



The positive effects of nature on health and well-being

2nd July 2021, Biella/Lombardy,
Ökosystemleistungen zwischen Stadt, Land & Berg

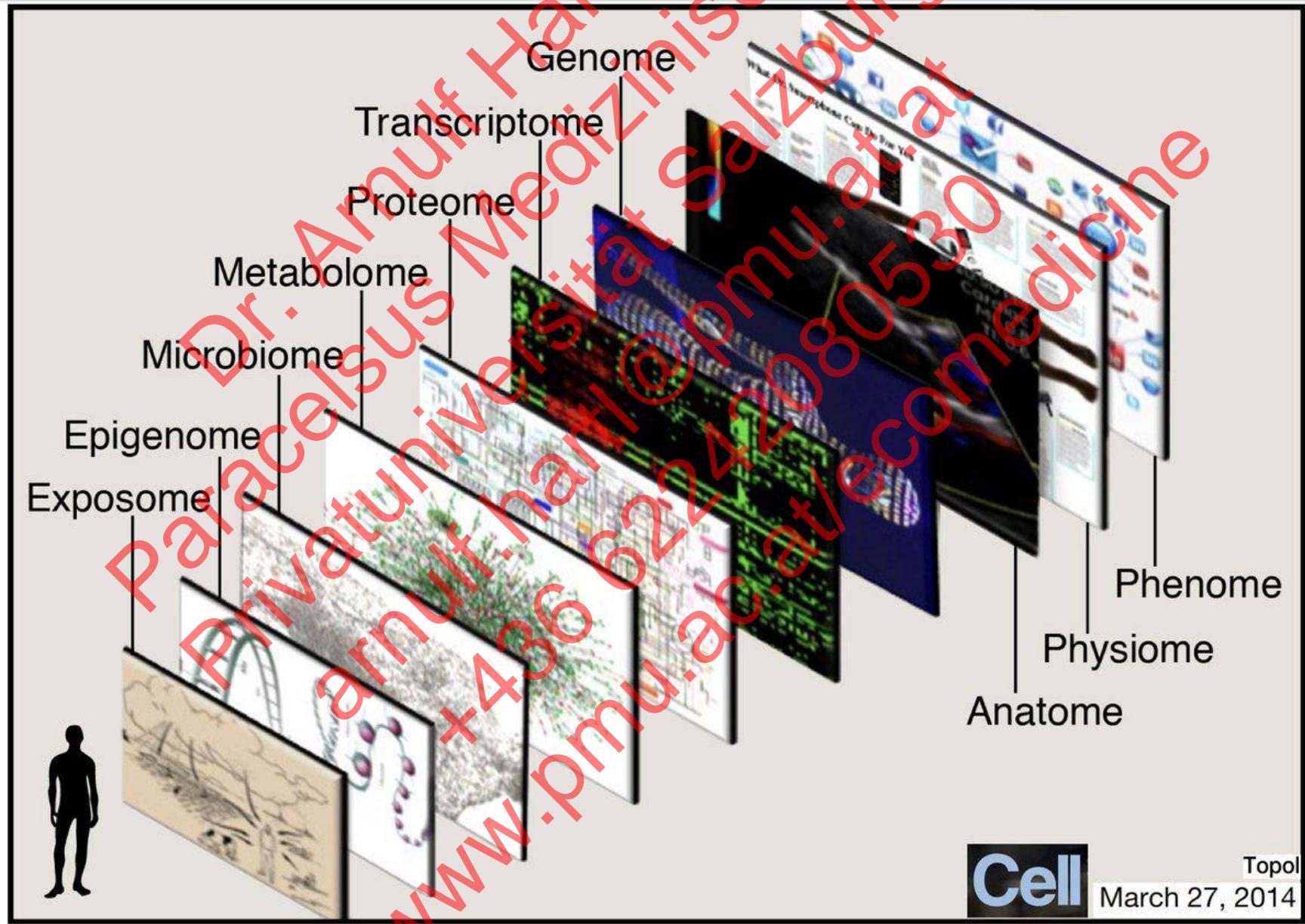
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CIPRA
LEBEN IN
DEN ALPEN



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Exposome

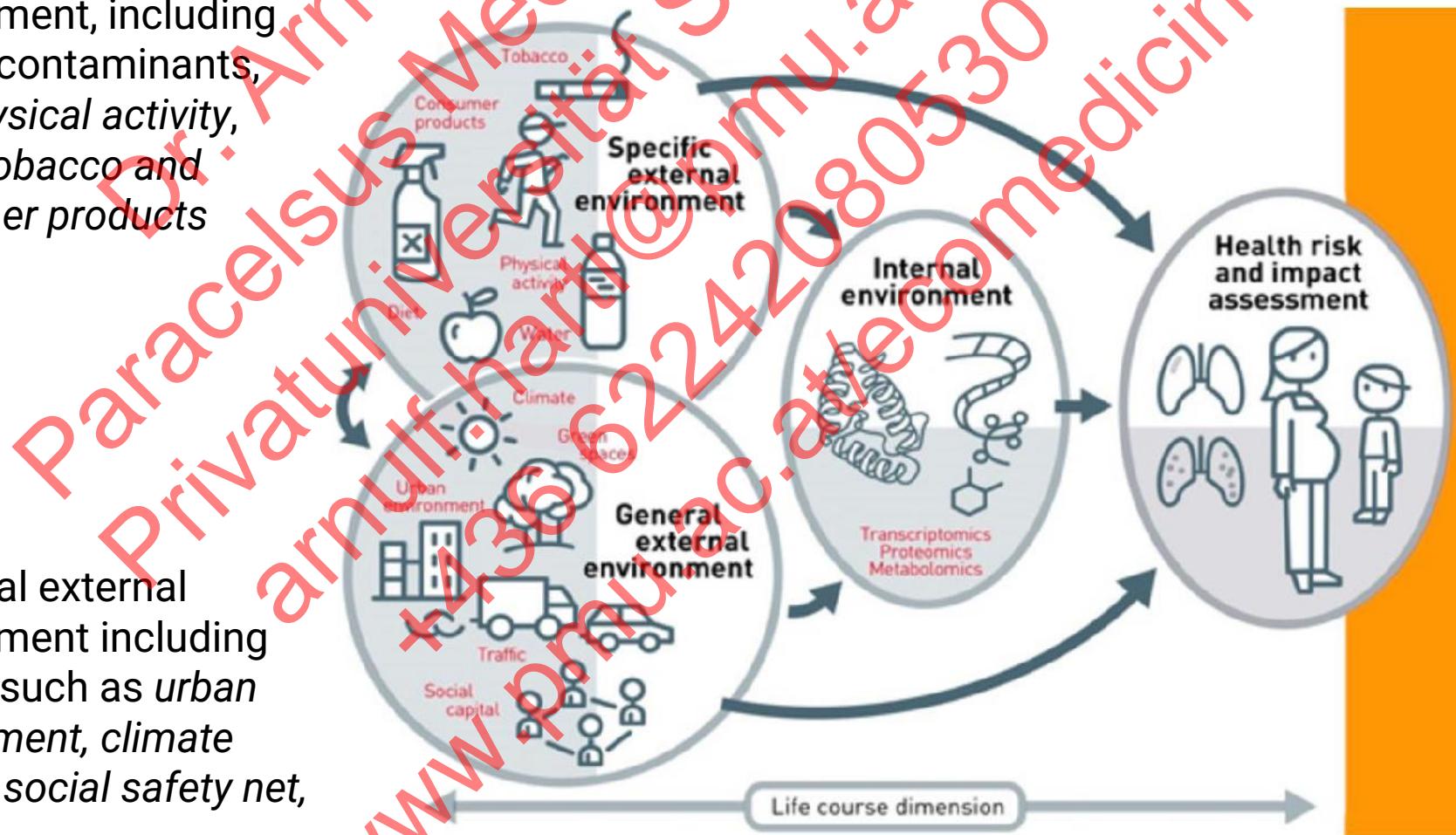
The human exposome is the totality of *all environmental exposures* in a person's lifetime, internal and external, including those before birth.

The exposures are from all the *chemical, biological, and social agents* that influence human health.

