ALPINE NATURAL HEALTH RESOURCES

Interreg
Alpine Space
EUROPEAN UNION
HEALPS²
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This brochure presents **20 natural health resources** offered by the Alpine region. Alongside the basic knowledge, studies with the level of medical evidence and the potential for health tourism are cited for each resource. The brochure has been produced within the framework of the **HEALPS 2** project.

The project

Project goal: Harnessing the healing power of the Alps and their natural resources for sustainable health tourism
Project lifetime: 2019-2022
Partners: 11 partners from the Alpine countries
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Diversity, i.e. variety, should more than ever be a distinguishing feature of tourism development in the Alpine region. Those who recognise the strengths of their own region and derive innovative, authentic offers from these will also successfully differente themselves from other destinations. An undisputed strength of the Alps is their unique natural and cultivated landscapes – waterfalls, dense forests, pure mountain air, meadows full of flowers and herbs, and much more besides. Promoting the beauty of these is a strategy – while recognising their healing power and thus developing health tourism offers is a successful strategy.

Topics such as health and well-being, strengthening the immune system, or healthy routines are all in vogue. We are also witnessing an explosion of lifestyle diseases such as stress, noise and stimulus overload or lack of exercise that stem from our increasingly urban way of life. It can be assumed that these tendencies will further intensify in coming years, meaning that concentrating on the target group of those seeking better health is a forward-thinking decision for Alpine destinations. But how can municipalities and regions best take this path?

„Man is a part of Nature, not something contrasted with Nature!“
Bertrand Russel

An 11-member consortium with partners from the entire Alpine region worked on precisely this question in the HEALPS 2 project. Among them as lead partner was Salzburg's Paracelsus Private Medical University (PMU), which has been researching in the field of eco-medicine for many years in order to prove the healing power of the Alps with clinical studies. It is this research that has provided hard medical evidence for the good feeling produced by a long hike as an effective antidepressant, or for the Krimml waterfalls as a state-approved healing resource for asthma.

Together with pilot regions from all over the Alpine region, an online planning tool was developed under HEALPS 2 to help destination managers analyse and improve the health tourism potential of their respective regions. This tool matches the needs and expectations of guests with the natural resource profile of a particular destination. This in turn creates added value in terms of public health and regional prosperity.

Alongside the direct work carried out in and with the pilot regions, a digital platform – "Alpine Health Tourism" – was also developed and configured (https://healing-alps.eu/). Interested destinations, regions, municipalities and stakeholders can all exchange views, as well as find information and evidence on resources, on types of exercise and about experts so as to advance the topic through joint projects. In addition, recommendations for action have been developed for politicians at various levels in order to anchor the topic of sustainable health tourism in national and international strategies.

For full information on the HEALPS 2 project see the project website
https://www.alpine-space.eu/projects/healps-2/en/home

Recommended reading: **Hartl, Arnulf; Geyer, Christina: Heilkraft der Alpen; 2020**

Medical evidence as a quality mark

The Alpine region offers numerous natural health resources. This is a powerful unique selling point of the Alpine region that distinguishes it from other natural areas.

Health is the greatest asset that human beings possess. Health tourism products must therefore have a high degree of credibility and verifiably offer:

- an increase in health-related quality of life to make us more capable = **prevention**; or
- the means to cure diseases = **therapy**; or
- the ability to get us back on our feet quickly after illness = **rehabilitation**.

The term "verifiably" here means that the product must have a medically proven effect on health. This requires either the use of existing medical knowledge or the establishment of new knowledge = evidence. This is the only way to ensure the long-term quality and economic success of health tourism offers.

Studies with evidence levels are cited for almost all of the natural health resources set out in the following chapters. Not all studies are the same, however. There are six levels of evidence that indicate whether a research study is of high quality and whether its results are scientifically transferable (www.gradeworkinggroup.org).

Level	Type of scientific evidence
Ia	Scientific evidence from meta-analyses of randomised clinical studies
Ib	Scientific evidence from at least one randomised clinical study
IIa	Scientific evidence from at least one well-designed, non-randomised prospective study
IIb	Scientific evidence from at least one well-designed, quasi-experimental study
III	Scientific evidence from well-designed observational studies, such as comparative studies, correlational studies or case-control studies
IV	Scientific evidence from documents or opinions of expert committees and/or clinical experience from renowned opinion leaders

Source: Agency for Healthcare Research and Quality (AHRQ) 2010

Overall, offers of nature-based and health-promoting tourism are thus founded on scientific knowledge (evidence) of the health effects of certain activities (e.g. hiking) in a natural environment (e.g. forests). The basis of these offers is always a combination of natural resources and certain activities or services. It is advisable to combine several natural resources and activities that are adapted to the desired target group: not only in terms of health effects, but also in terms of the offer's attractiveness. In general, high-quality – but not necessarily high-priced – offers can in this way be created that in many respects meet the principles of sustainable tourism. In addition to a strong orientation towards cross-sectoral regional value chains, a high awareness of nature and health on the part of guests and locals can also make a contribution. This can in turn lead to a more sustainable use of resources and thus, for example, to the long-term preservation of nature as a foundation for this economic system. Furthermore, such offers can also increase the average length of stay of guests.

AIR IONS

Background:

Ions are formed from originally neutral particles that have been positively or negatively charged by ionization. These charged particles are very small, have high mobility and can be spread quickly by the wind. Due to their electrical charge, these particles tend to form clusters and combine with larger particles and aerosols in the air. The cleaner the ambient air, the longer the ions are present as small ions, floating in the air to be deeply inhaled by breathing. High levels of air pollution quickly lead to the formation of larger ions with less positive health effects, as they sink to the ground more quickly and can also be inhaled less deeply. Light air ions, which usually consist of negatively charged oxygen molecules and have a beneficial effect in particularly high concentrations, are thus particularly healthy for humans.

Because plants are important producers of negative ions, the concentration of negative air ions in cities is significantly lower, at 100 to 800 ions/cm³, compared to green areas and forests where the concentration is around 700 to 2,000 ions/cm³. The ions are formed during photosynthesis: the more intense the light source, the more negative air ions are formed. The number of negatively charged particles therefore increases with increasing altitude, as the solar radiation becomes more intense. The concentration of negative air ions is highest in natural environments that host a water source, such as a river or waterfall. The air ions are created by the unbridled force of flowing water, breaking waves or especially by the force of falling water, as is the case with waterfalls, the main producers of negative ions.

