

Salts on the skin

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Introduction. In Health Resort Medicine, both balneotherapy and thalassotherapy, salt waters and their peloids, or mud products are mainly used to treat rheumatic and skin disorders.

These therapeutic agents act jointly via numerous mechanical, thermal, and chemical mechanisms. In this review, we examine a new mechanism of action specific to saline waters.

Discussion. When topically administered, this water rich in sodium and chloride penetrates the skin where it is able to modify cellular osmotic pressure and stimulate nerve receptors in the skin via cell membrane ion mechanosensitive channels.

We will describe the established models of cutaneous absorption and desorption models like QSPR-quantitative structure-permeability relationship, four pathways and brick and mortar.

Finally we study penetration of dissolved ions in mineral waters through the skin (osmosis and cell volume mechanisms in keratinocytes) and examine that the actions of salt mineral waters are mediated by a mechanism conditioned by the concentration and quality of their salts involving cellular osmosis-mediated activation/inhibition of cell apoptotic or necrotic processes. In turn, this osmotic mechanism modulates the recently described mechanosensitive piezoelectric channels.

Conclusions. The findings of this review indicate that mineral salt waters act via a cell osmosis mechanism conditioned by the concentration and quality of their salts that is capable of activating/ inhibiting cell apoptosis and necrosis. In turn, this osmotic mechanism participates in mechanotransduction via piezoelectric ion channels embedded in cell membranes. Piezo proteins play important cell developmental roles such as in gene expression, and cell volume regulation, migration, proliferation, division, and adhesion. These proteins are capable of translating mechanical forces into the biological signals that are pivotal for a wide range of physiological processes, including somatosensation, red blood cell volume regulation, and blood vessel physiology.

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