Exposome and One Health

a specific external environment, including certain contaminants, *diet, physical activity, water, tobacco and consumer products*

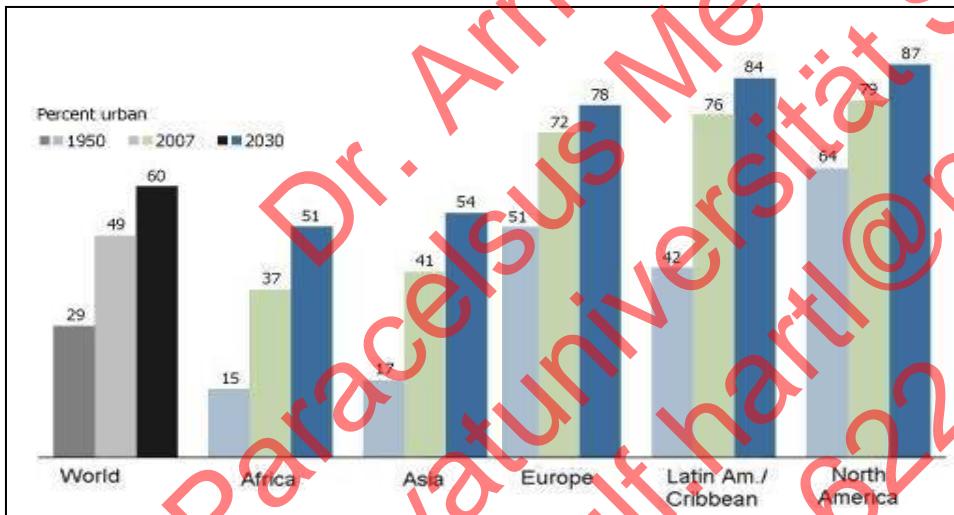
an internal environment with internal biological factors such as *metabolism, intestinal flora, inflammation and oxidative stress*



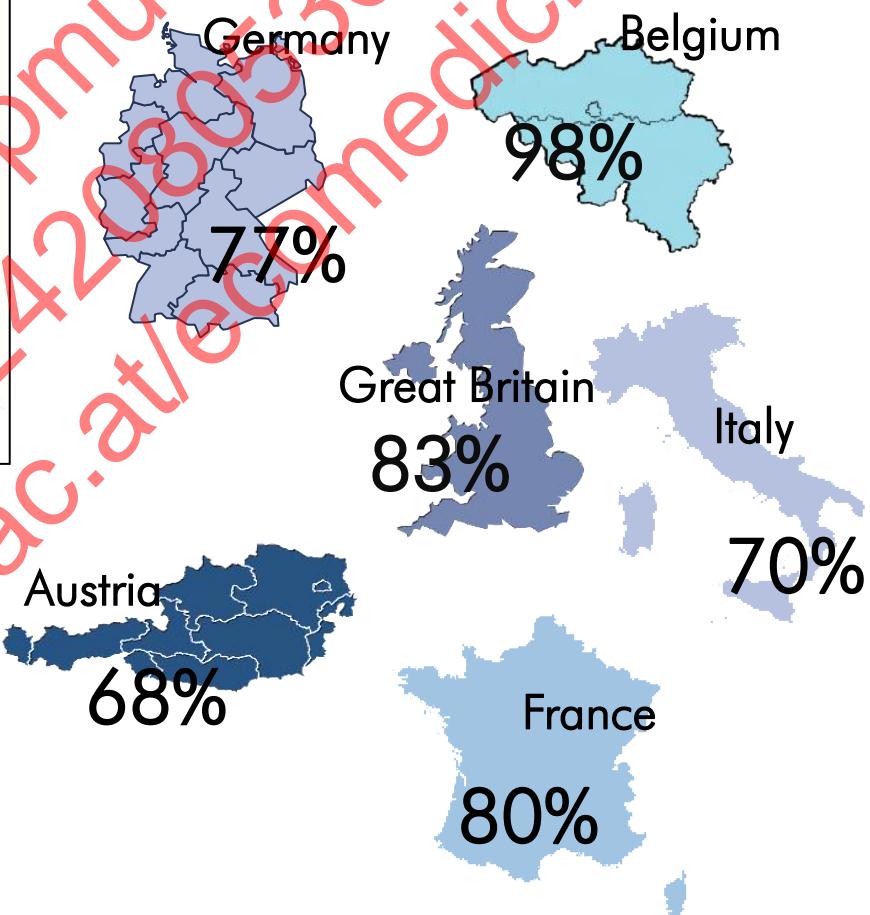
a general external environment including factors such as *urban environment, climate factors, social safety net, stress*

Urbanization is a major global trend

Degree of urbanization (percentage of urban population in total population) globally and per continent



Degree of urbanization in selected European countries



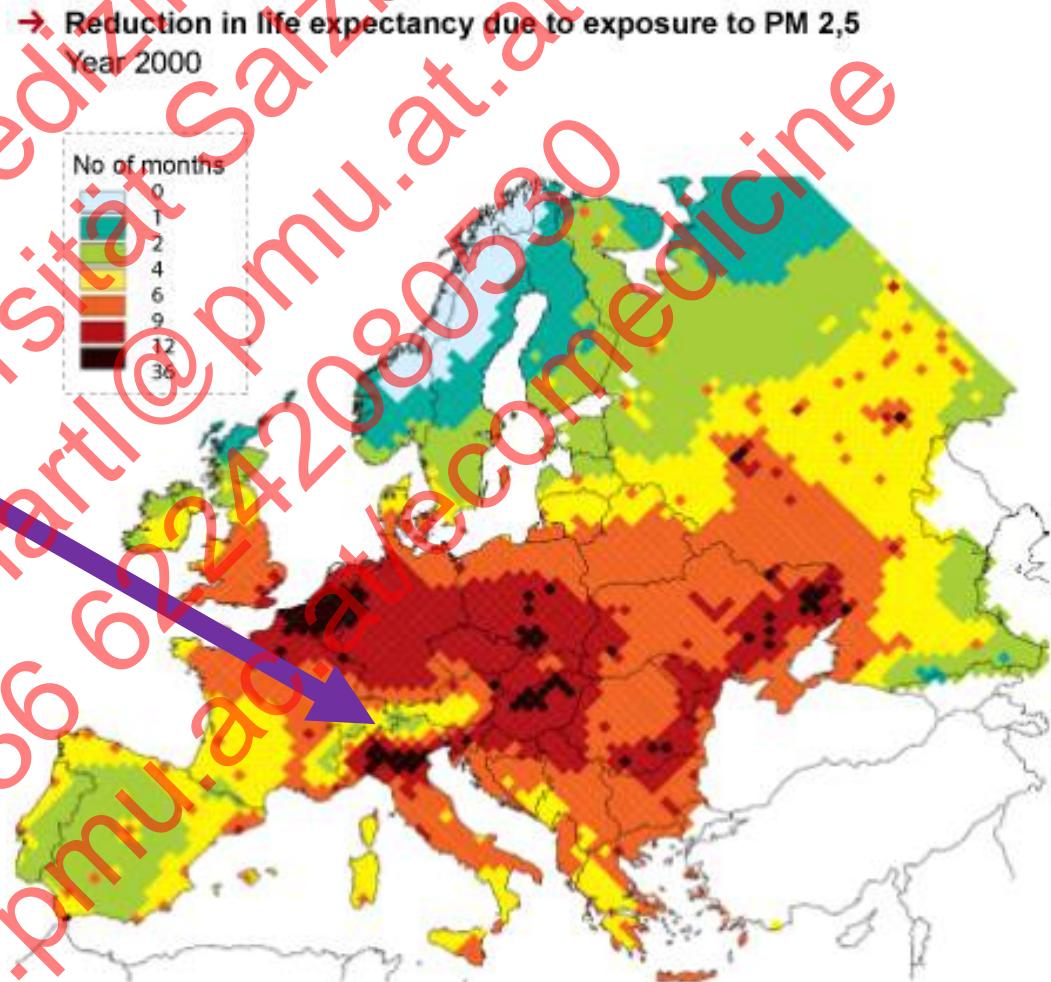
Urbanization is a global trend:

- 1940 19 % of the world's population was urban
- 2014 54 % of the world's population residing in urban areas in 2014
- by 2050, 66 % of the world's population is projected to be urban

Advantages and disadvantages of city life



- Education opportunities
- Leisure activities
- Job offers
- Childcare
- Fine dust pollution
- Noise pollution
- Less exercise
- Nature deficit
- Etc.