Studies of medical evidence:

- Indication: respiratory function (Alexander, Bailey, Perez, Mitchell & Su, 2013): evidence level Ib
- Indication: anxiety, mood, relaxation, sleep; depression (Perez, Alexander & Bailey, 2012): evidence level Ia

Conclusion:

A range of single studies suggests that negative air ions have multiple health benefits on humans. They have a clear influence on human health and well-being. A positive health effect of negatively charged air ions seems to be apparent as regards immunological, physiological and psychological aspects. However, some of these results need to be further verified in high quality studies.

In combination with water aerosol from e.g. waterfalls they are likely to induce an immunemodulatory effect (see also Waterfalls).

Health tourism potential:

- Examine possible distinction formats (e.g. climatic spas, climatic health resorts).
- Linking of tourist offers with plenty of exercise in the open air (note altitude and existing water sources).

BALNEOTHERAPY IN ALPINE HEALING WATERS

Background:

In the strict sense of the term, balneotherapy is defined as the use of baths containing thermal mineral waters from natural springs at a temperature of at least 20°C and with a mineral content of at least 1 g/l. The temperature of the thermal water is usually around 20 degrees. Balneotherapy has been used since ancient times in the treatment of various diseases and is still in use today.

There is no international definition of balneotherapy in a broader sense and the treatment methods included. It may involve mineral baths, sulphur baths, brine baths, radon-carbon dioxide baths or Dead Sea salts. As an adjunct to balneotherapy, spa therapy employs various modalities such as physiotherapy; a change in environment and lifestyle per se may contribute to the changes seen in patient outcomes, i.e. the therapeutic result may not be due to the balneotherapy alone. As the composition of the mineral waters differs in its content in terms of cations and anions, it is difficult to assess the specific therapeutic component.

Studies of medical evidence:

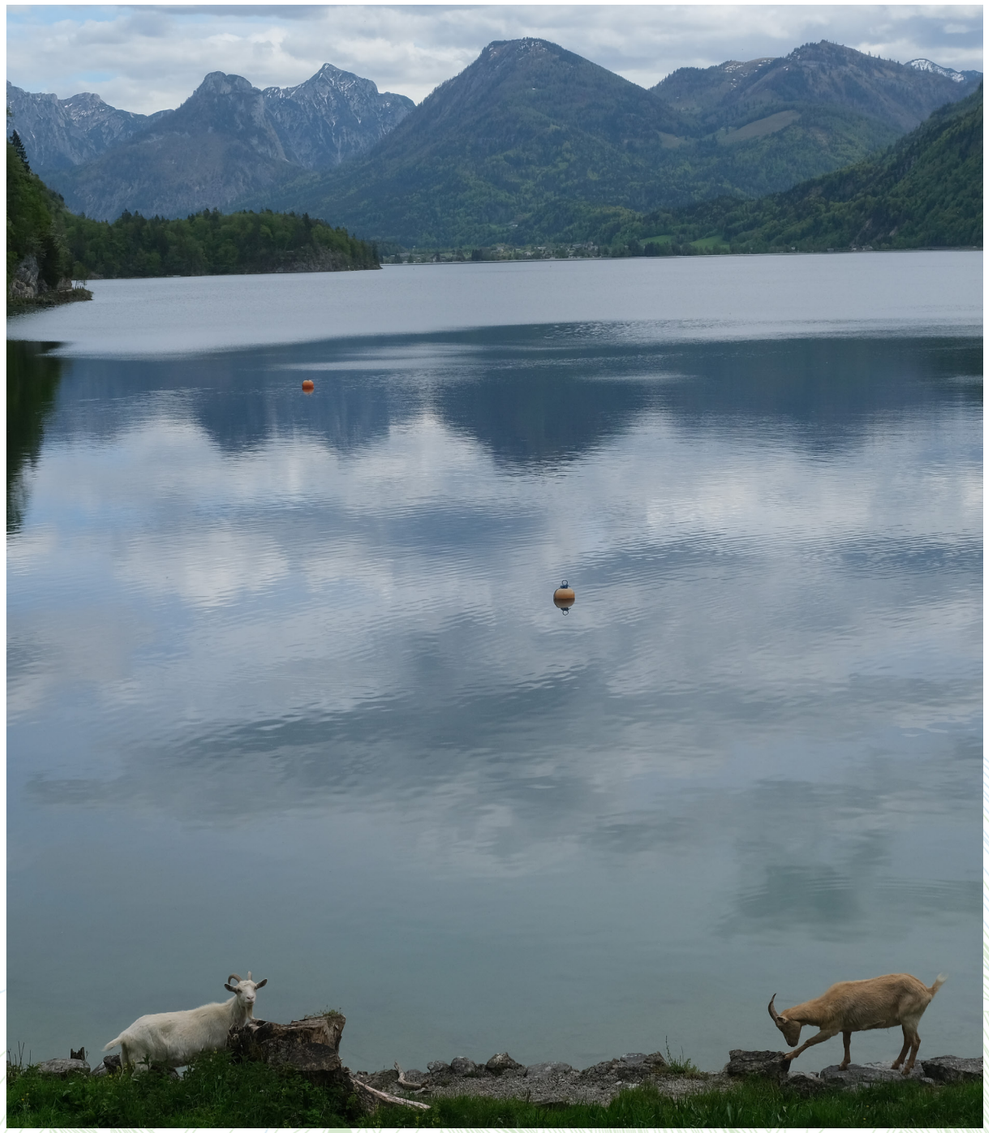
- Resource: mountain hiking + iodine-sulphur-Na-Cl-water / brine baths / Na-Ca-Cl-SO4-water. Indication: prevention of falls; healthy aging: stamina and strength (Prossegger et al., 2019): evidence level Ib
- Resource: mountain hiking + Mg-Ca-SO4-water. Indication: non-specific chronic pain in the lower back area (Huber et al., 2019): evidence level Ib
- Resource: balneotherapy. Indication: rheumatoid arthritis and chronic pain in the lower back area (Morer et al., 2017): evidence level Ib
- Resource: balneotherapy. Indication: stress (Antonelli & Donelli, 2018): evidence level Ib

Conclusion:

The available data suggest that balneotherapy may in fact be associated with healing in several rheumatological diseases. However, existing research is not sufficiently clear to allow firm conclusions to be drawn. The use of Alpine balneotherapy in health tourism would require the examination of each Alpine healing water as regards its effects on specific indications, with account taken of experiences drawn from successful product development.

