

Scientists develop new approaches diabetes treatment

December 12 2017

A team of scientists from the Ural Federal University (UrFU) and the Institute of Immunology and Physiology modeled type 1 diabetes in an experiment to study recovery processes in the pancreas. The results of the study will contribute to new approaches to treating diabetes. The researchers have published an article in *Biomedicine & Pharmacotherapy*.

"We decided to create new approaches to the prevention and treatment of [diabetes](#) by using synthesized anti-diabetic chemical [compounds](#). It was important for us to understand the mode of their action at cell, tissue, organ and body levels," said Irina Danilova, the author of the research.

Type 1 diabetes is a serious chronic disease caused by termination of [insulin production](#) in the pancreas, leading to increased levels of [blood sugar](#) and gradual damage of organs and tissues. For example, high levels of glucose in the blood activate oxidative stress—damage of protein, lipid, and DNA molecules by [free radicals](#). Another notable tissue damage mechanism associated with diabetes is nonenzymatic glycosilation (glycation) of proteins. In the course of this process, glucose interacts with amino groups of proteins without the participation of enzymes. In healthy people, this reaction is slow, but if the level of blood sugar is high, glycation speeds up and causes irreversible damage to tissues.

Patients with type 1 diabetes need daily injections of insulin. Scientists

are interested in finding a chemical compound that would activate regeneration processes in cells damaged by free radicals. To do so, they decided to study the potential of the compounds that are able to eliminate both metabolic (oxidative stress and protein glycation) and immunological (inflammatory response) disorders associated with diabetes.

First of all, they selected heterocyclic compounds of 1,3,4-thiadiazine synthesized in UrFU in the Department of Organic and Biomolecular Chemistry under the guidance of Oleg Chupakhin (Russian Academy of Sciences, full member). These substances have anti-oxidizing and anti-glycation properties. Then the researchers tested the compounds on lab rats with diabetes.

"We tried to eliminate the disorders associated with diabetes using derivative substances of 1,3,4-thiadiazine. As a result, the levels of glucose and glycosylated hemoglobin in the blood of the rats decreased, and the level of insulin went up. The compounds that block the aforementioned pathogenetic mechanism may potentially be turned into medicinal drugs for the treatment of this socially significant disease," concluded Irina Danilova.

Provided by Ural Federal University

Citation: Scientists develop new approaches diabetes treatment (2017, December 12) retrieved 26 April 2024 from

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