SOURCE: Clean Air for Europe Programme / www.environment.no

Bewegungsarmut



Altered leisure & nutrition behaviour

Obesity, Diabetes II, metabolic syndrome

Physical inactivity

Osteoarthritis, Back Pain, Osteoporosis

Stress and Crowding

Mental disorders, Cancer

Altered microbiota

Allergy&Asthma, Autoimmune diseases

Changing lifestyles

Crowding & andere Stressfaktoren



Freizeitgestaltung und Essgewohnheiten



COVID-19

Covid-19 has made the obesity epidemic worse, but failed to ignite enough action

New urban
penalties?

Homo urbanus
E. Oberzaucher,
2017, Springer

Stress and the city

City living and urban upbringing affect neural social stress processing in humans

Florian Lederbogen^{1*}, Peter Kirsch^{1*}, Leila Haddad^{1**}, Fabian Streit¹, Heike Tost¹, Philipp Schuch¹, Stefan Wüst¹, Jens C. Pruessner², Marcella Rietschel¹, Michael Deuschle¹ & Andreas Meyer-Lindenberg¹

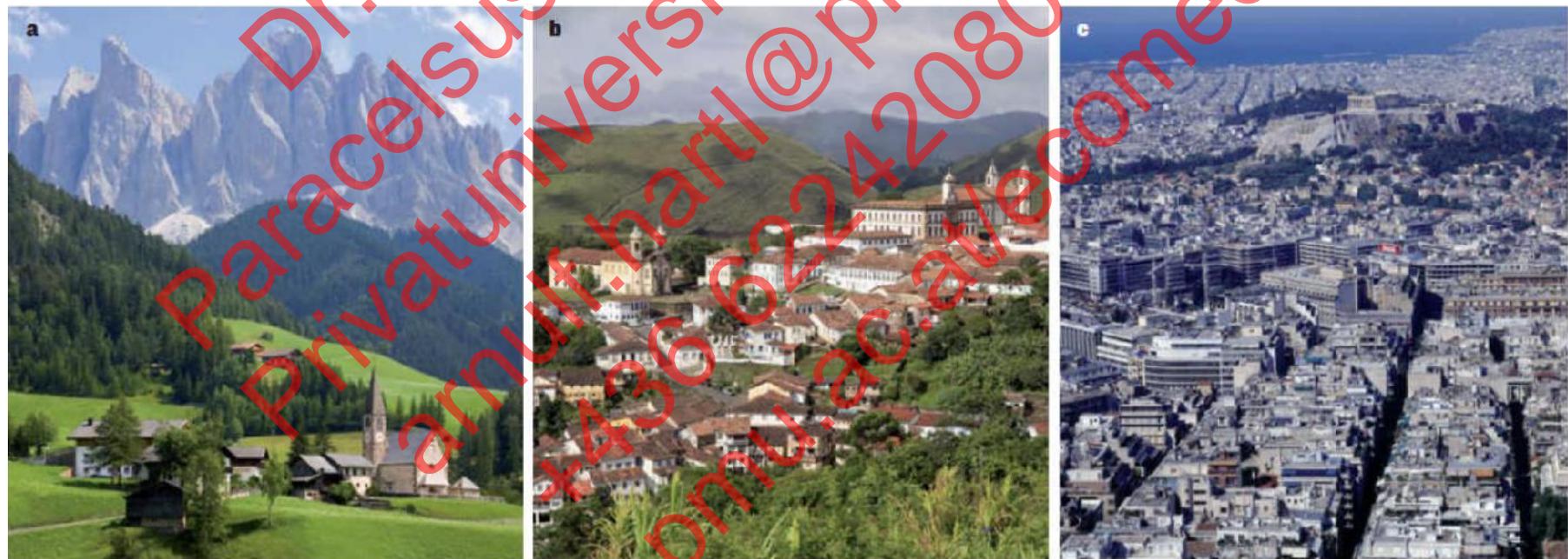


Figure 2 | Regional categories. In their study⁶, Lederbogen et al. categorized living conditions as those associated with rural areas (a), towns with more than 10,000 inhabitants (b) and cities with more than 100,000 inhabitants (c). Their data suggest that city living affects the brain's response to stress.

(Haddad et al., 2015; Kennedy & Adolphs, 2011; Lederbogen et al., 2011; Lederbogen & Meyer-Lindenberg, 2015)

City and stress experience

People who were born and raised in large cities

- react to a social stressor with a stronger activation of brain regions, which play an important role in the control of stress-responsive systems
 - e.g. Anterior zingulum and Amygdala

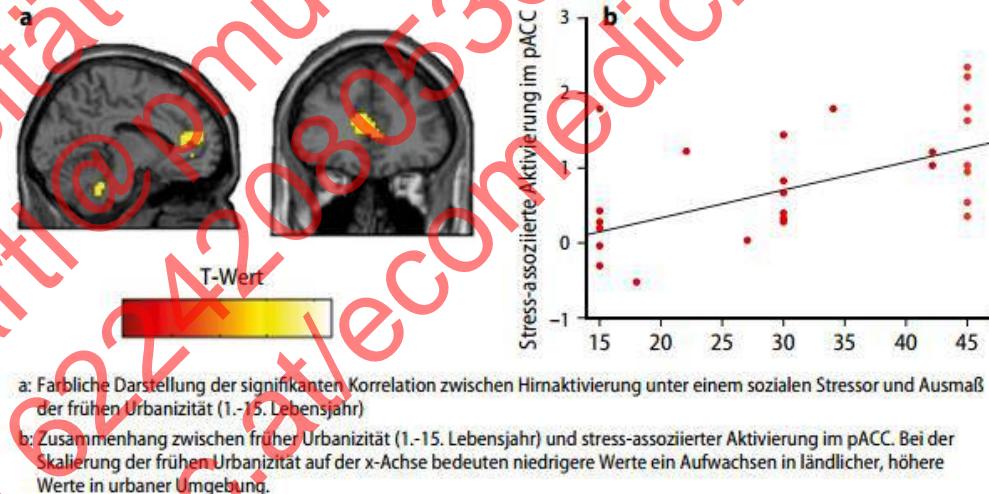
People who currently live in a big city

- show a stronger activation of the amygdala ("stress center" of the brain)

Increasing evidence for this urbanity effect

- Disease risk of people in urban populations:
- Affective disorders → + 38 %
- Anxiety disorders → + 21 %
- Depression rate → + 40 %

Abb. 2 Zusammenhang zwischen früher Urbanität und Aktivierung im perigenualen anterioren cingulären Cortex (pACC) unter Stress [11]



Schizophrene disorders

- 130% more common in women
- 190% more common in men
- Every third schizophreic psychosis can be associated with city life



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Green Exercise

Physical activity and nature have a positive effect on health independently of each other

Synergistic health effects of training in nature and especially in the Alps



Interreg
Alpine Space
HEALPS²
European Regional Development Fund



Jo Barton, Director of the Green Exercise Research Group, University of Essex

Empirical evidence: Mountain hiking in the Alps is the best doctor

Mountaineers

- ... have fewer mental health problems than the average European (14%:38%)
- ... The more exercise the fewer mental disorders
- ... The more positive emotions (pos. affective valence In green exercise) the fewer mental disorders



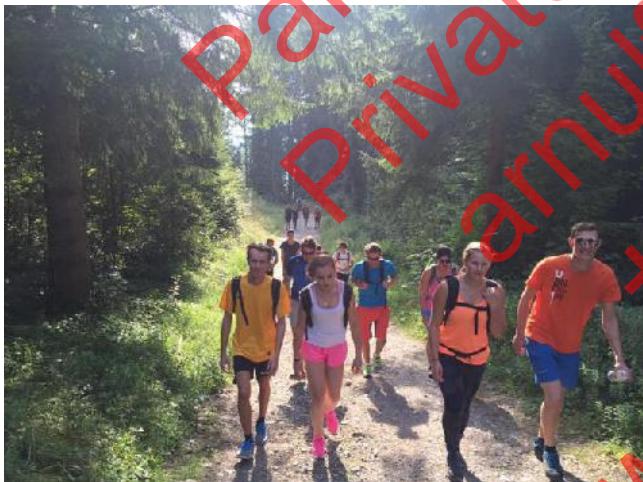
Prevalence of Mental Health Problems and Factors Associated with Psychological Distress in Mountain Exercisers: A Cross-Sectional Study in Austria