Health tourism potential:

- Identification of existing natural healing springs.
- Development of tourism offers with therapeutic services in cooperation with experts and institutions (health hotels, spa resorts, Kneipp associations, therapists. etc.).
- Making natural springs accessible to the public.



ALPINE WATER – BLUE SPACES

Background:

Water is one of the most important physical and aesthetic landscape elements. Humans have always been attracted by rivers, lakes and the sea. What impact do aquatic environments have on people's health? While the health benefits of green spaces are quite well explored, little analysis has been made of "blue spaces" and even less of "Alpine" blue spaces. Blue spaces have occasionally featured in public debate as far as the risks are concerned, e.g. drowning or microbial contamination. However, a stay in a blue space environment can promote health and well-being. The evidence is still insufficient as far as the underlying mechanisms are concerned.

Studies of medical evidence:

- Indication: public health (Grellier et al., 2017): evidence level IV
- Indication: well-being; combating stress (Franco et al., 2017): evidence level IV
- Indication: well-being; mental health (Gascon et al., 2017): evidence level IV
- Indication: well-being (de Bell et al., 2017): evidence level IV

Conclusion:

The water resources of the mountains are of vital importance to both society and the ecosystem. The increasing demand for water and the effects of climate change are leading more and more to water use conflicts. Overcoming these conflicts while at the same time maintaining the ecosystem are major challenges. Alpine destinations can use their various forms of blue space to develop evidence-based health tourism products and integrate these into economic value chains. The healing potential and the resulting health tourism potential are still underestimated and should be the focus of further research.

Health tourism potential:

- Take account of existing blue spaces for hiking tours, excursion destinations, etc.
- Make blue spaces accessible while also checking possibilities for people of limited mobility.

ALPINE STREAMS FOR KNEIPP HYDROTHERAPY

Background:

Kneipp water applications are among the therapies commonly used in the field of naturopathy. The list of indications for Kneipp hydrotherapy is long yet the scientific evidence is hardly explored by clinical studies. In many cases its application is based upon experiential judgment. Core elements of Kneipp's hydrotherapeutic treatments are treading water, hot and cold half-baths and full baths, contrasting baths, steam treatments, wraps and compresses and, most importantly, cold gushing water briefly applied to various parts of the body. Moderately intensive daily physical activities also form part of Kneipp hydrotherapy.

Medical evidence:

There is insufficient evidence from clinical studies on the efficacy of Kneipp hydrotherapy treatments. But, as a therapeutic add-on option for different diseases, hydrotherapy according to the Kneipp method has become more and more a topic of scientific research. Treatment successes have for example been found for Kneipp hydrotherapy as an add-on in the concomitant treatment of dementia. There is sound evidence that cold water applied locally to the face and neck region is able to provoke significant improvement in cognitive abilities or in cases of chronic obstructive pulmonary disease. Hydrotherapy in general shows therapeutic benefits concerning balance, increasing mobility and quality of life for people with movement disorders.

Studies of medical evidence:

- Indication: movement disorders in cases of Parkinson's disease (Rocha et al., 2015): evidence level Ia
- Resource: Alpine cold water (Doering et al., 2001): evidence level Ib
- Indication: health prevention measures; awareness of individual health resources (Eckert & Anheyer, 2018): evidence level IV
- Indication: quality of life; treatment of side effects of breast cancer treatment (Hack et al., 2015): evidence level IV

Conclusion:

There are indications that Kneipp hydrotherapy can be a useful add-on treatment for people with different disease patterns. However, clinical trials are required that compare e.g. therapies of varying duration and frequency to clarify the associated risks and benefits for each indication.

Health tourism potential:

- Development of seasonal concepts with Alpine streams at the centre always bearing in mind regional conditions and compatibility with prevailing values.
- Establishing appropriate partnerships.
- Offer health experiences that revolve around cold water.
- Reactivation of existing Kneipp facilities or opening of new facilities.

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.).

ALPINE MOUNTAIN HIKING

Background:

The main reasons for hiking are experiencing nature, fresh air, the beauty of nature and landscape, fauna and flora. Another aspect that is becoming increasingly important is health as a motive for hiking holidays, with the scientific evidence of the positive effects of hiking on health and well-being now constantly growing.

One of the first approaches to investigating the health effects of Alpine mountain hiking was represented by the "Austrian Moderate Altitude Studies" (AMAS) conducted in Austria. AMAS I (2000) focused on the indication of the metabolic syndrome, a combination of overweight, disturbed blood sugar and blood fat metabolism, as well as high blood pressure, whereas AMAS II (2006) focused on persons with high stress levels. The studies proved that an active sojourn (a combination of hiking and active/passive regeneration) at moderate Alpine altitudes (1,500 – 2,500 metres a.s.l.) under the guidance of professional coaches has positive effects in persons with metabolic syndrome as well as in clients suffering from stress.

Mountain hiking and healthy aging:

Healthy aging and physical activity go hand in hand: the longest possible healthy life is therefore directly dependent on an active lifestyle, while efficient interventions are needed to preserve functional abilities so as to prolong disability-free life expectancy.

Mountain hiking is a very popular pastime among older people. More than 6 million people over 60 years of age undertake mountain activities in the Alps every year, but mountaineering demands a relatively high level of physical fitness. Aging is typically associated with declining fitness, but this decline is not solely the result of aging; it is mostly the price to be paid for physical inactivity.

When mountain hiking, people are often confronted with rapidly changing environmental conditions such as path gradients, stony or narrower passages, altitude, weather conditions, or ascending and descending sections. These constantly changing conditions require continual proprioceptive feedback, thus promoting the diversification of gait patterns and balance responses.

Mountain hiking could therefore be an effective form of training for older people, addressing aerobic capacity, strength and balance.

