the place where the science meets practice – in other words, the real needs of Czech patients," explains Michal Stiborek, director of the Institute for Clinical and Experimental Medicine.

The joint project is already targeting not only obesity and diabetes but also cardiovascular diseases, with teams examining the problems of heart failure in search of ways to prevent inflammation of the heart muscle and also identify possible alternatives to cardiovascular surgery.

As for the nervous system, the collaboration is focusing on research into the mechanisms responsible for the development of diseases and the rational design and preclinical testing of new potential drugs. Currently, the researchers' strategy is primarily based on the development and modification of substances known as neurosteroids, which form within the body and can substantially influence the function of various receptors.

In addition to the collaborations already underway, the joint teams intend to look for new therapeutic agents in the areas of virology, oncology, and inflammation – one of the common factors in the development of the diseases being studied.

Unlike other types of research, biomedical research is considerably dependent on opportunities for good interdisciplinary collaboration on activities ranging from the development of new substances with therapeutic potential and their quality preclinical testing to the testing of new drugs in clinical studies. An inseparable part of all these efforts is the characterization of the mechanisms responsible for the development of the diseases. Compared with the West, this type of interconnection and organization and the possibilities and results of biomedical research still fall short in the Czech Republic. The joining together of the complementary partners in the MediAim consortium will significantly advance the possibilities for development of new drugs and therapeutic strategies for diseases with the greatest impact on society as a whole.

The goals and benefits of MediAim (**www.mediaim.cz**) **include:**

- the establishment of a comprehensive research program encompassing experimental, translational, and clinical research activities in the prevention and treatment of cardiovascular, oncologic, neurodegenerative, and viral diseases as well as of obesity and diabetes;
- the integration of Prague's complementary basic, preclinical, and clinical research infrastructures;
- the application of new findings about the causes and mechanisms of the development of the diseases in prevention and treatment;
- and the development of new potential pharmaceuticals and therapies.

The **Institute of Organic Chemistry and Biochemistry of the Czech Academy of Sciences (IOCB Prague)** (**www.uochb.cz**) is a leading internationally recognized scientific institution whose primary mission is the pursuit of basic research in chemical biology and medicinal chemistry, organic and materials chemistry, chemistry of natural substances, biochemistry and molecular biology, physical chemistry, theoretical chemistry, and analytical chemistry. An integral part of the IOCB Prague's mission is the implementation of the results of basic research in practice. Emphasis on interdisciplinary research gives rise to a wide range of applications in medicine, pharmacy, and other fields.

The **Institute of Physiology of the Czech Academy of Sciences (IPHYS)** (**www.fgu.cas.cz**) is a leading national biomedicine research institute. It focuses on examining basic biological mechanisms, from the molecular level to the entire body. These mechanisms play a role in the occurrence of serious diseases, namely diseases associated with ageing and obesity (neurodegenerative and cardiovascular diseases, diabetes), epilepsy, and inherited metabolic diseases. The results of the research conducted at IPHYS help improve preventive, diagnostic, and therapeutic methods in the fight against serious lifestyle diseases affecting the whole of society. Much research is conducted in collaboration with the partners of this project as well as with other institutions, and IPHYS enriches these joint efforts with its unique expertise, methods, and biomodels. The institute offers preclinical testing of potential drugs with support provided by Strategy AV21 of the Czech Academy of Sciences. It also educates university students and trains PhD students in its biomedicine programs. In 2019, IPHYS was one of the first research institutes in the Czech Republic to receive the European Commission's prestigious HR Award for excellence in human resources management in the scientific environment.

The Institute for Clinical and Experimental Medicine (IKEM) (**www.ikem.cz**) is the only clinical center in the Czech Republic combining the full spectrum of therapies for diabetes and cardiovascular diseases, from various types of pharmacotherapies and standard invasive interventions to transplantation therapy for organ failure (heart, liver, kidneys, pancreas, and pancreatic islets). Intensive clinical, experimental, and translational research is conducted in each of these areas. In experimental research, IKEM primarily focuses on the study of experimental pathophysiological and physiological models pertaining to cardiovascular diseases, transplantation, diabetology, obesitology, and kidney disease. Most experimental research activities are conducted at the Experimental Medicine Centre (EMC), which also serves as a base for postgraduate studies in molecular biology and genetics, physiology and pathophysiology, biochemistry and pathobiochemistry, and metabolic disorders. In 2018, the Research, Development, and Innovation Council of the Government of the Czech Republic ranked IKEM an outstanding Class A research organization based on a new methodology known as M17+.