Martin Niedermeier^{1*}, Arnulf Hartl² and Martin Kopp¹

Indoor vs Outdoor Hiking



3h indoor treadmill walking



3h mountain hiking

Synergistic effect of movement and nature/mountains

- Higher positive affective valence during and after the intervention
- Lower negative affective valence during and after the intervention
- Higher activation after the intervention
- Lower fatigue values after the intervention

Cortisol/HRV/Blood pressure

PLOS ONE

Citation: Niedermeier M, Einwanger J, Hartl A, Kopp M (2017) Affective responses in mountain hiking—A randomized crossover trial focusing on differences between indoor and outdoor activity. PLOS ONE 12(5): e0177719. <https://doi.org/10.1371/journal.pone.0177719>



International Journal of
Environmental Research
and Public Health

Article

A Randomized Crossover Trial on Acute Stress-Related Physiological Responses to Mountain Hiking

Martin Niedermeier ^{1,*} , Carina Grafstätter ², Arnulf Hartl ² and Martin Kopp ¹

Received: 29 June 2017; Accepted: 9 August 2017; Published: 11 August 2017

Institute of Ecomedicine

- Evidence-Based Medicine
 - Randomized, controlled clinical trials
 - Evidence-based health tourism products and services
- Hiking and Alpine bathing: Immunosenescence, 65+
- Mountain sports and health with Alpenverein/UIBK
- Hiking: HICO Studie - (Hiking and Coaching)
Hiking & cardiorespiratory fitness
- Speleotherapy: Allergy and Asthma
- Winter sports: Dust mite allergy, Knee Endoprothesis
- Alpine bathing and Mountaineering: Osteoporosis prevention, **chronic back pain, marital quality**
- Waterfalls – **Allergy/Asthma** and Stress/Burnout
- Mountain forest & Mindfulness: primary prevention
www.klimatherapie.eu in Lagundo, ITA
- Mountain forest & Waterfall: primary prevention
- Alpine meadows: Microbioma, Parkinson, prim. prevention
- Green Virtual Reality: nature to bedside (COVID, COPD)



Randomized, controlled clinical studies

Treatment of different indications with specific alpine landscapes and natural health resources

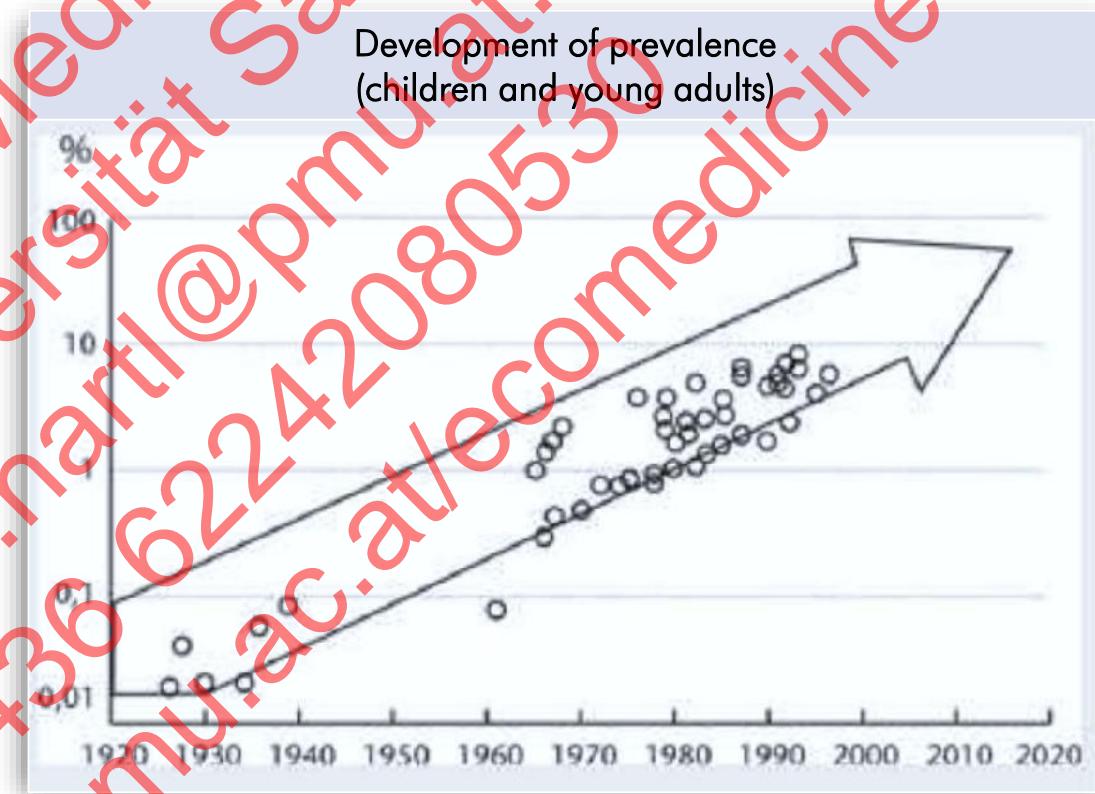
- Waterfalls against Allergy and Asthma
Hohe Tauern Health Study
Immunological disease – hypersensitivity against allergens
- Hiking and Balneotherapy against chronic low backpain
Albenbad Study
Musculoskeletal disorder



Prevalence of Asthma is rising

In Austria 11% of all children and 6% of all adults suffer from asthma

In 2025 the half of all European people will suffer from some kind of allergic disease



Asthma-prevalence is associated with the degree of urbanization

Children living in a neighborhood street with much traffic suffer more often from asthmatic, spastic and obstructive bronchitis

Published in final edited form as:
J Allergy Clin Immunol. 2010 March ; 125(3): 545–549. doi:10.1016/j.jaci.2010.01.037.