Studies of medical evidence:

- Resource: mountain hiking at medium (1,700 m) and low (200 m) altitudes. Indication: metabolic syndrome (Neumayr et al., 2014): evidence level Ib
- Resource: mountain hiking and balneotherapy. Indication: osteoporosis prevention (Winklmayr et al., 2015): evidence level Ib
- Indication: stress (Niedermeier, Grafetstätter, Hartl & Kopp, 2017): evidence level Ib
- Indication: mood – emotional reactions (Niedermeier, Einwanger, Hartl & Kopp, 2017): evidence level Ib
- Resource: mountain hiking + waterfall. Indication: medium to high stress levels; burnout prevention (Grafetstätter et al., 2017): evidence level Ib
- Resource: mountain hiking + iodine-sulphur-Na-Cl-water / brine baths / Na-Ca-Cl-SO4-water. Indication: prevention of falls; healthy aging: stamina and strength (Prossegger et al., 2019): evidence level Ib
- Resource: mountain hiking + Mg-Ca-SO4 thermal water. Indication: non-specific chronic pain in the lower back area (Huber et al., 2019): evidence level Ib

Health tourism potential:

- Development of offers in combination with other natural resources (e.g. balneotherapy, waterfalls, etc.).
- Development of target-group specific products (e.g. hiking trails with different characteristics for specific indications such as cardiorespiratory fitness, chronic back pain, etc.) with reference to increasing levels of lifestyle diseases.

ROCK CLIMBING / OUTDOOR BOULDERING

Background:

Rock climbing is a popular pastime for all age groups. Several disciplines can be distinguished, including traditional climbing, sports climbing and bouldering. The Alps offer an infinite number of climbing and bouldering routes of varying skills levels. In addition, many indoor climbing facilities and climbing parks are on offer.

Therapeutic climbing is a new approach adapted from artificial rock-climbing movements. It does not necessarily involve climbing entire routes as in traditional climbing, but may only involve specific exercises performed on a climbing wall. Therapeutic climbing is currently used for treating orthopaedic, neurological and psychological diseases. A meta-analysis from 2010 states that the evidence for the effectiveness of therapeutic climbing is limited and involves a high risk of bias: the effects of therapeutic climbing are therefore still unclear.

Studies of medical evidence:

Climbing as a preventive health intervention

- Indication: trunk muscles and mobility (Heitkamp, Wörner & Horstmann, 2005; Muehlbauer, Stuerchler & Granacher, 2012): evidence level IIa

Therapeutic climbing

- Indication: cerebral palsy (Böhm, Rammelmayr & Döderlein, 2015; Schram Christensen, Jensen, Voigt, Nielsen & Lorenthen, 2017): evidence level Ib
- Indication: multiple sclerosis (Velkonja, Curić, Ozura & Jazbec, 2010): evidence level Ib
- Indication: chronic back pain (S.-H. Kim & Seo, 2015; Schinhan et al., 2016): evidence level IIa
- Indication: depression (Stelzer et al., 2018): evidence level Ib

Conclusion:

Further research is required for the indications described. Only long-term interventions were examined in the existing studies, which limits implementation in health tourism. Furthermore, highly trained staff are needed, while no evidence exists concerning short-term interventions (e.g. 1-2 weeks).

Health tourism potential:

- Well-trained staff (climbing instructors, therapists, psychologists) are required for climbing therapy.
- Creation of a wide range of climbing courses (from beginner to expert). Creation/designation of new tours in cooperation with local climbing clubs and mountain guides.
- Indoor offers for days when the weather is bad.

FOREST THERAPY

Background:

In recent years there has been considerable and increasing attention paid to using the forest environment as a place for recreation and health promotion. This trend comes from Japan, where it is called shinrin-yoku, a term that means “taking in the forest atmosphere through all of our senses” or, more simply, “forest bathing”.

Alpine forests represent a distinguishing element of the Alpine region. Forests are an important area for recreational activities and play a key role in tourism as they are a defining feature of the landscape, while numerous hiking trails and similar run through Alpine forests. Given the emerging global trend of forest therapy and the wide occurrence of forests in the Alpine area, one might think that forests and their postulated health effects make a good base for the development of Alpine health tourism products. However, a closer look to the scientific literature on forest therapy reveals several gaps and shortcomings, especially regarding the research methodology and transferability of results.

Medizinische Evidenz:

The lack of high-quality studies means that there is no convincing evidence for the benefits of forest therapy. Besides the lack of methodological quality, there are further limitations on the transferability of study results to Alpine forests:

- Research suggests that many of the health effects measured can be attributed to phytoncides, a generalized term for natural chemicals released by plants into the environment. It is theorized that these chemicals could influence stress physiology and immunology through inhalation. Most forest therapy studies were conducted in tropical primeval forests (mostly Japanese, Korean and Chinese) with a high degree of biodiversity. These forests are totally different from typical Alpine forests: almost all Alpine forests are semi-natural as defined by Forest Europe, with a significant presence of large trees and deadwood. There are almost no truly primary forests and plantations. Thus their phytoncide composition is also totally different and the effects measured cannot be transferred to Alpine forests.

- In most studies, the control group lived in Asian megacities like Tokyo with high air and noise pollution. The health benefits measured could therefore also be attributed to the absence of such factors. Furthermore, these cities are not comparable to typical European/Alpine cities.

To date only the following three randomized controlled clinical trials have been conducted in Europe.

Studies of medical evidence:

- Indication: higher stress levels (Dolling et al., 2017): evidence level Ib
- Indication: exhaustion (Sonntag-Öström et al., 2015): evidence level Ib
- Indication: exhaustion (Stigsdotter et al., 2017): evidence level IIa

Conclusion:

Strong evidence for the benefits of the forest environment in terms of health and well-being has yet to be confirmed. The findings of previous research support the premise that exposure to forest environments may provide health benefits. The evidence is however insufficient owing to methodological design flaws. Future investigation is necessary to validate any forest specific health effects, especially for Alpine forests.

Health tourism potential:

Considering the wide occurrence of forests in the Alpine region and the emerging trend towards nature-based recreation, forests may be considered an important resource with a high health tourism potential. However, based on current data, no scientifically grounded statement can be made about the specific health effects of Alpine forests. Therefore, there is a strong need for future research with high-quality studies.

PROTECTED AREAS & BIODIVERSITY

Background:

The Alps are among the richest regions in Europe for the variety of their landscapes and their plant and animal species. As the loss or destruction of habitats is the most direct threat to biodiversity, protected areas are crucial in countering the continuing loss of ecosystems and species. All in all, more than 1,000 large Alpine protected areas are listed, covering some 25% of the Alpine region. The Alps are thus one of the world's most important ecoregions in terms of con-serving global biodiversity.

