

"Development of standardized procedures to evaluate morphological, mechanical and physical properties of nails and their alterations: pharmaceutical and cosmetics applications"

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It is quite a challenge to find scientific literature references of standardize procedures meant to evaluate and characterize nail products: in cosmetics field in particular, usually, nail products efficacy is in fact evaluated thru in-vivo studies, often with self-evaluation endpoints. The aim of this three years' work has been the development of an in vitro model for nail, which is suitable to become the gold standard to objectively support products commercial claims, but also a tool in safety evaluation process. In the first part of the work both production and characterization paradigms for bovine hooves membranes, which are well-known in literature to be used as a human nail substitute in studying nail permeability and effect of ingredients on nail [1] [2], has been developed and fully described. In particular, mechanical characterization were carried out using a novel technique already applied in vivo [3]. Afterwards, the model has been applied to the development of protocols to evaluate products in vitro. In the cosmetics field, the work focus has been the evaluation of several products meant to improve nail conditions affecting mechanical properties, such as brittle nail syndrome. Onychomycoses, which is a wide diffused pathology, hard to be successfully treated, has been the focus on the development of in vitro protocols for pharmaceutical applications. In summary, the in vitro model developed within this experimental work has proved to be suitable for a wide range of characterization techniques and in vitro test, beyond permeability studies applications.

References: [1] D. Mertin e B. C. Lippol, «In-vitro Permeability of the Human Nail and of a Keratin Membrane from Bovine Hooves: Penetration of Chloramphenicol from Lipophilic Vehicles and a Nail Lacquer,» J. Pharm. Pharmacol, vol. 49, pp. 241-245, 1997; [2] D. Monti e et al., «Validation of bovine hoof slices as a model for infected human toenails: in vitro ciclopirox transungual permeation,» British Journal of Dermatology, vol. 165, pp. 99-105, 2011; [3] P. Perugini e e. a. , «Nail StrainStress Meter NM 100: A novel in vivo method to characterize biomechanical properties of nail,» Skin Res Technol, vol. 00, pp. 1-9, 2019.