The Urban Environment and Childhood Asthma Study

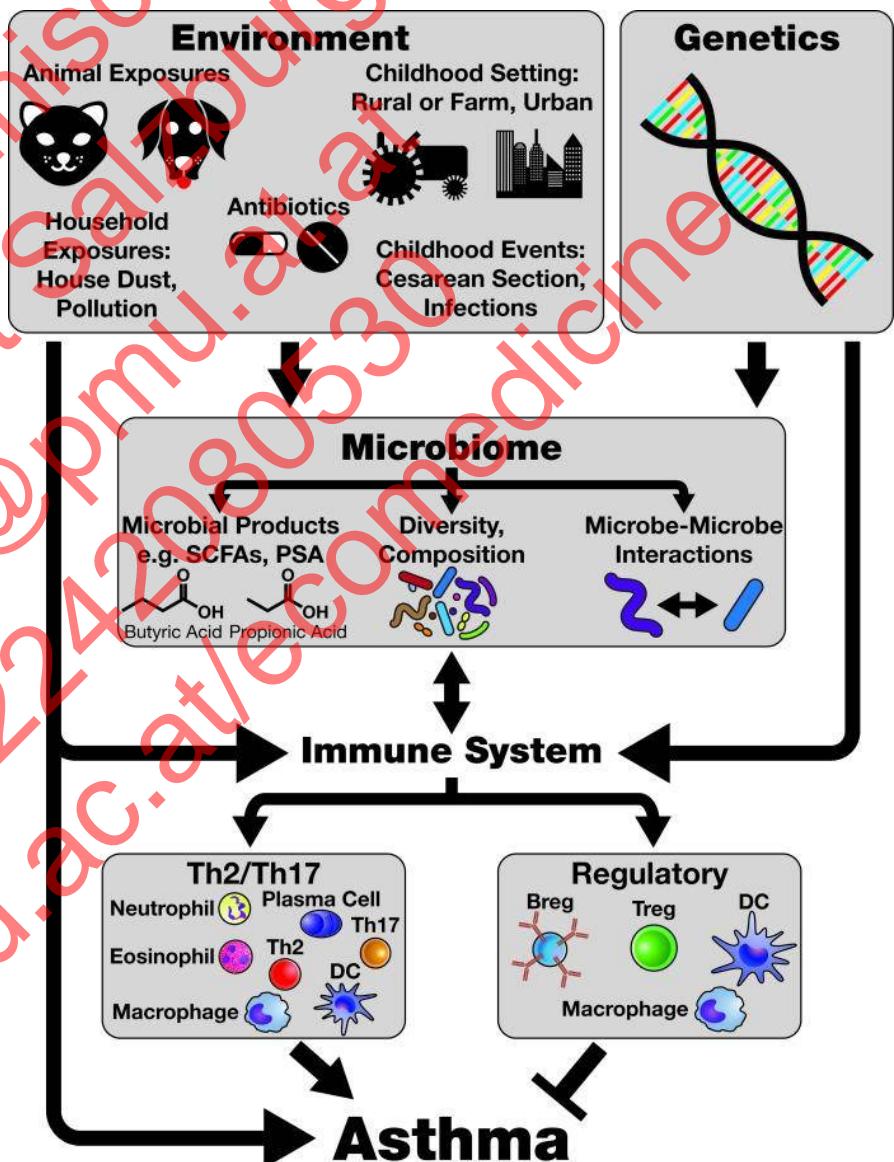
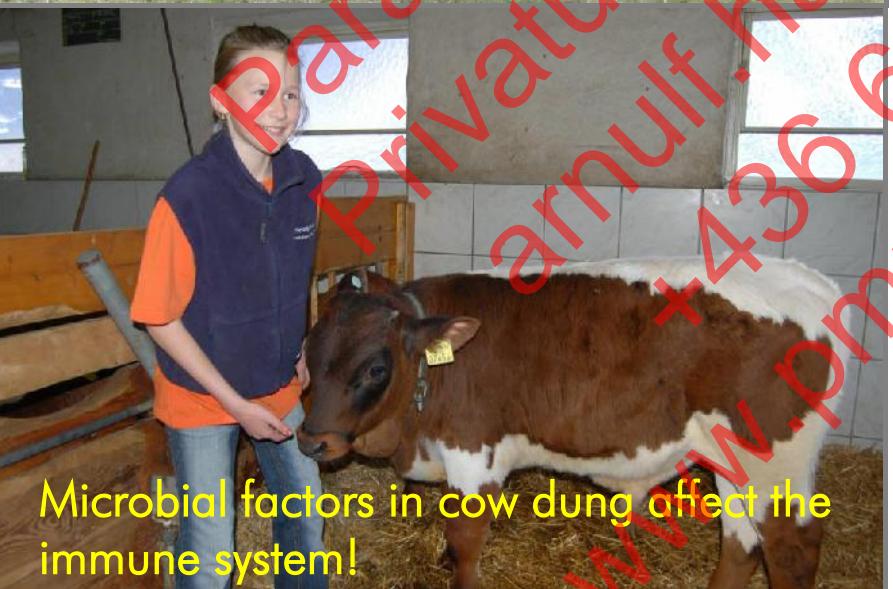
James E. Gern, MD

Professor of Pediatrics and Medicine, University of Wisconsin-Madison

Abstract

Childhood asthma is not distributed evenly throughout the population, and children who grow up in crowded urban neighborhoods have higher rates of asthma and experience greater morbidity due to asthma. There are several environmental and lifestyle factors associated with urban living that are suspected to promote the development of asthma, particularly in the first few years of life. Collectively, this information suggests the hypothesis that exposure in early life to adverse environmental and lifestyle factors associated with disadvantaged urban environments modifies immune development to increase the risk for allergic diseases and asthma. The Urban Environment and Childhood Asthma birth cohort study was initiated in 2004 to test this hypothesis. The study population was recruited prenatally, and consisted of 560 families from four urban areas who were at high risk for allergies and/or asthma on the basis of parental histories, along with an additional 49 families without atopic parents. Immune development, respiratory illnesses, and exposure to stress, indoor pollutants, microbial products, and allergens were measured prospectively, and the major study outcomes are recurrent wheeze at three years of age and asthma at age seven. This review summarizes the study design, methods, and early findings of the URECA study.

Farmer's children are less susceptible



airways harbour a unique microbiota

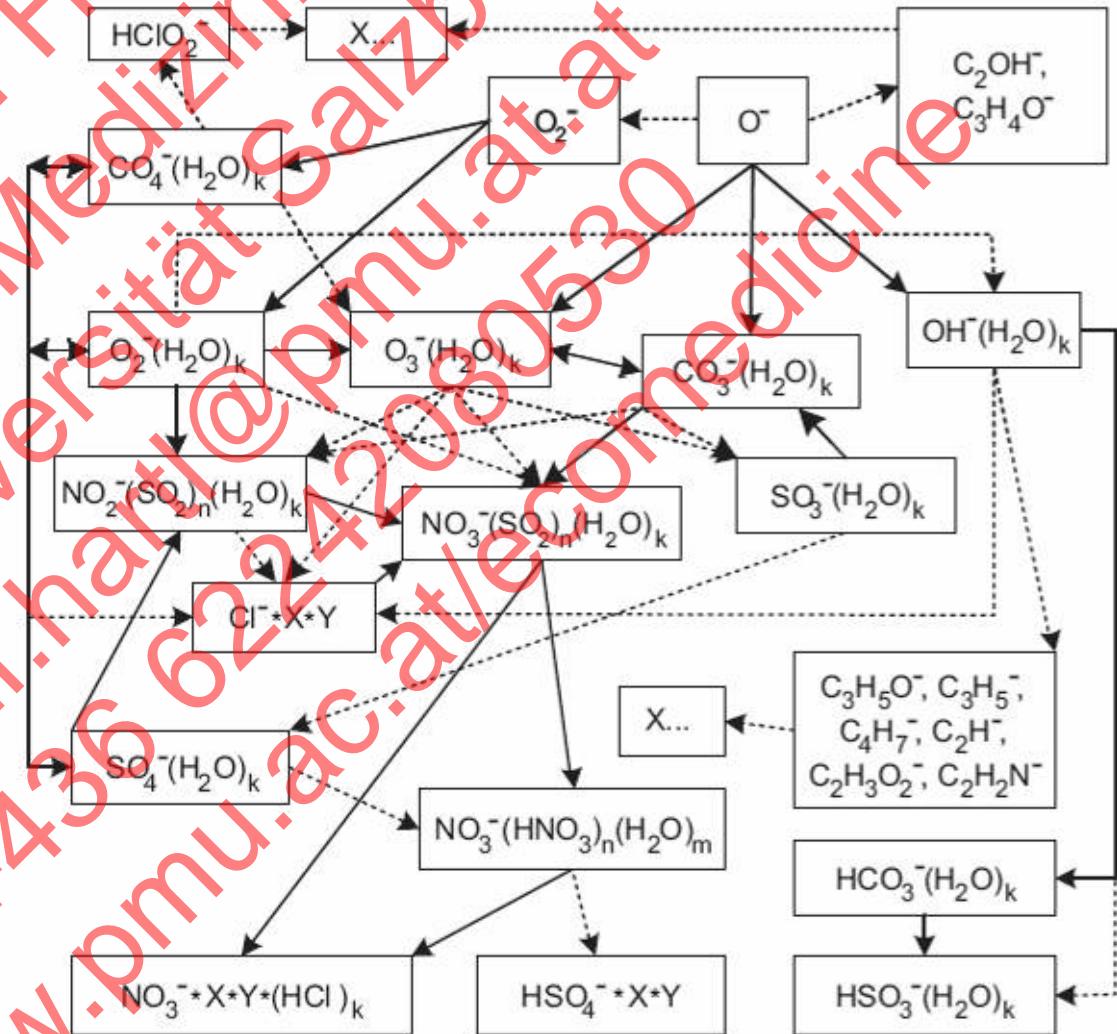
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Waterfall Aerosols