Closely linked to biodiversity is the environmental microbial diversity that influences the human microbiome, i.e. the collection of microorganisms including bacteria, archaea and fungi living in and on the human body. This is an emerging research field in medical science and holds significant health tourism potential as an Alpine-specific resource.

Medical evidence:

The best-researched aspect of the direct link between protected areas and human health concerns the effects on psychosocial well-being. Protected areas have a strong restorative capacity and have been shown to aid recovery from mental fatigue, reducing stress levels, assisting cognitive functioning and improving the overall psychological state. Some studies show that these psychological benefits are higher in areas of greater biodiversity. Furthermore, research indicates a potential beneficial and protective influence on respiratory systems of residential areas with high biodiversity.

No intervention study could be identified that explicitly links Alpine-specific protected areas to direct health outcomes. However, based on the indirect links of protected areas and biodiversity to human health and well-being, it strongly appears that there exists a huge potential for health tourism. Protected areas also play a key role in the conservation of other Alpine natural resources with medically and scientifically proven effects, such as waterfalls, and can therefore be seen as "meta health resources".

Health tourism potential:

- A balance must be found between offers and access to unspoilt nature and diverse nature.
- Visitor guidance measures are required to conserve and protect biodiversity and nature.
- Include such indicators as "Nature connectedness / Nature relatedness", "Recovery from stress and fatigue", "Health related quality of life / Well-being" and "Promotion of physical activity" when developing and promoting tourism offers.

ALPINE FARMING & ALPINE PASTURES – ENVIRONMENTAL MICROBES

Background:

The accumulating evidence indicates that the environmental microbiome plays a significant role in asthma development. The very low prevalence of asthma in populations highly exposed to the microbiome indicates its potential for disease prevention. These protective effects are most likely related to the specific microbial diversity in farming environments, especially those that practise animal husbandry.

The human microbiome is defined as the collection of all microorganisms including bacteria, archaea and fungi living in and on the human body. The microbiome seems to affect virtually every bodily function. Depending on its composition, it can produce thousands of different biologically active substances, including neurotransmitters such as dopamine, serotonin and norepinephrine. According to the current state of science, the diversity of the microbiome seems to play the biggest role in human health. It is becoming increasingly apparent that the composition of the intestinal microbiome beginning in utero has long-term consequences for human health and well-being. Studies show for example that those living in densely populated areas are less susceptible to microbial diversity than those in rural neighbourhoods, which also reduces the diversity of the human microbiome. There is emerging evidence that biodiversity loss in the wider environment may lead to reduced diversity in human microbiota and such modifications are associated with a dramatic increase in the incidence of immune-related diseases including metabolic, allergic and inflammatory diseases and, most likely, neurodegenerative and psychiatric disorders as well.

Medical evidence:

Asthma and allergies are today the most common chronic diseases in children. A large body of literature shows that children raised on farms have much lower rates of allergies and asthma. The timing of the exposure to environmental microbes found on farms seems to be crucial. The strongest effects are observed for exposure that occurs in utero and during the first years of life. This implies a variety of options for future preventive strategies in terms of health tourism.

Studies of medical evidence:

- Resource: agricultural environment with increased exposure to bacterial components in stables as well as livestock. Indication: hay fever, asthma and eczema (Von Ehrenstein et al., 2000): evidence level III
- Resource: microbial agents in stables and farms. Indication: hay fever, asthma and other common allergies. (Riedler, Eder, Obergeld & Schreuer, 2000): evidence level III
- Resource: diversity of microbial exposure. Indication: asthma and atopy (Ege et al., 2011): evidence level III
- Resource: agricultural environment. Indication: asthma and other atopic illnesses (Alfvén et al., 2006): evidence level III
- Resource: agricultural environment. Indication: allergies (Horak et al., 2002): evidence level IIb
- Resource: agricultural environment. Indication: allergies and asthma (Schulze, Strien, Praml, Nowak & Radon, 2007): evidence level III
- Resource: agricultural environment, visiting stables. Indication: asthma, allergies and other atopic diseases. (Radon, Ehrenstein, Praml & Nowak, 2004): evidence level III
- Resource: agricultural environment, exposure to stables holding livestock. Indication: asthma, allergies and other atopic diseases (Riedler et al., 2001): evidence level III
- Resource: farmstays for pregnant women. Indication: asthma, allergies (Ege et al., 2006): evidence level III

Health tourism potential:

- Cooperation between farmers and hosts in the region.
- Focus for farmstay holidays on working in stables and with animals. Holiday offers for pregnant women and/or for families with children in the first year of life for the prevention of allergies and asthma.

HIGH ALTITUDE (2,500+ METRES)

Background:

Altitude training is a popular strategy among athletes to improve sea-level performance. Altitude training is today a standard training routine in many endurance sports to increase physical capacity.

Studies of medical evidence:

- Resource: altitude training. Indication: stamina and performance (Ploszczyca, Langfort & Czuba, 2018; Lundby & Robach, 2016): evidence level Ib

Conclusion:

Although altitude training is widely used to improve exercise capacity, clear scientific proof for its effectiveness is still lacking. Further research is needed to explore the effects of altitude training in detail.

Health tourism potential:

- Cooperation with medical institutions.
- Physiotherapeutic offers especially in combination for training camps at high altitudes for competitive athletes.

MEDIUM ALTITUDE (1,000 – 2,500 METRES)

Background:

In contrast to UV radiation, which increases with altitude and is associated with vitamin D synthesis, fine dust pollution reduces as the altitude increases. Furthermore, shorter flowering phases and more extreme weather conditions lead to a change in vegetation at higher altitudes, which in turn significantly reduces allergen concentrations compared to lower-lying natural habitats.

The "thinner" air or lower air viscosity facilitates breathing, while stays at medium altitudes induce relaxation and lower stress levels.

A one-week stay at 1,700 metres above sea level leads to significant improvements in sugar metabolism and cardiovascular parameters such as pulse and blood pressure.

Climate therapy at medium to high altitudes is also well-known as a successful alternative medical treatment for respiratory and allergic illnesses such as bronchial asthma, atopic dermatitis, psoriasis and eczema.

