

Boosting natural detoxification pathways in the body to reduce cellular oxidative stress

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Promoting innate detoxification mechanisms in the body and discovering which supplements increase the efficacy of those biochemical pathways could be an efficient strategy to reduce the cellular oxidative stress and protect our health, according to an article published in the journal *Food Chemistry* by the researchers Rafael Franco, from the Institute of Biomedicine of the University of Barcelona, and Eva Martínez Pinilla, from the Institute of Neurosciences of Asturias (INEUROPA) and the University of Oviedo.

According to the new study, which analyses scientific information on the metabolism and health under the perspective of chemical laws, antioxidant properties in the molecules of in vitro testings do not seem to be a good indicator of their in vivo activity. According to Professor Rafael Franco, member of the Biomedical Research Networking Center on Neurodegenerative Diseases (CIBERNED), "Organisms that live in an environment rich in Earth's atmospheric oxygen survive thanks to chemical reactions—mostly reduction-oxidation or REDOX reactions—which are not significantly affected by antioxidant molecules."

Oxidative stress and free radicals have been related to the origins of some chronic diseases and ageing processes. "The main factor that contributes to increase the [oxidative stress](#) in cells unespecifically is age", says Rafael Franco. "Age affects negatively the efficiency of some [detoxification](#) mechanisms, and this would be the same [mechanism](#) that occurs in some diseases in which the production of the necessary

compounds to maintain the rhythm of detoxification cycles is involved. The oxidative stress is caused by a deficiency in detoxification mechanisms and the simple consume of "antioxidants" cannot reverse this fact."

The article, published in the journal *Food Chemistry*, analyses the main mechanisms to palliate the effects of cellular oxidative stress developed by mammals via evolution. Out of these detoxification mechanisms, the most understood of these is based on glutathione in blood cells. It is a tripeptide that acts as a powerful natural antioxidant—and the action of glucose-6-phosphate dehydrogenase (G6PDH), which creates another important antioxidant, NADPH, a basic co-enzyme in the cellular metabolism.

Living beings can properly manage oxidative [stress](#) thanks to selected mechanisms during evolution. Therefore, it is necessary to better understand the detoxification mechanisms of blood cells, rather than the brain: "Regarding the [blood cells](#), eating oxidant food such as beans—the opposite of consuming antioxidants—seems to be essential to improve the efficiency of innate detoxification mechanisms and increase the level of glutathione and glucose-6-phosphate dehydrogenase. Although it looks paradoxical, this is the pathway evolution took."

The healthy effects of the Mediterranean diet, with a nutrition pattern rich in antioxidant elements, could be explained due its capacity to strengthen the body's innate detoxification mechanisms, according to the authors. "Basically, the idea is that antioxidants are not necessary in an environment which is, and should be, highly oxidant. We should know detoxification mechanisms better and see which supplements can increase its efficiency."

More information: Rafael Franco et al. Chemical rules on the

assessment of antioxidant potential in food and food additives aimed at reducing oxidative stress and neurodegeneration, *Food Chemistry* (2017).
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