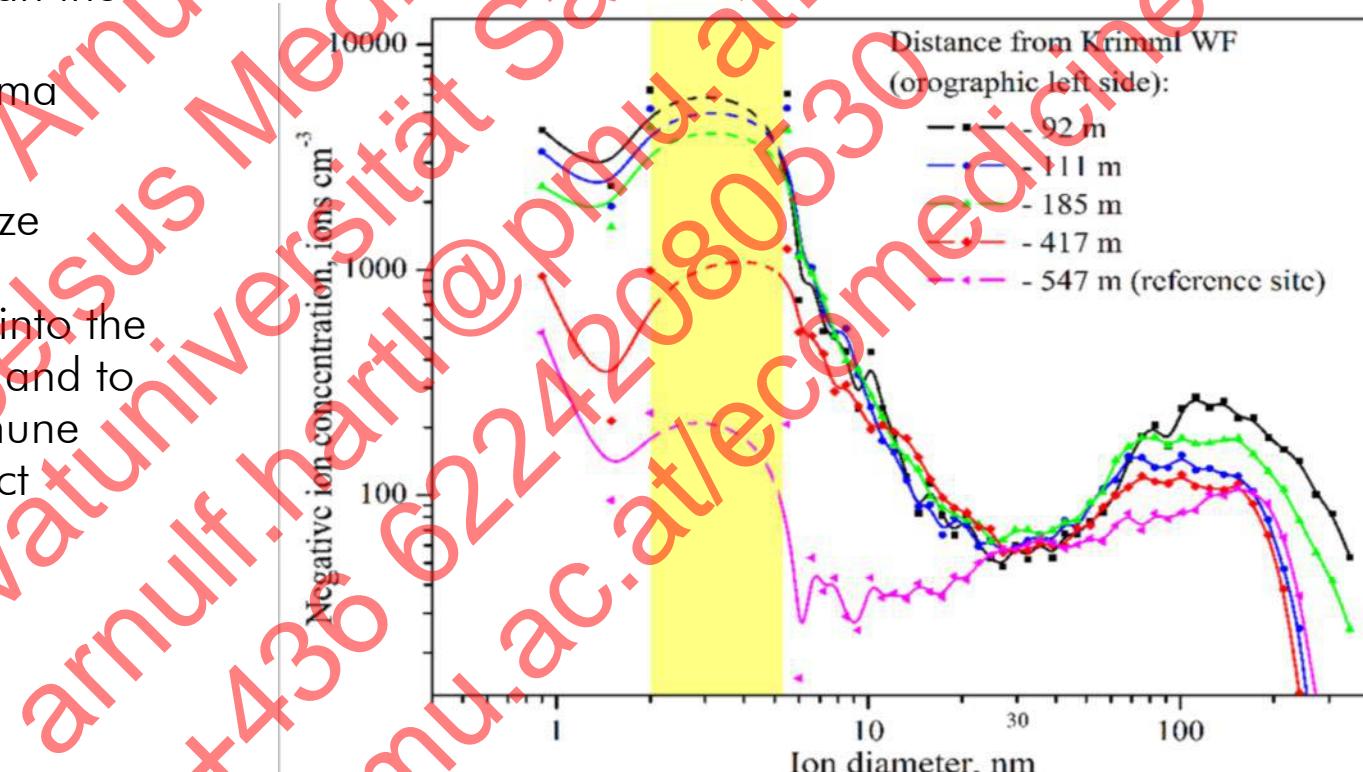
- High concentration of negatively-charged, finely atomized breathable water fragments
- Oxygen radicals

→ Waterfall aerosols



Negatively charged Nanoaerosols

- The droplet size is 200 times smaller than the droplets in an emergency asthma spray
- The minuscule size allows them to penetrate deep into the respiratory tract and to develop an immune modulatory effect

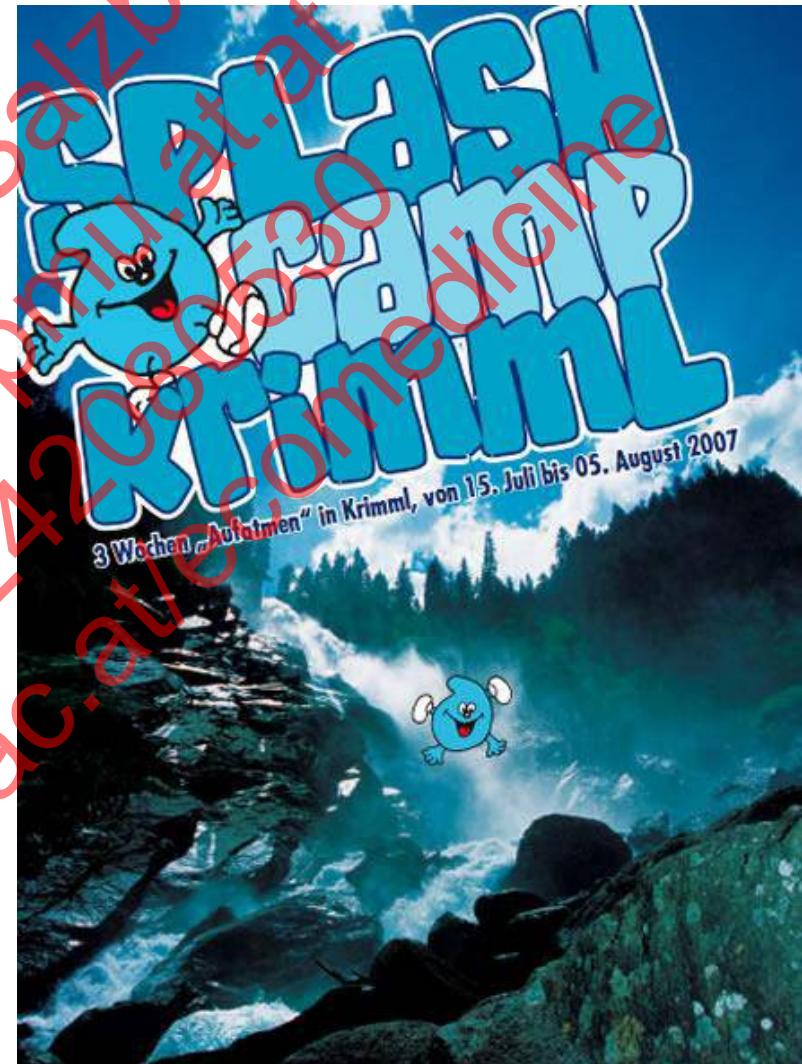


Kolarz, P.; Gaisberger, M.; Madl, P.; Hofmann, W.; Ritter, M.; Hartl, A.
(2011). Characterization of ions at Alpine waterfalls. *Atmos. Chem. Phys* 11,
S. 25297–25325.

Analysis of the influence of waterfall aerosols
on functional, molecular and immunological
parameters of allergies and asthma

↓
Randomized controlled clinical trial
„packed“ in an asthma camp for kids

- 54 kids ages 8-14 years
- Mild to severe bronchial asthma
- Duration: 3 weeks
- Waterfall group: 1 h exposure to waterfall/day
- Control group: control site, no exposure to waterfall
- Methods of analysis: blood parameters, lung function (PEF), FeNO, ACT symptoms score, health related quality of life (HRQOL) etc.



