

## Supporting a therapy of non-healing wounds with witch hazel bark

The widespread issue of chronic non-healing wounds affects roughly 1-2% of the population in developed countries. The problem is recognized when skin damage persists for longer than four weeks. Numerous factors contribute to the increasing numbers of patients with wound healing deficiency in developed countries. They are primarily associated with lifestyle diseases of metabolic and cardiovascular background, which significantly affect the regeneration of the skin, *i.e.* by sustaining chronic inflammation. The vast majority of chronic wounds are chronic leg ulcers, which significantly affect patients' quality of life.

The occurrence of infections may also suppress skin and soft tissue regeneration. A variety of microorganisms may be responsible, as they appear in diverse patterns related to other diseases patients suffer from, the socioeconomic factors, and previous therapies of the recurring skin ailments. The chronicity of skin ailments is also affected by increasing bacterial resistance to antimicrobial agents. Moreover, in recent years there has been an expansion in the research, which progressively incorporates studies on the influence of xenobiotics on the microbiome or the microbiome on the xenobiotics. Rediscovery of the importance of microbiota will furtherly result in deepening comprehension of the complex interplay between disease-related processes, characteristics of microbial communities and the use of xenobiotics.

All of these factors together influence the availability of treatments and the outcome of therapy. **Thus, while witnessing the escalation of wound-healing related problems together with the increasing economic burden they pose, new and diverse therapeutic interventions aimed at wound healing treatments should be considered by medical professionals and society.**

For years phytotherapy was the available primary treatment for dermatological conditions. However, the application of herbal remedies has been based mainly on historical or anecdotal evidence. More credible data obtained in comprehensive research, as well as approaching both the efficacy and safety of traditionally used remedies, is required. The reintroduction of previously used herbal remedies, which had been replaced by antibiotics, may be a promising strategy, provided it will be executed based on scientific-based evidence, sufficient standardization, and quality control of plant-based products.

The project aims to find a justification for the traditional use of witch hazel bark as a topical agent used in skin infections, inflammation, and skin regeneration. The research will be founded on investigating the plant material in terms of phytochemical composition and biological activity. The latter will be investigated using *ex vivo* and *in vitro* models using cells directly engaged in the wound-healing processes. In addition, interactions of the witch hazel bark constituents with skin microbiota will be investigated. Finally, *in vivo* studies will be conducted on the plant-derived products showing the most potent activity in cellular models.

Results obtained with the current proposal should provide efficient data on the chemical composition and biological activity related to wound-healing deficiencies.