

COSMECEUTICAL CRITIQUE

Dead Sea Minerals

The palliative effects of immersing in baths or pools of thermomineral water, known as balneotherapy, have been known for centuries, with modern practices dating back to the 1800s and natural health spas dating back more than 3,000 years (*Dermatol. Ther.* 2003;16:132-40; *Clin. Dermatol.* 1996;14:659-64).

Places such as the Kangal hot spring in Turkey, the Blue Lagoon in Iceland, and the Dead Sea between Israel and Jordan are particularly popular “hot spots” for such therapy.

The Dead Sea is the lowest saline lake—and the lowest accessible point—on earth (400 meters, or about 1,300 feet, below sea level). Its therapeutic benefits have been well known for 1,500 years, with the modern era for such treatments beginning in 1959 (*Clin. Dermatol.* 1998;16:695-8). Over the past half century, the Dead Sea has become well recognized for its balneologic activity, allowing climatotherapy to be used for dermatologic and rheumatologic conditions.

In particular, Dead Sea climatotherapy is considered to be very effective in the treatment of psoriasis and, to a lesser extent, atopic dermatitis (*J. Am. Acad. Dermatol.* 2005;52:445-50; *Arch. Dermatol.* 1998;134:1416-20). Other conditions successfully treated with balneotherapy include acne, alopecia areata, chronic ulcers, contact dermatitis, dyshidrotic dermatitis, granuloma annulare, ichthyosis, lichen planus, lichen sclerosus and atrophicus, mycosis fungoides, palmoplantar keratosis, pityriasis rubra pilaris, pruritus, rosacea, scleroderma, seborrheic dermatitis, urticaria pigmentosa, vitiligo, and xerosis (*Dermatol. Ther.* 2003;16:132-40). Products that contain Dead Sea minerals are currently used to treat several of these cutaneous conditions.

Dissolved Minerals

The Dead Sea, which contains exceedingly high salt concentrations, acts as a reservoir of minerals with distinct evaporation properties. Dead Sea salts are the source of numerous chemical and health products. Specifically, various skin conditions and allergies, as well as arthritis and respiratory disorders, have been treated with Dead Sea–derived magnesium salts and sulfur-containing mud (*Rev. Environ. Health* 1999;14:257-67). Magnesium salts, which are known to have anti-inflammatory activity, are the prevailing minerals in Dead Sea water (*Int. J. Dermatol.* 2005;44:151-7). Compared with the world’s oceans, the Dead Sea is more abundant in calcium, magnesium, potassium, and bromide, and lower in sodium, sulfate, and carbonate (*Dermatol. Ther.* 2003;16:132-40; *Int. J. Dermatol.* 1989;28:1-9).

Enzyme Stimulation

In 1985, Shani et al. found that glutathione peroxidase activity was significantly increased in 35 psoriatic Danes who received 4-week therapy at the Ein Bokek International Psoriasis Treatment Center along the Dead Sea in Israel. The drinking water at the center was found to be rich in selenium. The researchers assayed the activity of erythrocyte glutathione peroxidase, the most reliable marker for increases in selenium bioavailability, in the psoriasis patients, in 25 long-time local hotel workers, and in healthy volunteers who consumed low-selenium water. Enzymatic activity in the hotel workers was found to be 50% higher than in the low-selenium drinkers. The investigators concluded that selenium might play a beneficial role in psoriasis treatment (*Pharmacol. Res. Commun.* 1985;17:479-88).

That same year, several of the same researchers compared the penetration of electrolytes through the skin of healthy volunteers and psoriasis patients who bathed in the Dead Sea or comparable bath-salt solutions for a

4-week period. Only the psoriasis patients had significant increases in serum levels of bromine, calcium, and zinc (*Pharmacol. Res. Commun.* 1985;17:501-12).

Antiproliferative Action

Two years later, Shani et al. tested diluted Dead Sea brine and salt solutions, and found that they reversibly suppressed cell proliferation in vitro. They noted that bromides were more potent inhibitors than chlorides, and that potassium salts exhibited greater effectiveness than sodium or magnesium salts. The authors speculated that the penetration of minerals through the skin, along with antiproliferative effects, may help explain the effectiveness of Dead Sea spa treatments for psoriasis (*Pharmacology* 1987;35:339-47).

Interestingly, in 1996, investigators sought to identify the antiproliferative effects of certain Dead Sea minerals that play a role in ameliorating psoriasis, by comparing the in vitro proliferation of fibroblasts grown from

biopsy specimens of healthy and psoriatic skin. They found that magnesium bromide and magnesium chloride exhibited significantly more potent inhibitory effects on cell growth than did their corresponding potassium salts and sodium chloride, and that these effects were manifested in healthy as well as psoriatic fibroblasts (*Pharmacology* 1996;52:321-8).