Waterfall vs Control Group



3 weeks daily intervention 1h/day
Control point 4km distance to the waterfall
standardized rooms, meals and daily routine
Outdoor sports programme (hiking, soccer)

Significant better lung function

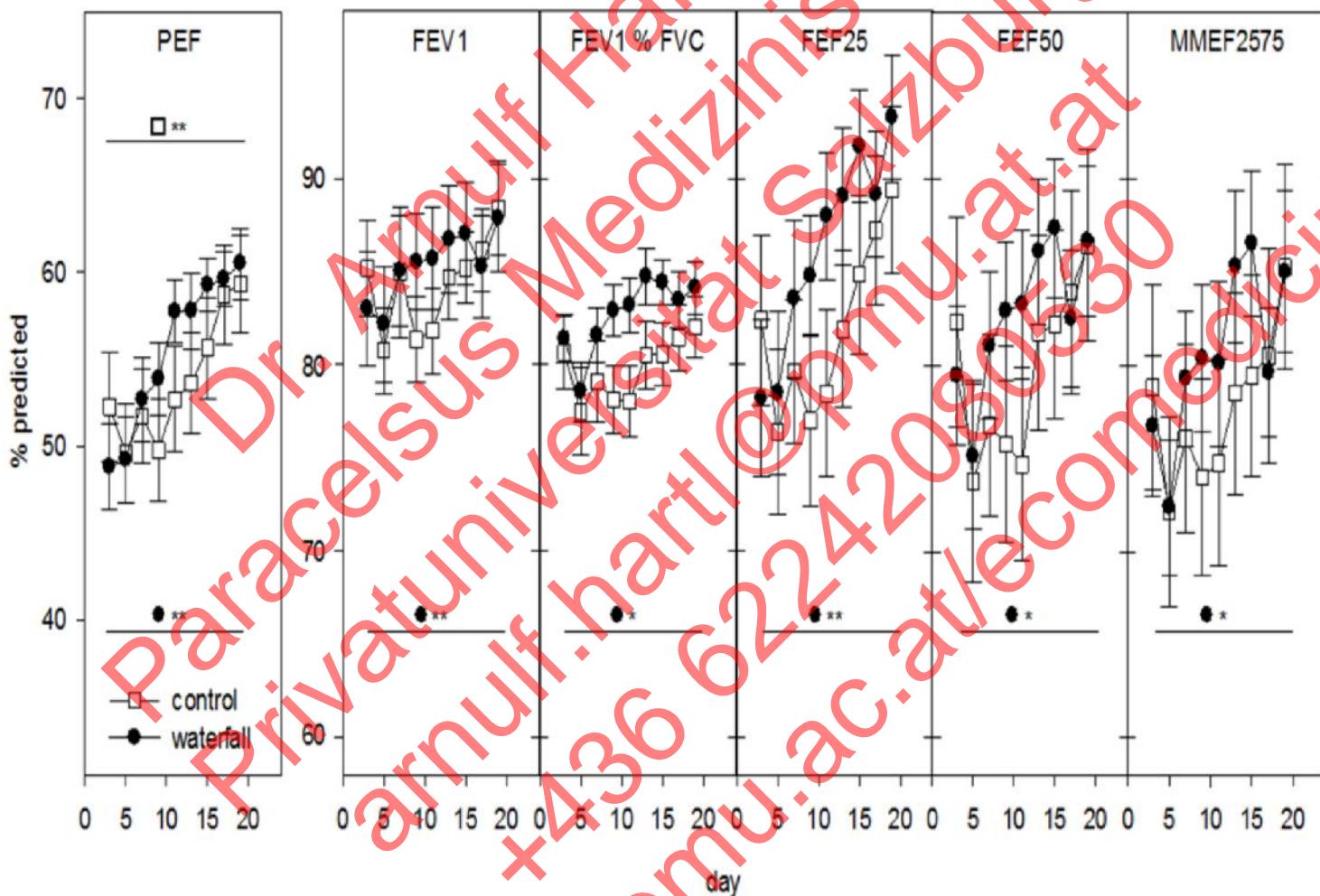
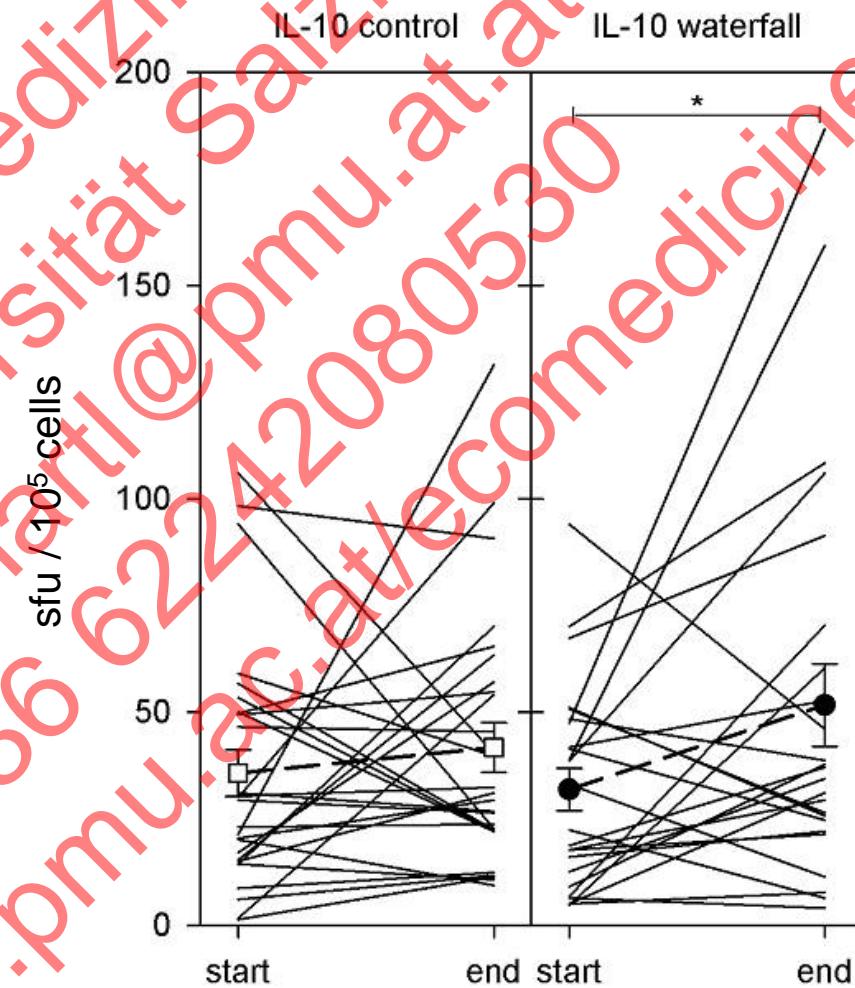


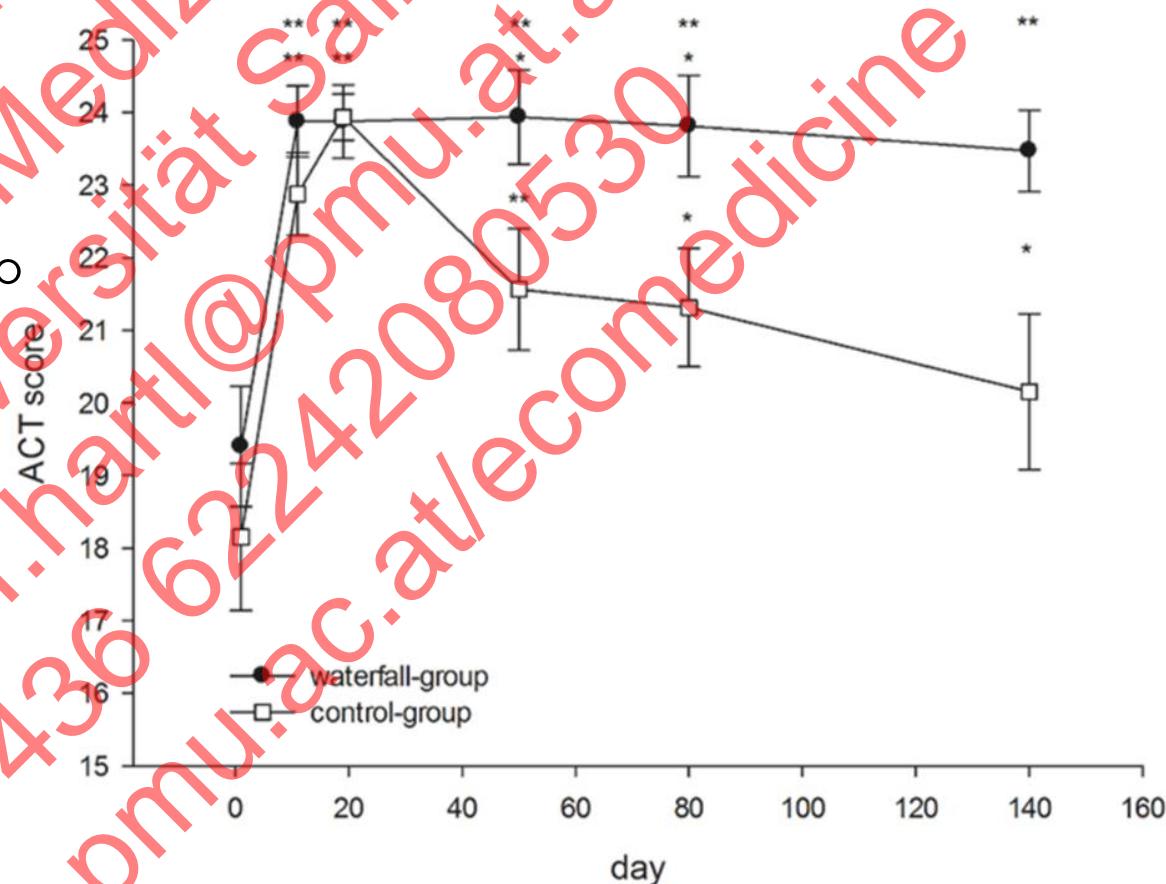
Figure 4. Lung function and significances from day 3 to day 19. * $p \leq 0.05$, ** $p \leq 0.01$. Error bars are shown as SEM.

