

Press release of 07.11.2019

More than 40 million people suffer from type 1 diabetes worldwide, in the USA alone there are approximately 1.25 million, and in Europe circa 7 million. WHO claims that by 2030 diabetes will be the seventh most common cause of death in the world. Polish scientists are working on a breakthrough therapy that will revolutionize the treatment of diabetes. Their aim is to create a functional bionic pancreas that will restore the body's ability to regulate blood sugar levels.

Proper treatment of diabetes is based on a proper diet, physical activity and daily administration of insulin injections. Recently, specialized pumps have been developed to administer insulin, or even two-hormonal pumps, that not only administer insulin but also the glucagon necessary for hypoglycemia. Unfortunately, these devices are only a bridge treatment and do not protect against the risk of development of complications such as eye damage, kidney damage, atherosclerosis or the occurrence of severe hypoglycaemia resulting in loss of consciousness. In such cases, the solution may be a pancreas transplantation or a transplantation of pancreatic islets. This is the only method leading to a complete cure, but these are difficult and not devoid of problems, such as the shortage of organs for transplantation, chronic immunosuppression or the risk of surgical complications. Unfortunately, there are still too few surgeries and the number of patients waiting for a transplant is steadily increasing.

In response to the problems related to the current concept of diabetes treatment, Polish scientists decided to develop an innovative medical therapy. Since 2017 the Bionic Consortium has been conducting research on the creation of a functional bionic organ, which is a real chance to cure type 1 diabetes. Only after two years, on March 14, the team of the Foundation of Research and Science Development under the direction of Michał Wszola MD, PhD, printed the first fully vascularized prototype of a 3x3x5cm bionic pancreas in the world. Research has shown that the organ produces insulin whereas magnetic resonance imaging has shown a carbon copy of the planned vascular system. The researchers developed two innovative bioprinters for the project: for printing with pancreatic islets and for the printing of blood vessels with endothelial cells. In the next stage it is planned to replace pancreatic islands with stem cells transformed into alpha and beta cells, i.e. cells producing insulin and glucagon. Thanks to this solution, the patient will not have to wait for cells from the donor; also the risk of rejection will be reduced because the organ will be created from its own stem cells.

Over the past six months, scientists have worked to improve the bioreactor, perfusion fluid and vascular system. They have also developed a technology for producing external blood vessels. The results achieved allowed to move to the next phase of the project and start animal testing. The first results indicate that the material developed is non-toxic to animals. Entering an advanced stage of work and promising results have launched a debate on the clinical phase of the project. The new objective of the Foundation of Research and Science Development is to build the Centre for Innovative Medical Biotechnologies, where the team will be able to continue the research and the transplantation of bionic pancreas into patients from all over the world.

Scientists and doctors gathered around Michał Wszola MD, PhD, want to create an innovative research and clinical centre where they will develop pioneering medical therapies from scratch. The direct linking the worlds of science and medicine in one place will allow on faster and more effective implementation of the latest developments in clinical practice. This will enable to a better transfer of research results to the economy and strengthen the position of Poland in the world as a country where innovative technologies solve present medical problems.

Foundation of Research and Science Development is involved in research and education in the field of medical and biochemical sciences. The Foundation has been and still is inspired by the scientific activity of a transplant surgeon Michał Wszola MD, PhD, who took part in the first transplantation of pancreatic islets in Poland, the first transplantation of the pancreas itself and in the first exchange of kidney between family donors and recipients. Within 10 years of its operation, the multidisciplinary team has carried out many impressive and pioneering projects. Scientists are convinced that Poland, as a country, can have a real impact on the progress and technological development of the world. Currently, the Foundation, as the leader of the BIONIC Consortium, is working on 3D bioprinting of bionic pancreas - a functional organ made of living cells, which will enable people with diabetes to function normally and replace the need for chronic insulin therapy. The project is financed by the Polish National Centre for Research and Development within the framework of the STRATEGMED programme. On March 14, 2019, the team led by Michał Wszola MD, PhD, printed the world's first vascularized prototype of the bionic pancreas. The project is currently in the pre-clinical phase.

The Foundation has also carried out other projects dedicated to diabetics: pioneering research on endoscopic transplantation of pancreatic islets under the gastric mucosa, pilot research on gene expression in diabetes and a nationwide educational campaign "Wean-off sugar".

November 14th is World Diabetes Day. The project of bionic pancreas implemented by the Foundation is a real chance for a breakthrough in the treatment of diabetes. Researchers working on organ printing are recognized experts in Poland and abroad, who participate in national and international symposia and give interviews as well as expert comments in the media. The specialists of the Foundation will gladly take part in the discussion on modern methods of diabetes treatment.

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