Moisturizing Action

In 1997, Ma’or et al. compared the cutaneous smoothing effects of three different liquid gels, one of which contained Dead Sea minerals. The formulations were applied to 20 mature women twice daily over 4 weeks, with computer-aided laser profilometry used to evaluate skin roughness before and after the treatment period. At the conclusion of treatment, the gel containing 1% Dead Sea mineral solution was associated with a 41% reduction in skin roughness. A 28% reduction was achieved with the use of the gel devoid of mineral additives, and a 10% reduction was seen with a control gel absent any antiwrinkle ingredients (*Int. J. Cosmet. Sci.* 1997;19:105-10).

Photodamage and Skin Cancer

In 2005, in a multicenter controlled cross-sectional study, investigators determined the prevalence of photodamage and skin cancer in a cohort of psoriasis patients undergoing climatotherapy by the Dead Sea. The cohort consisted of 1,198 patients (460 psoriasis patients and 738 controls) between 20 and 70 years of age who received treatment at the Dead Sea Solarium Clinic and participating outpatient clinics.

Results indicated that psoriasis patients were much more likely to manifest elastosis, poikiloderma, solar lentigines, and facial wrinkles than controls, with a dose response associated with increased exposure time to the Dead Sea. Control patients self-reported more previous skin cancers than psoriasis patients, but examinations revealed no differences in the prevalence of non-melanoma skin cancer. Neither group included cases of malignant melanoma. The researchers concluded that Dead Sea climatotherapy poses no increased risk for developing skin cancer among psoriasis patients, but the prolonged solar exposure inherent in this therapeutic modality may increase the risk of inducing photodamage (*J. Am. Acad. Dermatol.* 2005;52:445-50).

Easing Chemotherapy’s Side Effects

In another recent study, researchers assessed the effectiveness of Dead Sea products in mitigating the side effects of radiochemotherapy in 24 patients suffering from head and neck cancer. The control group con-

sisted of 30 conventionally treated patients. The radiochemotherapy patients were directed to use two products containing Dead Sea minerals—a mouthwash (Lenom, made by Clinica Lenom Ltd.) and a moisturizing cream (Solaris)—three times daily for 1 week before, during, and up to 2 weeks following the conclusion of radiotherapy.

The investigators observed grade 1-2 mucositis in 13 patients treated with Dead Sea minerals (54%), with none exhibiting grade 3-4 mucositis. In the control group, 17 subjects (57%) had grade 1-2 mucositis, while grade 3-4 mucositis was noted in 4 (13%). In addition, grade 1-2 dermatitis was seen in 13 patients treated with Dead Sea minerals (54%), with none displaying grade 3-4 dermatitis, whereas grade 1-2 dermatitis was observed in 11 control patients (37%) and grade 3-4, in 5 (17%) (*Isr. Med. Assoc. J.* 2007;9:439-42).

On the Market

Several companies offer product lines that feature Dead Sea minerals, including Adovia Inc., Ahava, Health & Beauty Dead Sea Minerals, Kawar, La Cure, and Obey Your Body.

The array of such products includes hand and body lotions, bath salts, body butter, eye cream, cleansing mud masks, mineral mud soaps, mineral peeling soaps, body exfoliants, collagen firming creams with SPF, acne lotions, lightening cream with SPF, firming night



The therapeutic effects of immersion in the water of the Dead Sea have been well known for 1,500 years.

creams, antidandruff and numerous other shampoos, scalp masks, and sunscreens.

Conclusions

The therapeutic effects of mineral waters at various spas, and at the Dead Sea in particular, have been well established. Such results help explain the popularity of makeup and other skin products that contain mineral ingredients. Vichy Thermal Spa Water (Vichy Laboratories Inc.) and La Roche-Posay Spa Water (La Roche-Posay) contain the anti-inflammatory minerals sulfur and selenium, respectively, and mineral-laden Dead Sea water is known to exert a lenitive influence on psoriasis, eczema, and other cutaneous conditions.

It remains unclear, however, how effective several products touted for harnessing the curative powers of the Dead Sea are in conferring similar benefits. Although these products likely do no harm and, given the host of other ingredients, probably at least contribute to moisturizing the skin, more research is necessary to establish these products as adjuvants for any of various skin disorders. ■

DR. BAUMANN is director of cosmetic dermatology at the University of Miami. To respond to this column, or to suggest topics for future columns, write to Dr. Baumann at our editorial offices via e-mail at sknews@elsevier.com.



BY LESLIE S. BAUMANN, M.D.