Studies of medical evidence:

- Resource: mountain hiking for one week. Indication: prevention of cardiovascular diseases (Theiss et al., 2008): evidence level III
- Indication: allergic bronchial asthma (Massimo et al., 2014): evidence level IIa
- Resource: mountain hiking for one week. Indication: cardiopulmonary and metabolic effects of physical activity for older people (Burtscher et al., 2001): evidence level Ib
- Resource: mountain hiking. Indication: metabolic syndrome (Neumayr et al., 2014): evidence level Ib
- Indication: airway inflammation, allergy and asthma (Rijssenbeek-nouwens & Bel, 2011): evidence level Ib
- Indication: "allergy and inflammation" (Engst & Vocks, 2000): evidence level Ib

Conclusion:

There is considerable scientific evidence that describes the benefits and positive health effects of medium-altitude stays. The limiting factor, however, is the fact that very few studies solely address a stay at medium altitude. In most studies, a stay at medium altitude is combined with an additional intervention such as physical activity. In addition, the participants involved in the studies are mostly not in good health but rather have a specific indication, making it difficult to draw general conclusions about particular health benefits.

Health tourism potential:

Development of packages for one to two-week stays in close cooperation with hosts and mountain guides with:

- Mountain hikes
- Plenty of exercise in the fresh air
- Wellness-offers

APITHERAPY

Background:

Apitherapy is the medical use of honey products such as honey itself, propolis, royal-jelly, beeswax or bee venom to treat various diseases in complementary medicine. Honey has been used since ancient times for medicinal purposes such as healing wounds, tissue regeneration, alleviating gastrointestinal disorders, gingivitis and various other pathologies. Beekeeping and apitherapy have a long tradition in European folk medicine.

Medical evidence:

Honey is the most ancient biomaterial used for wound dressing and the effectiveness of honey in the treatment of wounds has been confirmed by many studies. It is believed that honey may be used as a suitable alternative with most infected wounds owing to its antibacterial and healing effects.

Studies of medical evidence:

- Indication: treatment of wounds (Oryan, Alemzadeh & Moshiri, 2018): evidence level Ia

Bee venom therapy:

Bee venom therapy (BVT) uses bee venom for medicinal purposes. The various therapeutic ap-plications of BVT include various musculoskeletal conditions (e.g. arthritis, rheumatism) and immune-related diseases.

Studies of medical evidence:

- Indication: unwanted side effects during treatment with BVT (Park, Yim, Lee, Lee & Kim, 2015): evidence level Ia
- Indication: rheumatic arthritis (A. Lee et al., 2014): evidence level Ib
- Resource: bee venom acupuncture. Indication: chronic lower back pain (Se, Han, Kwon, Jo & Lee, 2017): evidence level Ib

Conclusion:

The greatest evidence for apitherapy is centred on wound treatment. It is not easy to treat wounds in health tourism as this requires highly trained medical personal and appropriate facilities.

Health tourism potential:

- Development of cross-sectoral innovations with local apiarists.
- Workshops with local beekeepers where participants learn how to make simple wound dressings.

HONEY

Background:

Honey is a highly nutritional food with a low glycaemic index. Honey consumption reduces blood sugar levels and prevents excessive weight gain. It also improves lipid metabolism by reducing total cholesterol, triglycerides and low-density lipoprotein while increasing high-density lipoprotein, decreasing the risk of atherogenesis. In addition, honey enhances insulin sensitivity that further stabilizes blood glucose levels and protects the pancreas from overstimulation brought on by insulin resistance. There is therefore a strong potential for honey supplementation to be integrated into the management of metabolic syndrome, both as preventive as well as supplementary therapeutic agents. Metabolic syndrome is a cluster of diseases consisting of obesity, diabetes mellitus, dyslipidaemia and hypertension.

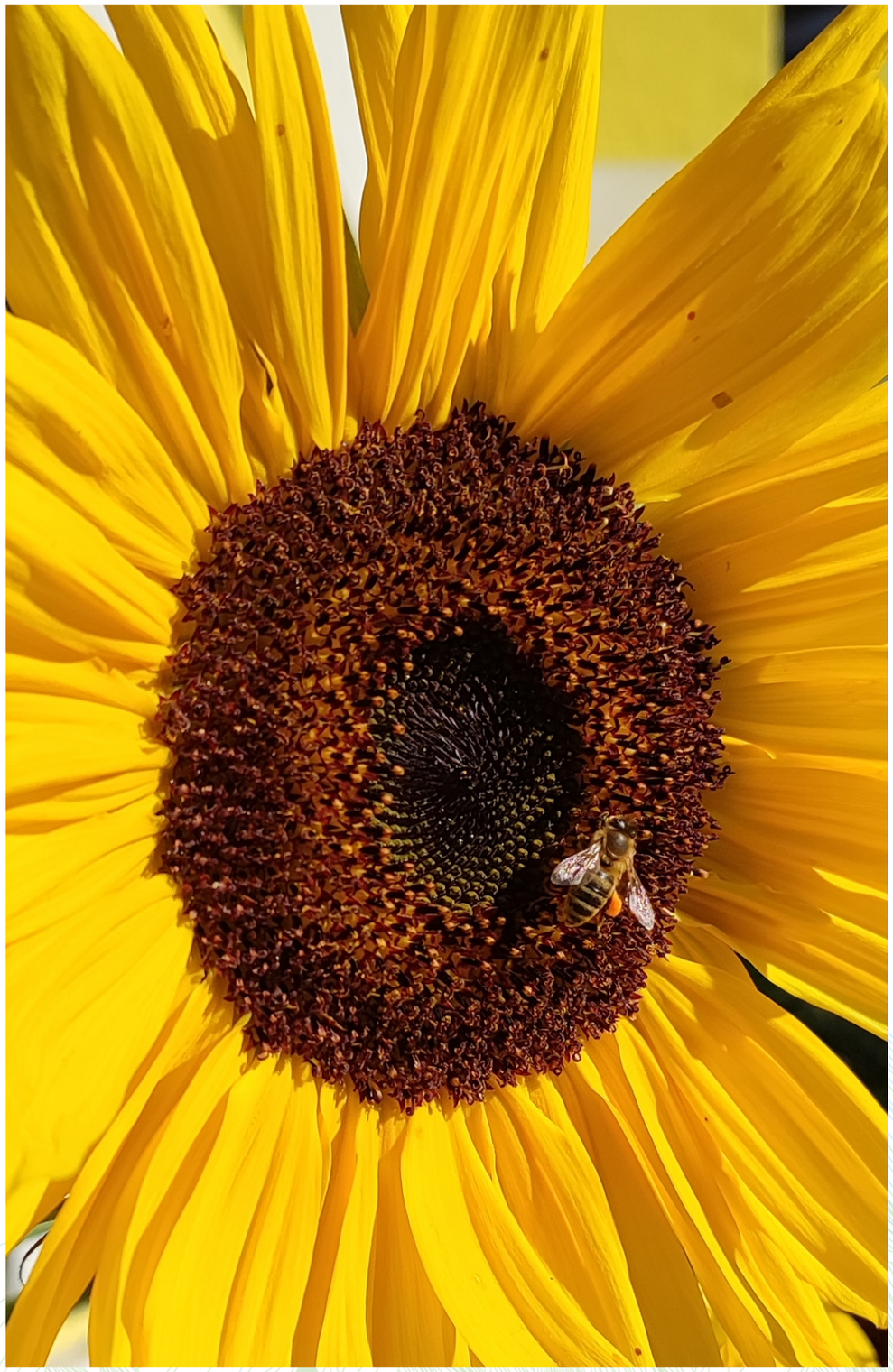
Studies of medical evidence:

