

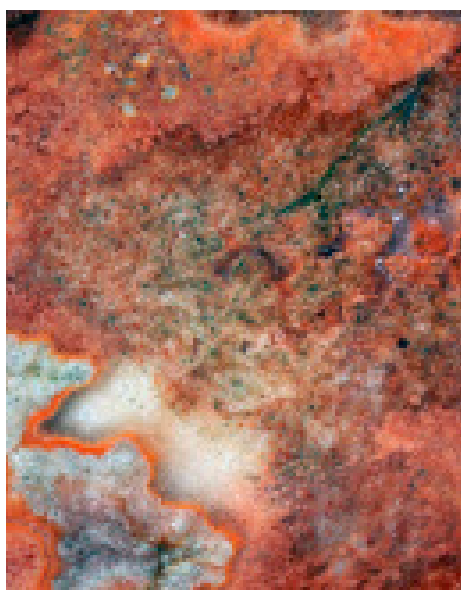


SMALL MOLECULE TECHNOLOGIES, INC.

# MOLECULES & HEALTH

HEALING THROUGH MODERN SCIENCE • A PUBLICATION BY SMALL MOLECULE TECHNOLOGIES, INC.

## The Importance of Skin Minerals



Many minerals are recognized in the USDA Dietary Guidelines for Americans (2010), as being essential for human health and well being, including calcium, magnesium, potassium, zinc, copper, and selenium<sup>1</sup>.

Although, it is well established that the dietary intake of minerals is essential for general health, there is also increasing evidence for the importance of minerals in skin health<sup>2</sup>.

Interestingly, a significant amount of essential minerals can be found in spas, medicinal clays (as well as a large amounts of trace minerals), mud baths and mineral water baths that have been used for cen-

turies in skin health and healing.

The use of minerals for medicinal purposes has been recorded since the times of the ancient Egyptians and Greeks when mineral-rich earths were used for their anti-inflammatory and antiseptic properties. Hippocrates and Aristotle produced classifications of medicinal earths, which were mostly clays. In modern times, the minerals used for therapeutic purposes are also from clay materials due to the cost and difficulty of synthetic mineral production<sup>3</sup>. In addition, clay minerals are probably commonly used because they are the “most abundant components of the surface mineral world<sup>4</sup>.”

Small Molecule Technologies SkinMineralZ is the only skin care product to combine the amazing healing power of three mineral-rich clays with zinc oxide and carboxymethylcellulose. SkinMineralZ corrects skin mineral deficiencies associated with poor healing and helps remove toxins and contaminants from skin. Small Molecule Technologies SkinMineralZ-ST™ is “skin toned” so it blends with skin color to provide a contemporary approach to wellness, individual privacy and

skin healing dignity.

### Medicinal Clays

Medicinal clays have been used traditionally for skin health due to the adsorption (attraction of molecules) and absorption (liquid uptake) qualities as well as extremely fine particle size of the clays, which allows them to remove oils, secretions, toxins, and contaminants from skin<sup>5</sup>.

Recently, medicinal clays have been used in clinical and pharmaceutical applications. Montmorillonite (in smectite group) clays have been used extensively due to the fact that they have high cation (positive charge) exchange capacities, as well as large specific surface properties that allow optimum absorbance of organic



and inorganic substances<sup>6</sup>. For example, montmorillonite clays have been used to absorb harmful toxins produced by fungi<sup>7</sup>.

The antibacterial properties of medicinal clays are believed to be due to their ability to transfer cations. Metallic cations such as silver, copper, and zinc, which have strong bactericidal effects on a broad spectrum of bacteria<sup>5</sup>, may be released from medicinal clays producing damaging effects against bacteria.

### **Re-mineralizing Skin to Promote Health and Healing**

Reduced blood flow to skin tissues due to diabetes, obesity smoking or aging<sup>8</sup> can decrease the access of essential minerals to the skin. Mineral deficiencies including copper, selenium and zinc, are associated with deleterious skin health effects including dermatitis and skin lesions<sup>9,10</sup>.

