

Demystifying Proteins

Prof. dr hab. Michał Dadlez from the Institute of Biochemistry and Biophysics of the Polish Academy of Sciences is an expert in proteomics, a science exploring cellular proteins. One of the techniques used to gain an understanding of the identity, quantity and structure of proteins is mass spectrometry. The improvement of this technology is the goal of “Mass spectrometry for the analysis of biopharmaceuticals”, a project supported by the Foundation for Polish Science in the framework of the TEAM-TECH Core Facility 2/2016 competition.



Prof. dr hab. Michał Dadlez. Photo: OneHD

Mass spectrometry is an analytical method widely used in biotechnology, pharmacy and medical diagnostics. One of its applications is to identify and analyse protein drugs. These are called biologics (or biopharmaceuticals). They differ from traditional ‘chemical’ drugs in that they are large protein complexes synthesised by living cells. The introduction of biologics into therapies turned out to be a breakthrough in the treatment of millions of patients suffering from diseases in which existing pharmaceuticals had been ineffective. Since the 1980s, when the first medicinal products of this type were registered, not only have biologics grown in significance, but also the areas of medicine where they are used have expanded. Currently, biologics can be used to treat, for instance, some types of cancer, type 1 diabetes, multiple sclerosis, osteoporosis, inflammatory bowel diseases, shortness of stature, psoriasis, or rheumatoid arthritis. A significant disadvantage of biologics is that they are expensive. However, with the expiry of patents for branded biologics, more and more ‘biosimilars’ are entering the market – way less expensive and equally effective counterparts. Owing to this, substantially more patients can be treated for the same money. However, in order for a biosimilar to be registered and admitted into clinical practice, it needs to undergo a range of tests and analyses, proving, *inter alia*, a high similarity between the structures of the biosimilar and of the branded biologic, as well as their identical pharmacokinetic properties (i.e. identical absorption patterns in both drugs, distribution in the human body, metabolism, excretion etc.). And this is where mass spectrometry comes into play. The scientific project led by professor Michał Dadlez is aimed at developing improved mass spectrometry procedures to support pharmaceutical companies in the development of new protein drugs,

also against cancer, and in the control of drug quality. There is a chance that owing to him, new Polish therapeutic products will enter the market.

The improved mass spectrometry procedure will serve a range of further purposes, such as advanced medical diagnostics, i.e. the monitoring of drug and metabolite levels in the body fluids of patients. This will support the personalisation of therapies, for example in post-transplant patients. Using the modified procedure, scientists directed by professor Dadlez will also look for new protein disease markers, including for lung cancer.

Professor Michał Dadlez is the Head of the Laboratory of Mass Spectrometry at the Institute of Biochemistry and Biophysics of the Polish Academy of Sciences. He has been working for the Institute for almost 25 years. He also worked at the Whitehead Institute for Biomedical Research at MIT in Cambridge, USA. He completed a master programme at the Faculty of Electronics of the Warsaw University of Technology.