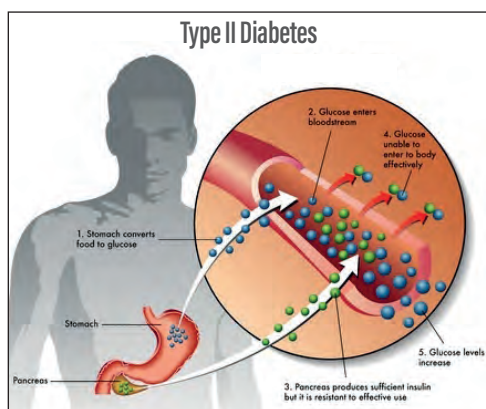


Did You Know?

Brain Iron Overload in Type 2 Diabetes

Take-home message

- Globally, an estimated number of 422 million adults lived with diabetes in 2014.
- Type 2 diabetes usually occurs from the age of 40.
- Symptoms of type 2 diabetes may not develop for a very long time.
- Type 2 diabetes could accumulate more iron and lead to neuronal death.



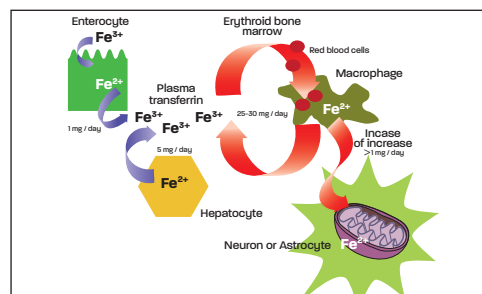
▪ **Type 2 diabetes**, also known as non-insulin dependent diabetes, is **the most prevalent and most insidious form of the disease**, representing 90% of diabetes. Type 2 diabetes affects obese or overweight people. **Its origin is often genetic.**

Diabetes can lead to complications that affect many parts of the body. **Indeed, type 2 diabetes is due to a decrease of insulin secretion.**

It is well-known that there are bi-directional relationships between the brain, obesity and insulin resistance. **Iron overload is significantly increased in obese subjects.**

Iron seems to play a direct and occasional role in the pathophysiology of type 2 diabetes.

Patients with type 2 diabetes accumulate **more iron** and **this can be a major factor triggering increased oxidative stress leading to neuronal death (Ref. 2).**



Complications

- In the long term, can affect the heart, blood vessels, eyes, kidneys and nerves.
- Renal failure and iron overload are frequent consequences of type 2 diabetes.
- Brain iron overload could lead to neurologic disorder and dementia.

Possible therapy

- Regular glucose monitoring.
- Food precautions, physical activity.
- Blood pressure and lipid monitoring to reduce cardiovascular risks and other complications.

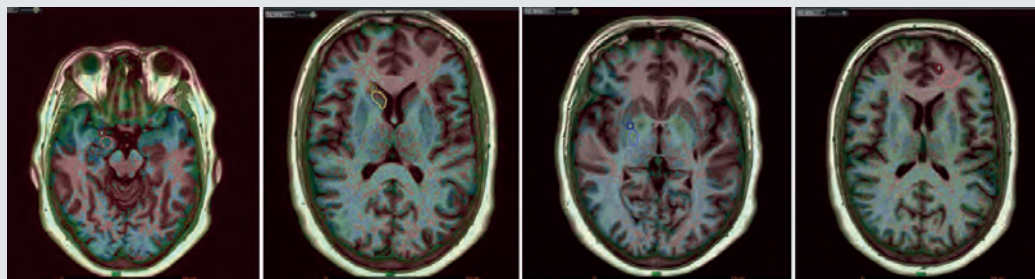
In Olea Sphere®?

In MRI, T2* and R2* are sensitive markers of the iron content in tissue (Ref. 1). **The quantitative study of T2* and R2* in Olea Sphere® makes it possible to estimate iron loading in the brain.** Thus, cognitive dysfunctions in diabetes type 2 patient may be a marker of iron overload in the brain (Ref. 2).

An MRI-acquired 8-echo gradient echo sequence will produce T2* and R2* maps with the **Relaxometry** plugin. In the **Analysis plugin**, «Regions of Interest» (ROI) can be drawn on target regions. **Olea Sphere® makes the use of several ROIs possible on several slices**, thus displaying the R2* (or T2*) curves on the same graph. **This ensures optimal visualization for a radiologist.**



The decline in cognitive function in obese and insulin-resistant patients is poorly understood. The quantification of iron in the brain will help for a better understanding.



Sources: Ref. [1] Quantitative MR Imaging of brain iron: A postmortem validation study; Christian Langkammer MSc, Nikolaus Krebs MD, Walter Goessler PhD, Eva Scheurer MD, MSc, Franz Ebner MD, Kathrin Yen MD, Franz Fazekas MD, Stefan Ropele, PhD; Radiology, Volume 257: Number 2—November 2010 Ref. [2] Brain Iron Overload, Insulin Resistance, and Cognitive Performance in Obese Subjects: A Preliminary MRI Case-Control Study; Gerard Blasco, Josep Puig, Josep Daunis-i-Estadella, Xavier Molina, Gemma Xifra, Fernando Fernandez-Aranda, Salvador Pedraza, Wilfredo Ricart, Manuel Portero-Otin and Jose Manuel Fernandez-Real; Diabetes Care 2014;37:3076–3083 | DOI: 10.2337/dci14-0664 ■ <https://fr.statista.com/statistiques/560006/nombre-de-cas-de-diabete-de-type-2-entre-2007-et-2020/> ■ <http://www.contrelediabete.fr/quest-ce-que-le-diabete.html> ■ http://www.passeportsante.net/fr/Maux/Problemes/Fiche.aspx?doc=diabete_type2_pm ■ <https://diabete.ooreka.fr/comprendre/diabete-type-2> ■ <http://apps.who.int/iris/bitstream/10665/254648/1/9789242565256-fre.pdf>