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According to the latest research results from the Medical University of Vienna, endocannabinoids, cannabis-like substances produced by the body itself, can affect the development of a baby's pancreas. The study also highlights the importance of diet during pregnancy for the foetal pancreas to form. These are the findings of a recent study that has now been published in the journal *Proceedings of the National Academy of Sciences* (*PNAS*).

Regulation by unsaturated omega-3 fatty acids

In collaboration with colleagues from Poland, the USA, Italy and Sweden, the team led by Tibor Harkany of the Center for Brain Research at MedUni Vienna successfully demonstrated that endocannabinoids have a direct influence upon pancreatic development in the unborn baby. These endogenous messenger substances are part of the endogenous cannabinoid system and are increasingly recognized as molecular determinants of the development of fetal organs.

The current study highlights a possible risk-effect of these substances, which we have only known for about 20 years: if endocannabinoid levels are perturbed, an increased probability for children to develop difficulties to process glucose could exist – thereby exposing them to a higher risk of developing diabetes. The reason for this is that, during development of the pancreas, endocannabinoids influence both the composition and size of the islets of Langerhans, which produce insulin and glucagon.

It can be a benefit for expectant mothers to take diets enriched in unsaturated omega-3 fatty acids – such as those found in fish oil – to lower not only their own but also their baby's endocannabinoid levels, which can positively influence the unborn child's pancreas development.

Nevertheless, since endocannabinoids were discovered at the beginning of the 1990s, these substances, produced by the body itself, have been regarded as "multi-talented": endocannabinoids control many physiological processes, such as fertility, development of the central nervous system, pain perception, appetite, immune response and even energy metabolism. We can now add to this expanding list that endocannabinoids are also active to "program" the fetal pancreas. "In our tests, we were essentially able to modulate the position of cells making up the islands of Langerhands at will by adding molecules that regulate endocannabinoid signaling. Thereby, we succeeded in growing functional pancreatic island-like cell clusters, at least in culture,"

describes lead author Katarzyna Malenczyk.

Tibor Harkany is impressed by the research results: "This new understanding will certainly help us to develop strategies to repair faulty pancreatic development in good time. It will also accelerate the pharmacological development of effective drugs. In my view, the therapeutic potential is vast since our study also shows the exact sequence of processes that promote life-long benefits, particularly improved hormonal responsiveness."

More information: Fetal endocannabinoids orchestrate the organization of pancreatic islet microarchitecture *PNAS* 2015 ; published ahead of print October 22, 2015, DOI: 10.1073/pnas.1519040112

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