Electronic modulation of carotid sinus nerve can be used as a treatment for type 2 diabetes in rats

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The team lead by Sílvia Vilares Conde, from CEDOC-NOVA Medical School, in collaboration with the pharmaceutical company Galvani Bioelectronics, demonstrated through findings in rats that is possible to restore insulin sensitivity and glucose homeostasis, by modulating electrically the carotid sinus nerve, the sensitive nerve that connects the carotid body with the brain. The study is published in *Diabetologia*, the journal of the European Association for the Study of Diabetes [EASD].

In 2013, Silvia Vilares Conde and her research group described that the carotid body, a paired organ that is located in the bifurcation of the common carotid artery and that is classically defined as an oxygen sensor, regulates peripheral insulin sensitivity and that its dysfunction is involved in the development of metabolic diseases.

This first study and others afterwards performed by her group in diabetic rats showed that the bilateral resection of the carotid sinus nerve, and therefore the abolishment of the connection between the carotid body and the brain, restore insulin sensitivity and glucose tolerance. Although efficient this surgical irreversible approach has disadvantages, since the carotid body possess other physiological functions as the response to the lack of oxygen (hypoxia) or the adaptation to exercise. Silvia Conde's team also described that the carotid body is over-activated in animal models of type 2 diabetes, suggesting that decreasing the activity of the organ could be a good therapeutic strategy.

From the partnership with Galvani Bioelectronics (former Glaxo Smith Kline Bioelectronics), the opportunity to electrically modulate the carotid sinus nerve come up. In fact, this work demonstrated that is possible to maintain glucose homeostasis in animals in which electrodes have been implanted in the carotid sinus nerve and submitted to electrical modulation, without significant adverse effects. It has also been demonstrated that the electrical modulation is reversible. Silvia Conde notes that "this work opens the door to the development of a new therapeutic for type 2 diabetes that will provide a long-term management of the disease with negligible adverse effects and interference with daily activities".

Type 2 diabetes is characterized by insulin resistance and by increased hepatic glucose production that culminates in hyperglycemia. Although a lot of efforts have been performed until the date none therapeutic induce long-term glycaemia control, being expected for the next decades a huge increase in the prevalence of the disease. Thus, this work gives hope to patients with metabolic diseases, as it brings a new approach for the management of type 2 diabetes.

More information: Joana F. Sacramento et al. Bioelectronic modulation of carotid sinus nerve activity in the rat: a potential therapeutic approach for type 2 diabetes, *Diabetologia* (2018). DOI: 10.1007/s00125-017-4533-7

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