Many of the minerals found in medicinal clays benefit skin health by participating in important cellular, physiological and enzymatic processes. Metal ions are important cofactors for many enzymes, in fact, it's estimated that approx-

imately one-third of all enzymes require metal ions for enzymatic activity. Calcium is a key regulator of epithelialization and keratinocyte differentiation during the formation of corneocytes. Potassium is important for maintaining cellular membrane potential. Magnesium is an important cofactor for many metalloenzymes. In addition, magnesium and calcium ions play key roles in regulating keratinocyte proliferation and have been shown to activate keratinocyte migration<sup>2</sup>. Salts rich in magnesium have been used traditionally for health purposes. Epsom salt (MgSO<sub>4</sub>) has been used for its soothing and healing properties. Dead Sea salts that also have high levels of magnesium have been used to treat dermatitis and have been reported to improve skin barrier properties<sup>11,12</sup>.

Zinc is located intracellularly and in the extracellular matrix (ECM) of epidermal and dermal tissues where zinc is involved in the stabilization of cell membranes<sup>13</sup>. Zinc-finger proteins are a family of more than 2,000 transcription factors that bind to DNA and activate important growth factors. Zinc is also a cofactor for many important skin enzymes includ-

ing matrix metalloproteases that are involved in wound healing, as well as the important antioxidant enzyme superoxide dismutase. Zinc has been shown to enhance wound healing<sup>14</sup>, and interestingly, the expression of zinc-and copper-binding proteins known as metallothioneins is upregulated in wound margins<sup>2</sup>. Furthermore, zinc deficiency results in depression at all levels of the immune system<sup>15</sup>.

The trace mineral, selenium is thought to protect skin through its involvement with antioxidant enzymes including glutathione peroxidase and thioredoxin reductase. Copper serves as an important cofactor for many enzymes including lysyl oxidase and tyrosinase, which are involved in collagen cross-linking and skin pigmentation respectively<sup>16</sup>.

All of the Small Molecule Technologies skin and wound care products including SkinMineralZ contain important antioxidants some of which also have potent anti-inflammatory activities such as oleuropein, resveratrol and epigallocatechin-3-gallate (EGCG) from olives, grapes and green tea respectively, as well as the important antioxidants, melatonin and glutathione<sup>17-21</sup>.

### **The Effectiveness of Zinc Oxide**

Metallic oxides also benefit skin health including zinc oxide which has a long history of safe and effective use in sunscreens and in the treatment of skin rashes such as diaper rash and skin conditions including eczema, warts, impetigo, and psoriasis<sup>2,10</sup>. Zinc oxide



is also known to have antibacterial activity, with demonstrated effectiveness against *E. coli* and *S. aureus*<sup>15</sup>, as well as anti-fungal activity<sup>22</sup>. Topical zinc oxide treatment has also been shown to increase endogenous gene expression of insulin-like growth factor-1 in granulation tissue, suggesting a potential mechanism for increased epithelialization and enhanced wound healing<sup>23</sup>.

Zinc oxide accelerates both chronic and acute wound healing and zinc oxide paste has been shown to induce rapid healing in vascular and leprosy ulcers<sup>10,13</sup>. In ad-

dition, zinc oxide paste has been shown to protect and soothe inflamed peri-ulcer skin. Zinc oxide is effective as a topical debriding agent in the treatment of pressure ulcers and burn wounds, and has been used effectively in the treatment of diabetic foot ulcers. Zinc oxide is advantageous because it provides a sustained release of bioavailable zinc to the wound at noncytotoxic levels unlike other zinc compounds<sup>13</sup>.

It's good to know that SkinMineralZ contains important minerals that are highly beneficial for skin health. SkinMineralZ also

removes toxins and contaminants and can correct mineral deficiencies associated with poor healing. SkinMineralZ-ST is "skin toned" to blend with individual skin color. SkinMineralZ and SkinMineralZ-ST combine three perfectly balanced mineral clays with zinc oxide and carboxymethylcellulose; they go above and beyond to enhance skin health and wound healing.

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