

Interactions of plant extracts traditionally used in skin diseases with a human skin microbiota

Human skin is a complex organ that is responsible for many vital functions. More recently, scientific reports show that **the bacteria, fungi and viruses present on the skin, known as the skin microbiota (SM) also play a crucial role in the protection against invading pathogens and in the development of inflammatory mediated diseases.** Profound changes in the composition of skin microbiota may lead to the development of many inflammation-associated diseases including atopic dermatitis, eczema or chronic wounds. Many studies focused on the biodiversity of SM were performed showing that the composition of skin microbiome is dependent on the topography of the human body. Different bacterial families and species are present in sebaceous, moist or dry skin areas. However, the most abundant bacterial genera present in SM can be limited to *Staphylococcus*, *Corynebacterium*, *Propionibacterium*, *Streptococcus* and *Pseudomonas*.

The scientific reports on the influence of topically administered drugs and cosmetics, also those containing plant extracts, are lacking and little is known on changes to SM that they can cause, especially by the prolonged treatment. It is also not clear whether **skin microbiota can alter the chemical composition** of herbal drugs used on the skin.

Medicinal plant materials are widely used in the treatment of skin diseases. They are most administrated topically as simple home-made extracts or are constituents as commercially used creams, tonics and ointments. They are considered as an effective anti-inflammatory, antimicrobial, wound healing, smoothing, or hydrating agents. Many scientific reviews show that medicinal plant materials are traditionally used in skin diseases around the world. The efficacy of some plant remedies i.e. comfrey root (*Symphytum officinale*) was confirmed in some clinical studies. However, in most cases including comfrey, **it is not clear what is the mechanism of the observed beneficial effect.** Additionally, for many plant remedies, the **chemical composition is still not fully elucidated.**

Taking into consideration the significant role of microbiota it seems justified to investigate interactions between skin microbiota and remedies containing natural products applied topically in the therapy. It was shown that changes in biodiversity of skin microbiota can be associated with the development of some diseases i.e. atopic dermatitis. The usage of any remedy externally leads to the direct contact of its components with skin microbiota can cause significant changes in its composition leading to beneficial or not beneficial effects. **Little is known on the influence of topically used plant-derived drugs on skin microbiota.** The aspect should be more deeply investigated to increase the effectiveness and safety of traditionally used drugs of natural origin.

Likewise, the possible biotransformation of drugs by skin microbiota, including plant extracts, is not well studied. Due to the fact that the research on gut microbiota metabolism of natural products showed put a new light on its role in compounds bioavailability and bioactivity, it should also be considered important in the therapy of skin diseases. It is highly probable that **natural products when applied topically can be metabolized by skin microbiome leading to the production of skin microbiota metabolites of plant origin (SMM)** that are absorbed and/or are bioactive on the site of application.

The proposal aims to investigate the interactions of chosen plant extracts with skin microbiota of healthy volunteers and to evaluate the bioactivity of extracts and mixtures of postbiotic metabolites (SMM) produced by skin microbiota using *in vitro* skin cell models.