An experiment in mice palliates kidney disease caused by diabetes

February 8 2018

Diabetes has become a major health problem worldwide; some estimates suggest that in 20 years, there will be around 600 million diabetics. The disease is caused by impaired insulin secretion, which in turn hinders cell glucose uptake; as a result, sugar levels in the bloodstream remain excessively high. One of the most common complications of diabetes is diabetic nephropathy, a disease which affects the ability of the kidneys to eliminate waste matter.

A research project led by the University of California-Davis in the U.S., and involving a research group at the University of Córdoba Department of Cell Biology, Physiology and Immunology, has healed lesions in mice by removing the protein tyrosine phosphatase 1B from renal podocytes, the cells involved in forming the barrier that filters substances from the bloodstream. This barrier is a vital element in the kidney filtration system.

Recent studies have shown that tyrosine phosphatase 1B "blocks" the cell systems that react to insulin, and thus limits cell glucose uptake; when its action is inhibited, cell sugar levels increase and blood sugar levels are reduced to less harmful levels.

Earlier studies used mice in which the protein was inhibited or eliminated from the whole organism, whereas the new study uses mice in which the protein is eliminated only from podocytes, the kidney cells involved in blood filtration. The findings have been highly promising. Mice subjected to this process displayed greater glucose tolerance and

improved insulin sensitivity, thus alleviating some consequences of diabetes.

A major conclusion of the study, according to co-author José Manuel Villalba, is that the protein is crucial in regulating the glucose metabolism. "In certain circumstances, such as hyperglycemia, exclusive inhibition of the protein in podocytes will benefit the whole organism. But there is still a lot of work to be done," he says. This research could contribute to the development of more selective drugs. The protein exists throughout the body, and has a number of key functions, so total inhibition could therefore have negative consequences. However, if a drug could be developed that inhibited the protein mainly in the kidney cells, physicians could treat diabetic kidney disease more effectively.

More information: Protein tyrosine phosphatase 1B deficiency in podocytes mitigates hyperglycemia-induced renal injury. Ito, Y; Hsu, MF; Bettaieb, A; Koike, S; Mello, A; Calvo-Rubio, M; Villalba, JM; Haj, FG. *Metabolism*.Volume 76, November 2017, Pages 56-69

Provided by University of Córdoba