Microarrays technique to evaluate the impact of a well-oxygenated brain cells environment or resveratrol on Sirt-1 gene in Wistar rats

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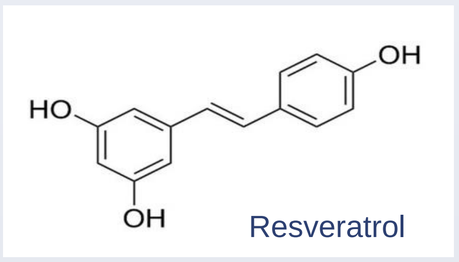
Introduction

Many circumstances allow the creation of free radicals: aging, pollutions, stress, mitochondrial dysfunction etc. – but also hypoxia (1) and hyperoxia (2).

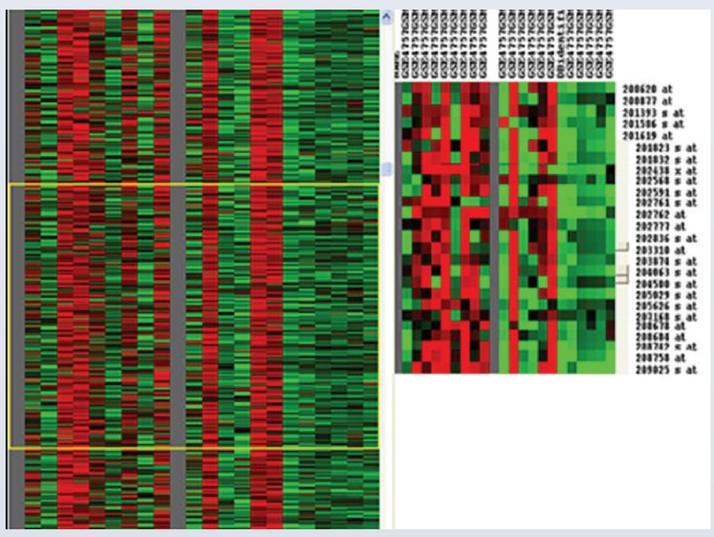
The aim of this study is to evaluate the **impact of a supplementation in resveratrol (a main antioxidant molecule), or an optimal oxygenation at the brain cellular level** (through regular breathing session of the Bol d'air Jacquier® [|BAJ] device**) on gene expression in brain.**

Material and method

Rat's BAJ breathing sessions



Resveratrol



Microarrays' technique

The "Bol d'Air Jacquier®" device has been used to allow a well-oxygeneted environment at the brain cell level.

The device generates peroxidizing volatile terpenes from organic essential oil of turpentine. It is proved that the peroxidizing molecules are able to optimize the oxygen permeation at the cellular level, during and subsequently to a breathing session (3). So, it is used as an help to fight hypoxia due to environmental pollution, ageing, or inflammatory disease. It is also an help for the control of glycated protein (4) and thus reducing oxidative stress (5).

A major natural molecule, the resveratrol, has been used as a major antioxidant

Resveratrol is a phytochemical with anti-carcinogenic, antioxidant, anti-inflammatory and cardioprotective effects which is found in some dietary sources such as grapes, berries, peanuts or red wine (6). Various galenic form exist to run resveratrol in bodies. We opted for an innovative soluble galenic form able to overcome the usual low absorption of trans-Resveratrol (7).

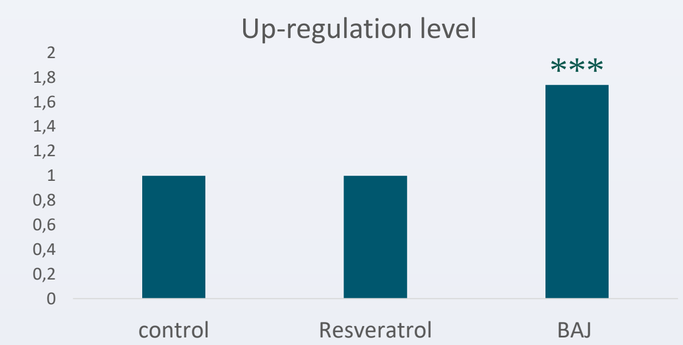
Microarray technology has been used to assess the genetical impact of a better cell oxygenation or resveratrol treatment on rat's brain.

This technology allows the analysis of the expression of more than 30000 genes, up or down-regulated under the impact of the various treatments (8).

Investigation: on 24 male Wistar rats, 12-month-old and weighing at first between 650 and 750 g, randomised into 3 groups (control, resveratrol and BAJ), fed with resveratrol (50 mg/l) or using BAJ 5 days/week, 5 months.

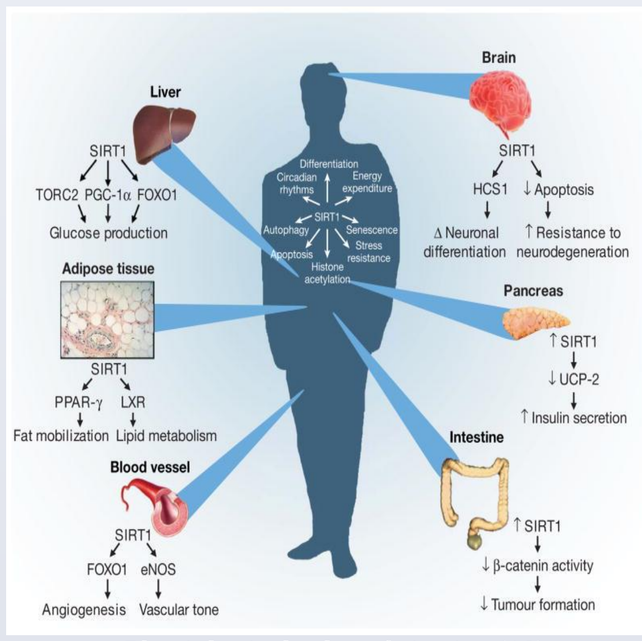
Results and discussion

Among the up and down-regulated genes, several results sound very interesting and relevant, specially for the Sirt-1 genes.



The BAJ highly up-regulates (around 170%) the Sirt-1 gene expression, but not resveratrol.

Resveratrol doesn't up or down-regulated the genes, but it is proved it increases the activity of the enzymes Sirt-1 - the pathway isn't direct gene activation (9).



Physiological roles of sirtuins (10)

Sirtuin-1 (*silent mating type information regulation 2 homolog*, also known as *NAD-dependent deacetylase sirtuin-1*), is a protein that in humans is encoded by the Sirt-1 gene. These enzymes play a vital role by deacetylate proteins and contribute to cellular regulation (10-13).

Thus, contribute to enhancing the activity of sirtuines is very important for fighting against ageing, especially in brain.

Conclusion

It is the first demonstration of the BAJ effect on the genetic expression in brain. This increase of Sirt-1 expression by BAJ could be impact positively and protect the brain from neurodegenerative diseases. Resveratrol activates the Sirt-1 without modify its gene expression.

The complementary effect of both treatments should be used to fight inflammation and brain ageing.

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