Construction, in vitro and in vivo evaluation of an in-house conductance meter for measurement of skin hydration.

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Abstract

Different probes are used in dermato-cosmetic research to measure the electrical properties of the skin. The principle governing the choice of the geometry and material of the measuring probe is not well defined in the literature and some device's measuring principles are not accessible for the scientific community. The purpose of this work was to develop a simple inexpensive conductance meter for the objective in vivo evaluation of skin hydration. The conductance meter probe was designed using the basic equation governing wave propagation along Transverse Electromagnetic transmission lines. It consisted of two concentric copper circular electrodes printed on FR4 dielectric material. The performance of the probe was validated by evaluating its measurement depth, its ability to monitor in vitro water sorption-desorption and in vivo skin hydration effect in comparison to that of the Corneometer CM 825. The measurement depth of the probe, 15 μm, was comparable to that of CM 825. The in vitro readings of the probe correlated strongly with the amount of water adsorbed on filter paper. Skin hydration after application of a moisturizer was monitored effectively by the new probe with good correlation to the results of CM 825. In conclusion, a simple probe for evaluating skin hydration was made from off-the-shelf materials and its performance was validated in comparison to a commercially available probe.