- Indication: metabolic syndrome (Ramli et al., 2018): evidence level Ib
- Indication: diabetes mellitus (Meo et al., 2017): evidence level Ib

Health tourism potential:

Development of offers in close cooperation with beekeepers and hosts., e.g.:

- Sale of local honey in hotels
- Guided tours and honey tastings
- Restaurant menus that feature dishes containing honey



ALPINE MILK & DAIRY PRODUCTS

Background:

An old farmers' maxim says that the grass is always better the higher one goes, and at the top it is so good that even the farmers might like to eat it. In fact, plant growth diminishes with altitude and with it the yield, but as the intensity of sunshine increases, Alpine plants process greater amounts of energy, in turn leading to a higher protein and fat content. Animals react in a similar manner: because of the demands placed on their bodies by living in the Alps, animals are slower to fatten than during the same period spent in the valley, while milk output at higher altitudes is much lower than in the valley. It is however creamier when produced higher up: even today it will contain between 15% and 30% more fat than down in the valley. What is more, Alpine products were considered tastier and healthier because of the herbs found only up there that contain high percentages of ethereal oils.

Dairy production therefore has a long tradition in the Alpine region and was early on associated with beneficial health outcomes. It plays a key role in the protection of Alpine flora and fauna as well as in the preservation of regionally typical landscapes. It is also integral to the ecological structure and cultural identity of the Alpine region and can therefore serve as a valuable product component in Alpine health tourism.

Medical evidence:

Milk and its derivates are useful foods throughout all life periods, in particular during childhood and adolescence, as their contents of calcium, protein, phosphorus and other micronutrients can promote skeletal, muscular and neurological development. Alpine milk and Alpine dairy products in particular seem to have a health promoting nutritional value owing to their composition. Generally, milk from grass-fed livestock is more beneficial than that of cornfed animals. Some studies also show that milk consumption might have a protective effect on the development of allergies and asthma.

Studies of medical evidence:

- Resource: exposure to farmhouse milk. Indication: childhood allergies and asthma (Lluis et al., 2014): evidence level IIa
- Resource: consumption of farmhouse milk. Indication: childhood allergies and asthma (Brick et al., 2016) evidence level IIa

Conclusion:

Studies indicate that milk consumption including that of unpasteurized milk might explain the protective effect of farming on atopy (hypersensitivity to otherwise harmless natural and artificial environmental substances). However, most studies are cross-sectional in nature and further investigation to identify specific protective agents or mechanisms is required. The consumption of unpasteurized milk is not without its hazards: it is therefore important to understand which components and mechanisms underlie both the protective effect observed and the risks so as ultimately to be able to utilize milk as a means of primary prevention. Until then the consumption of raw milk cannot be safely recommended.

Health tourism potential:

- Integration of alpine dairy products as product components in health tourism value chains.
- Farmstay holidays for families with children in the first year of their life for the prevention of allergies and asthma (needs further investigation, as most studies are cross-sectional).

PLANTS / PHYTOTHERAPY

Background:

Alpine herbs and plants are an essential part of traditional European folk medicine. Knowledge of herbs was deeply rooted in the rural population, as medical care was difficult to obtain. Indigenous plants and herbs were therefore used for medical purposes. Today, Alpine herbs are witnessing a revival as public interest in the region's natural treasures grows.

Studies of medical evidence:

- Resource: arnica. Indication: aching muscles after sport (Adkison et al., 2010; Pumpa et al., 2014; Iannitti, Morales-Medina, Bellavite, Rottigni & Palmieri, 2016): evidence level Ib
- Resource: St John's wort. Indication: depression (Ng et al., 2017): evidence level Ia
- Resource: St John's wort. Indication: psoriasis (Mansouri et al., 2017): evidence level IIa

Health tourism potential:

- Create publicly accessible herb gardens (with or without admission fee).
- Herb walks in combination with cookery courses.
- Courses for applications using herbs.
- Cross-sectoral cooperation of tourist businesses with herbalists (themed trails including menus featuring dishes with locally occurring herbs).

SWAMP

WINTER – SNOW-BASED ACTIVITIES

Exercise in the snow:

Nowadays, "lifestyle diseases" such as cardiovascular diseases, type 2 diabetes, obesity, high blood pressure, allergies or even psychological diseases such as depression and anxiety disorders are on the rise. On the one hand this is due to sedentary lifestyles (on average we generally exercise too little) combined with an unbalanced diet and high stress potential due to urban crowding effects, such as over-stimulus, noise, competitive pressure, etc. On the other hand, we spend too much time in enclosed spaces (>90%!) and, when we go outside, the environment and air quality play an important role. Besides the proven positive psychological effect of unspoilt nature on humans, nature also offers a higher concentration of negative air ions and reduced fine dust pollution. Particularly in winter, when the air is even more polluted by loose chippings, heating, etc., outdoor physical exercise in the fresh air is recommended.

Physical activity significantly improves cardiorespiratory fitness and increases our capacity to absorb oxygen. This improves our performance and blood circulation, so that every cell in our body is optimally supplied with oxygen. Movement also releases more endorphins in the brain, which has a mood-enhancing and activating effect on us. Regular exercise also has an influence on our immune systems and produces anti-inflammatory effects: People with a sedentary lifestyle who are overweight usually suffer from mild, chronic inflammation.

