

## Skin Anti-Aging Benefits of Phytotherapeutics-based Emulsions

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The modern medicine still needs the help of the alternative and complementary medicine, which is most often based on phytotherapy. Therefore, the identification and characterization of plant extracts and their major bioactive phytochemicals (e.g. polyphenols, triterpenes, carotenoids, vitamins) are highly valuable, especially if they, as natural compounds encapsulated or not, are proved to be more efficient and less toxic compared to that of conventional chemical formulations (i.e. synthetic or semi-synthetic compounds) used as drugs to prevent or treat diseases (e.g. melasma, melanoma, acne, dermatitis, skin sunburns), nutraceuticals/food supplements (e.g. antioxidants, anti-inflammatory compounds) or cosmeceuticals for topical application to delay physiological or pathological/premature aging (e.g. skin aging) [1-7].

Recent advances in biotechnology have demonstrated the feasibility of encapsulating plant extracts or derived-pure phytochemicals into various types of carriers (e.g. emulsions *aka* colloids or polymers in dispersed systems, other biocompatible and biodegradable polymers) in order to more specifically target the damaged tissue while enhancing their systemic bioavailability and reducing their cytotoxicity [3,4,8,9]. In this context, the administration route represents an important parameter to take into consideration, and topical/local application of phyto-agents appears to be the most suitable in skin aging prevention and skin therapy (e.g. photoprotective and DNA-damaging repair effects) in particular because this route permits to reduce the efficacy dose and subsequently the overall systemic and organic toxicity [1-5,8]. Interestingly, emulsions are frequently employed to establish new pharmaceutical and cosmetic formulations (e.g. creams) for either topical (e.g. skin applications), oral administration, or sometimes injection [10,11].

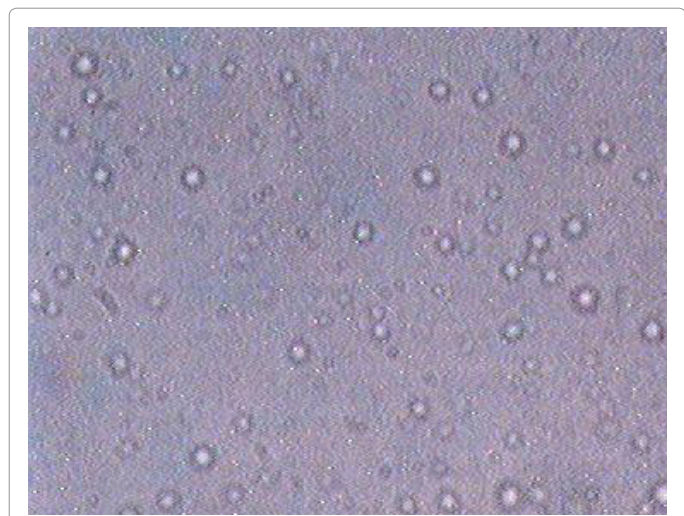
Emulsions (including macro-, micro- and nano-) are part of the colloids class, a two-phase systems of matter, in which the liquid of the dispersed phase (e.g. oil) is put in contact, albeit normally immiscible

(i.e. non-mixable or unblendable), with the liquid of the continuous phase (e.g. water) [9]. The droplets dispersed in the liquid matrix (*aka* "dispersion medium") are usually assumed to be statistically distributed (Figure 1).

Overall, there is emerging evidence that topical application of some emulsified plant extracts or pure phytochemicals can prettify the skin appearance and reduce a number of degenerative diseases as well as skin conditions such as skin inflammation, skin cancers and/or skin aging [12-15]. The ongoing challenge is to determine qualitatively and quantitatively, in the physiopathological context, which phytochemicals encapsulated into emulsions are really the most efficient and the safest.

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**Figure 1:** In house-made O/W macro-emulsion containing 5% *Cassia fistula* L. [*Caesalpinaceae* (*Fabaceae*)] crude pod's extracts for skin anti-aging applications.

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