



Faculty
of Medicine

Department
of Pharmacology



Prof. Pavel Anzenbacher

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During the period 2004–2014, prof. Pavel Anzenbacher was the Head of the Institute of Pharmacology at the Faculty of Medicine and Dentistry, Palacký University in Olomouc. Thanks to his professional erudition and rich experience in scientific work, this was a period of significant development in the scientific research of the Faculty.

Since 2014, prof. Anzenbacher has been the Chairman of the Committee of the Czech Society for Experimental and Clinical Pharmacology and Toxicology of the Czech Medical Association of J. E. Purkyně. He deals primarily with the metabolic transformations of foreign substances, most often drugs. He has been working in this area since around 1976.

Graduating in biophysical chemistry from the Faculty of Science in 1971, prof. Anzenbacher obtained his doctorate in 1972 with a work focused on the so-called Brdička reaction. In 1974 he successfully defended a thesis in the field of biochemistry on the interaction of insulin with low-molecular substances. In 1975 he began collaborating with Dr Z. Šípal, one of the first Czechoslovak biochemists, under the guidance of prof. Antonín Jindra, concentrating on the metabolic transformation of foreign substances, especially drugs – known as xenobiochemistry. This discipline gained wider attention when the researchers were able to provide an explanation for the mechanisms of a number of adverse drug reactions, which were found to consist in interactions of substances at the level of enzymes that metabolised foreign substances. Together with Dr Z. Šípal, prof. Anzenbacher was the first in Czechoslovakia to successfully isolate – according to the procedures reported in the literature – the pure and functional enzyme cytochrome P450 from the microsomal fraction of the liver homogenate of the laboratory rat.

prof. Anzenbacher continued to study the properties of this enzyme, which was soon found to exist in many forms and to fulfil various functions, both beneficial (detoxification of substances or, inter alia, synthesis of substances such as steroid hormones) and harmful (e.g. activation of polycyclic aromatic hydrocarbons and formation of chemical carcinogens). During an internship in the United States at the University of Connecticut

in Farmington, in the laboratory of Professor J. B. Schenkman, he prepared the pure forms of several P450 rat cytochromes. In a similar internship at Princeton University, in the laboratory of Professor T. G. Spiro, he studied the structure of an active intermediate responsible for molecular oxygen binding. He showed that the heme iron of this enzyme – in a form capable of binding oxygen and in the enzyme then foreign substances – is directly bound to the cysteine sulphur atom. Comparison of the different forms of the enzyme confirmed the conclusions, which were made possible thanks to resonance Raman spectroscopy. Prof. Anzenbacher was among the first researchers worldwide who were able to prepare a specific enzyme in its active form and find its properties, determined by structure, using this spectroscopic method. Professor Schäfer from the Medizinische Universität Lübeck invited him to collaborate in 1990, when Pavel Anzenbacher subsequently prepared pure cytochrome c oxidase and studied its properties by using Raman spectroscopy.

At the Institute of Experimental Biopharmacy in Hradec Králové, which he led between 1993 and 1998, he continued studying the metabolism of drugs and foreign substances, with a focus on the mechanisms of metabolic processes and interspecies comparison. In the laboratory of Professor J. Květina, the work validated the use of mini-pigs for comparative pharmacokinetic experiments. It was found that hepatic metabolism of drugs in a pig takes place with enzymes very similar to those in humans. These enzymes were then isolated and characterised. Prof. Anzenbacher has published a number of widely cited articles based on this work. During a further US internship between 1993 and 1995, made possible by a Fogarty Prize awarded by the US Public Health Service, prof. Anzenbacher worked in Professor F. P. Guengerich's laboratory at Vanderbilt University in Nashville, researching the ability of cytochromes P450 and peroxidases to activate molecular oxygen and to convert drugs and foreign substances. His work showed that not only cytochromes P450 but also other heme enzymes – peroxidases – are able to activate molecular oxygen and contribute to the metabolism of foreign substances including drugs.