Regular, moderate physical activity supports our immune systems in many ways and counteracts numerous diseases. Physical exercise has been shown to reduce the inflammatory capacity of leukocytes, increase the number of neutrophils (part of the leukocytes whose main task is defence against pathogens) in the blood and promote phagocytosis activity (the body's own defence mechanism against foreign or malignant cells).

Regular physical exercise reduces the resting pulse and sympathicotonus, strengthens our muscles, including the heart muscle, and increases heart rate variability. Exercise reduces both cholesterol and blood sugar levels, thus significantly reducing the risk of cardiovascular disease or type 2 diabetes. Even age-related hypertension can be counteracted via physical activity. Regularly covering a distance of 50 km/week will even halve our mortality rates. Regular physical activity strengthens our immune system, reduces susceptibility to infection and has a protective effect against the most common lifestyle diseases.

Tobogganing
Alpine skiing
Cross-country skiing
Ski mountaineering
Snowshoeing

Studies of medical evidence:

- Indication: stamina/strength/power/balance in older people (Muller et al., 2011): evidence level Ib
- Indication: cardiovascular risk factors in older people (Niederseer et al., 2011): evidence level Ib
- Indication: cardiovascular and metabolic behaviour (T. L. Stoggl et al., 2017): evidence level IIb
- Indication: cardiovascular fitness and metabolic behaviour (Stoggl et al., 2016): evidence level IIb
- Indication: health status (BMI, fitness, physical activity, depression, smoking and alcohol consump-tion) (Anderson et al., 2017): evidence level III
- Indication: cardiovascular diseases (M. Faulhaber et al., 2007): evidence level III

Health tourism potential:

- Guided winter hikes with and without sports equipment.
- Creation and maintenance of infrastructure such as toboggan runs, cross-country ski trails and winter hiking trails.
- Development of hiking routes and offers in close cooperation with tourist facilities and enterprises with hiking guides.

WINTER – NON-SNOW-BASED ACTIVITIES

Winter hiking:

Winter hiking is possible on all hiking trails that are walkable in winter. Calorie consumption per hour of winter hiking is around 250 kilocalories. Exercise in the sun and fresh air releases serotonin, the "happiness hormone", which counteracts both physical stress reactions and the "winter blues", thus lifting the mood. Winter hiking is particularly suitable for overweight people and those affected by metabolic syndrome (high blood pressure, abdominal obesity, fat metabolism disorders and increased blood sugar levels). Winter hiking reduces physiological parameters such as blood pressure and heart rate, aids weight loss and improves cholesterol and sugar metabolism.

Studies of medical evidence:

- Indication: respiratory function; allergic rhinitis and/or asthma (Prossegger, Huber, Grafetstätter, Pichler, Braunschmid et al., 2019): evidence level Ib
- Indication: metabolic syndrome (Neumayr et al., 2014): evidence level Ib

Ice skating:

Whether on a lake or on prepared rinks in the city, ice skating is a popular winter sport. It is not only fun and easy to learn, but also very healthy. Ice skating is a form of moderate endurance training and an ideal aid in losing weight. Gliding over the ice is therefore beneficial for the cardi-ovascular system, also improving coordination, balance and body control when skating. It trains many muscle groups, especially the thighs and the back, but also the buttocks and the arms as they swing. Like outdoor running, ice skating stimulates the blood circulation and helps the body to cope better with temperature fluctuations. Additionally, the fresh air strengthens the immune system.

Medical evidence:

There is considerable medical evidence concerning ice skating and its effects on the human body, but only as regards elite athletes. Evidence of the medicinal impact of ice skating in the amateur sector is lacking.

Conclusion:

In summary, the Alpine region offers a wide range of physical activities from which numerous tourist leisure activities can be derived. These activities are generally healthy and beneficial to the body, even if medical evidence is lacking for some of the activities mentioned as regards the amateur or leisure areas. One possible variation for non-snow-based activities is represented by themed walks. In the health tourism sector, there is still a need for research in this area to de-termine the actual health effects.

Health tourism potential:

- Themed hikes.
- Creation and maintenance of infrastructures such as skating rinks or winter hiking trails.
- Development of offers in close cooperation with tourist facilities and enterprises with hiking guides.

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RADON

Background:

Radon therapy has been used in central Europe since the beginning of the 20th century. It uses radon, a chemically inert, naturally radioactive gas for treating various diseases. Its main application is as a non-pharmacological treatment option for various inflammatory rheumatic diseases. For treatment purposes, radon is commonly applied by bathing for about 20 minutes in water with a radon concentration of 0.3–3 kBq/l or remaining for about one hour in caves or galleries with a natural radon concentration of about 30–160 kBq/m3.

Studies of medical evidence:

- Resource: radon cure therapy. Indication: rheumatoid arthritis (Falkenbach, Kovacs, Franke, Jörgens & Ammer, 2005; Franke, Reiner & Resch, 2007; Franke & Franke, 2013): evidence level Ib
- Resource: low-dose radon hyperthermia therapy. Indication: osteoporosis (Winkelmayr et al., 2015): evidence level Ib
- Resource: low-dose radon hyperthermia therapy. Indication: secondary osteoporosis (Lange et al., 2016): evidence level IIa
- Resource: low-dose radon cure therapy. Indication: pains and high blood pressure (Rühle et al., 2019): evidence level Ib

SPELEOTHERAPY

Background:

Speleotherapy is a special kind of climate therapy that uses the specific microclimate of mines and caves to treat respiratory and skin related diseases in particular. Speleotherapy is relatively widespread in Europe. Speleotherapy facilities vary in their environmental conditions, including as regards radiation levels, temperature and humidity. Patients are advised to rest while spending time in most caves. Physical or breathing exercises, including salt aerosols, are recommended for some caves.

Studies of medical evidence:

- Indication: asthma (Beamon, Falkenbach, Fainburg & Linde, 2001): evidence level Ia
- Indication: childhood asthma (Gaus & Weber, 2010): evidence level Ib

Conclusion:

Little scientific evidence is available for speleotherapy. Caves and mines vary in their specific conditions: further research is therefore needed to evaluate the specific effects of speleotherapy.

IMPRINT

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