# Influencing the Signs of Ageing with the Help of a Living Fossil

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## Abstract

The *Ginkgo biloba* tree is the world's oldest living tree. The use of *Ginkgo biloba* for medicinal purposes can be traced back to the oldest Chinese Materia Medica – about 2800 BC. The main use of *Ginkgo biloba* in the cosmetic industry is based on the anti-inflammatory effect and the radical scavenger properties specifically against oxygen-free radicals. Efficacy tests with a *Gingko biloba* active ingredient confirm anti-inflammatory and anti-oxidant properties.

The anti-inflammatory effects of cosmetic active ingredients are often demonstrated by the use of well known inflammation mediators such as TNF-α, Interleukins or MMPs which are part of the inflammation cascade. However, when some of the mentioned inflammation mediators are expressed, the cascade has already started. The anti-inflammatory effect of the present study was different. It was demonstrated by an *in vitro* test, showing the inhibition of NF-κB translocation, the nuclear translocation factor that initiates the process at the beginning of the inflammation cascade. The *Ginkgo biloba* active ingredient of the present study effectively inhibited NF-κB translocation.

Antioxidant properties were shown by a treatment of human fibroblasts with the *Ginkgo biloba* active ingredient against oxidative stress - the main cause of ageing – in the form of a peroxide treatment. The treated cells were able to resist the peroxide treatment and were still showing cell proliferation, while non-treated cells just died.

The effective reduction of inflammation and the improved resistance against oxidative stress help the cells to remain active and healthy for a prolonged time.

## Introduction

The Ginkgo tree is the only existing representative of the genus Ginkgo plants today. Its main development time was 250-300 million years ago. As the plant has remained unchanged until today, it is called a 'living fossil'. In Western culture mainly the leaves have been used. In contrast to Western culture, the seeds were used in Eastern culture in traditional Chinese medicine[1]. The first secure writings in Western culture about *Ginkgo biloba* originate in the year 1436, when the topical application of ginkgo leaves against skin diseases, inflammation and their use as band-aid were described[2].

Ginkgolides have anti-inflammatory properties. Terpene Lactone Ginkgolides are unique and can only be found in *Ginkgo biloba* trees. They are diterpenes that are slightly different in structure. The Terpene Lactone Ginkgolides and Bilobalide have a sesquiterpenoid structure[3].

The effects of Ginkgo Flavone Glycosides are based on their anti-oxidative properties, specifically the scavenger function for oxygen-free radicals[3]. The accumulation of oxygen-free radicals is a particularly important factor of age-related change processes in the skin. Ginkgo Flavone Glycosides protect against peroxidation of lipids that are important components of the cell membranes and essential for the preservation of membrane flexibility[3]. The radical scavenger function of *Ginkgo biloba* is comparable with other well-known antioxidants such as vitamins C and E.

*Ginkgo biloba* leaves contain two groups of active chemicals: Flavanone Glycosides and Terpene Lactones. Flavanone Glycosides are Kaempferol, Quercetin and Isorhamnetin (Figure 1 see next page). The Terpene Lactones are Ginkgolides A, B, C and Bilobalide (Figure 2 see next page).