



# WATERFALLS

## Background:

European mountain regions host numerous Alpine waterfalls that produce inhalable, negatively charged nano-water particles known as “Lenard ions” (see also air ions). Negative air ions close by waterfalls, the so called “ionosols”, are generated by aerosolization of water droplets on an obstacle, an aqueous surface or by aerodynamic breakup during free fall. After breaking up, these smaller fragments are negatively charged and remain in the air, carried by the air stream, for some time. The lifetime of ionosols is long enough for them to be inhaled. The remaining larger fragments are positive and precipitate to the ground. This airborne nano-aerosol is assumed to trigger a variety of biological effects, e.g. mild activation of the immune system, stabilizing of the autonomous nervous system and improvement in blood flow.

The specific environment of a waterfall provides beneficial effects for prophylactic or therapeutic stress management when combined with high-altitude climate therapy and physical activity (mountain hiking). A stay in close proximity to the impact zone of an Alpine waterfall (e.g. the Krimmler Falls) has proven beneficial effects for the treatment of allergic asthma and is even listed as an approved natural remedy.

## Studies of medical evidence:

- Indication: atopic dermatitis (Gaisberger et al., 2012): evidence level Ib
- Resource: mountain hiking and waterfall. Indication: moderate to high stress levels; prevention of burnout (Grafetstätter et al., 2017): evidence level Ib

## Conclusion:

Ancient traditions and folk wisdom from many regions of the world ascribe numerous curative and healing effects to waterfalls. There is evidence for an added health benefit due to exposure to a waterfall environment in combination with mountain hiking and a stay at moderate altitude. Alpine waterfalls represent a simple to implement and cost-effective health tourism product base for the treatment of stress-related symptoms, allergies and diseases of the airways.

## Health tourism potential:

- If possible check by means of studies those diseases on which existing waterfalls have a positive effect and develop offers that include professional support.
- Combine offers with accommodation (farmstay holidays, allergy-friendly accommodation, etc.), therapies (physiotherapy, nutrition, inhalation therapy, etc.) and complementary elements (guided hikes, recommendations for post-holiday period, etc.).

