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Washing with Ultra-pure Soft Water Instead of Tap Water Prevents Deposition of Metallic Soap Onto the Skin and Ameliorates Skin Dryness and Eczema Symptoms



Many people believe that washing in hard, rather than soft, water makes their skin more dry and irritated. Patients with common hereditary eczema (atopic dermatitis) are particularly prone to this adverse reaction, which may even precipitate an attack of eczema, especially during a cold, dry winter climate.

The deposition of “metallic soap” on the skin surface has been hypothesized as culprit, but the exact mechanism remains unclear. No benefit of replacing tap water with de-ionized water (<20 mg CaCO₃/l) was shown in a British study of 336 children with eczema (1). However, a recent paper from Japan and the UK shows that binding of fatty acids in soap to high concentrations of multivalent cations (Ca²⁺ and Mg²⁺) in hard water perturbs the skin barrier and elevates blood IgE levels in a murine model of atopic eczema (2). Furthermore, Tanaka et al. found that 2 weeks of washing with ultra-pure soft water (tap water exposed to cation-exchange resin; <1 mg/l of Ca²⁺ and Mg²⁺) markedly improved skin dryness and itching in both the murine model and in 8 women with mild, whole-body eczema. Concurrently, depositions of metallic soap almost vanished from the murine skin. Clearly, Ca²⁺

and Mg²⁺ must be almost eliminated from the skin surface before any beneficial effects of washing in soft water can be observed, thus explaining the negative outcome when using a less stringently de-ionized water source (1).

Although these results need to be repeated in several other settings and in a larger group of individuals before any firm recommendations can be made about using ultra-pure soft water for skin care, the prospect that patients with dry skin and a genetic predisposition for eczema may benefit simply by changing the source of water they use for washing is certainly intriguing.

References

1. Thomas KS, Dean T, O’Leary C, Sach TH, Koller K, Frost A, et al. A randomised controlled trial of ion-exchange water softeners for the treatment of eczema in children. *PLoS Med* 2011, 8: e1000395.
2. Tanaka A, Matsuda A, Jung K, Jang H, Ahn G, Ishizaka S, et al. Ultra-pure soft water ameliorates atopic skin disease by preventing metallic soap deposition in NC/Tnd mice and reduces skin dryness in humans. *Acta Derm Venereol* 2015; 95: 787–791.