

Interest of Argan Oil for The Prevention of Neurodegenerative Diseases: In Vitro and In Vivo Proofs of Concept

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In major age-related diseases such as cardiovascular diseases, certain ocular diseases (cataract, age-related macular degeneration) and neurodegenerative diseases (particularly Alzheimer's disease), a rupture of the RedOx equilibrium is observed. This enhances the lipid peroxidation associated with aging and increases the formation of certain oxidized cholesterol derivatives, called oxysterols, especially those formed by auto-oxidation such as 7-ketocholesterol (7KC). This lipid peroxidation is also accompanied by a degradation of the unsaturated fatty acids which generate highly reactive aldehydes which can lead to the formation of carbonylated proteins whose activities are modified compared to those of the native proteins from which they are derived. This results in perturbations of cell signaling leading to several cellular dysfunctions. Furthermore, the ability of molecules derived from lipid peroxidation to stimulate oxidative stress and/or inflammation, alter cell metabolism and induce changes in DNA may result in cell death. 7KC is the oxysterol preferentially formed by auto-oxidation of cholesterol. Since 7KC is weakly metabolized (at the exception of its degradation in bile acids by liver cells), it accumulates progressively, mainly in brain cells, and may induce cytotoxic effects: oxidative stress, inflammation and cell death. Its contribution to age-related diseases is therefore widely suspected. In order to prevent the cytotoxic effects of 7KC on the nerve cells of the central nervous system, one of the possibilities is to identify cytoprotective agents in order to reduce or inhibit its harmful activities. The cytoprotective agents may be either natural or synthetic molecules or mixtures of molecules such as oils. In this context, the cytoprotective properties of argan oils (Agadir, Berkane) and some of their major compounds (especially α -tocopherol) have been studied. To this end, complementary techniques of microscopy, flow cytometry and biochemistry were used. The composition of Argan oils has also been determined by different chromatography techniques. Argan oils have highly antioxidant properties even in vivo when given per os in the rat.

On 158N murine oligodendrocytes, these oils are capable of attenuating the cytotoxicity of 7KC: loss of cellular adhesion, alteration of the plasma membrane, mitochondrial and lysosomal dysfunctions, overproduction of oxygen radicals, induction of apoptosis and autophagy. Overall, our findings provide several in vitro and in vivo proofs of concept that suggest that Argan oils could prevent and mitigate severe age related pathologies especially neurodegenerative diseases.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5535876/>