Induction of IL-10 producing cells

- ELISPOT
Induction of anti-inflammatory IL-10 producing cells



- Significant induction of **regulatory T-cells** in both groups (CD4+ CD25+ CD127low)
- Reduction of **IL-13** in the Waterfall group compared to the control group after the camp
- Significant reduction of **Eosinophil Cationic Protein** and induction of **IL-10** in both groups
- Significant and sustainably lower **FeNO** in the WF group



Waterfalls, Allergy and Asthma Summary



- The Krimml Waterfalls induce a balancing immune response and sustainably improve functional, immunological and clinical parameters of allergic asthma
- The Krimml Waterfalls are a new natural health resource as proven by criteria and methods of evidence based medicine

Journal of Asthma, 2012; 49(8): 830–838
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DOI: 10.3109/02770903.2012.705408

informa
healthcare

PHARMACOTHERAPY

Effects of Ionized Waterfall Aerosol on Pediatric Allergic Asthma

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AMINA SELIMOVIC, M.D.,⁴ ISIDOR HUTTEGGER, M.D.,³ MARKUS RITTER, M.D.,¹ AND
ARNULF HARTL, PH.D.^{1,*}

Chronic Low Back Pain (LBP)

- Persistence of pain beyond 3 months of symptoms
- 2 mio patients in Austria suffer from LBP
- Most common reason to consult a MD
- Lifetime prevalence 84% in the West
- Rising prevalence of LBP in children and young adults
- 44%-78% relapse after improvement
- Enormous health care costs



Major causes of LBP

- motion poverty
- Adipositas
- Chronic stress and mental burden
- Poor posture
- Degenerative changes in the spine,
inflammatory processes or metabolic dis.



- Disc prolapse
- Rheumatic diseases
- Infectious diseases
- Osteoporosis
- Cancer
- Fractures



Alpine Nature Therapy

Therapy option for LBP?

Albenbad Study
Grins bei Landeck in Tirol

Influence of exercise (mountain hiking)
and balneotherapy on unspecific
chronic low backpain



Lechtaler Alps
very steep alpine region!
Pinewood forests up to 1700, high-alpine vegetation



Albenbad
Mg/Sulfur water, local remedy

Study-population

- ✓ >19 Jahre <65 years
- ✓ Chronic Low Back Pain
- ✓ Repeated medical attendance because of LBP in the last 3 years

- No Rheuma
- No disc prolapse
- No Osteoporosis
- No contraindications of balneotherapy

3 groups: n = 80

- Exercise (n = 27)
- Exercise + Balneotherapy (n = 25)
- No intervention (n = 28)

7 days intervention with 6x standardized hiking tours (600hm-1000hm)
+/- 20min Balneotherapy

Sunny weather...

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...Rainy weather



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Overview

560 Surveys

160 Spine measurements

160 Blood analysis

160 Serum/Plasma collection

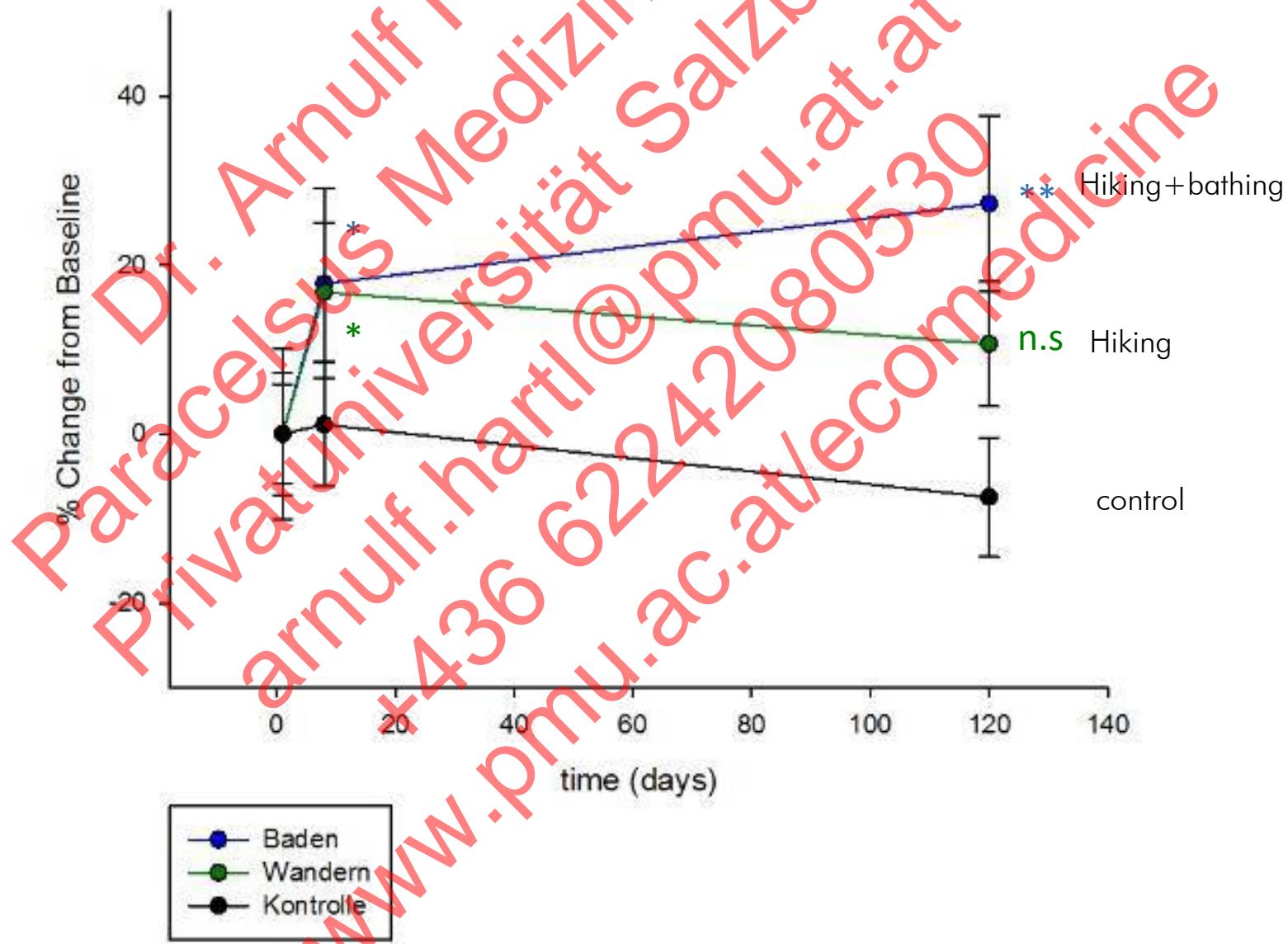
52 probands in 5 weeks
+ 28 in the control group)
259,31 km mountain hiking
14670 hm
156 Bathes in the Albenbad

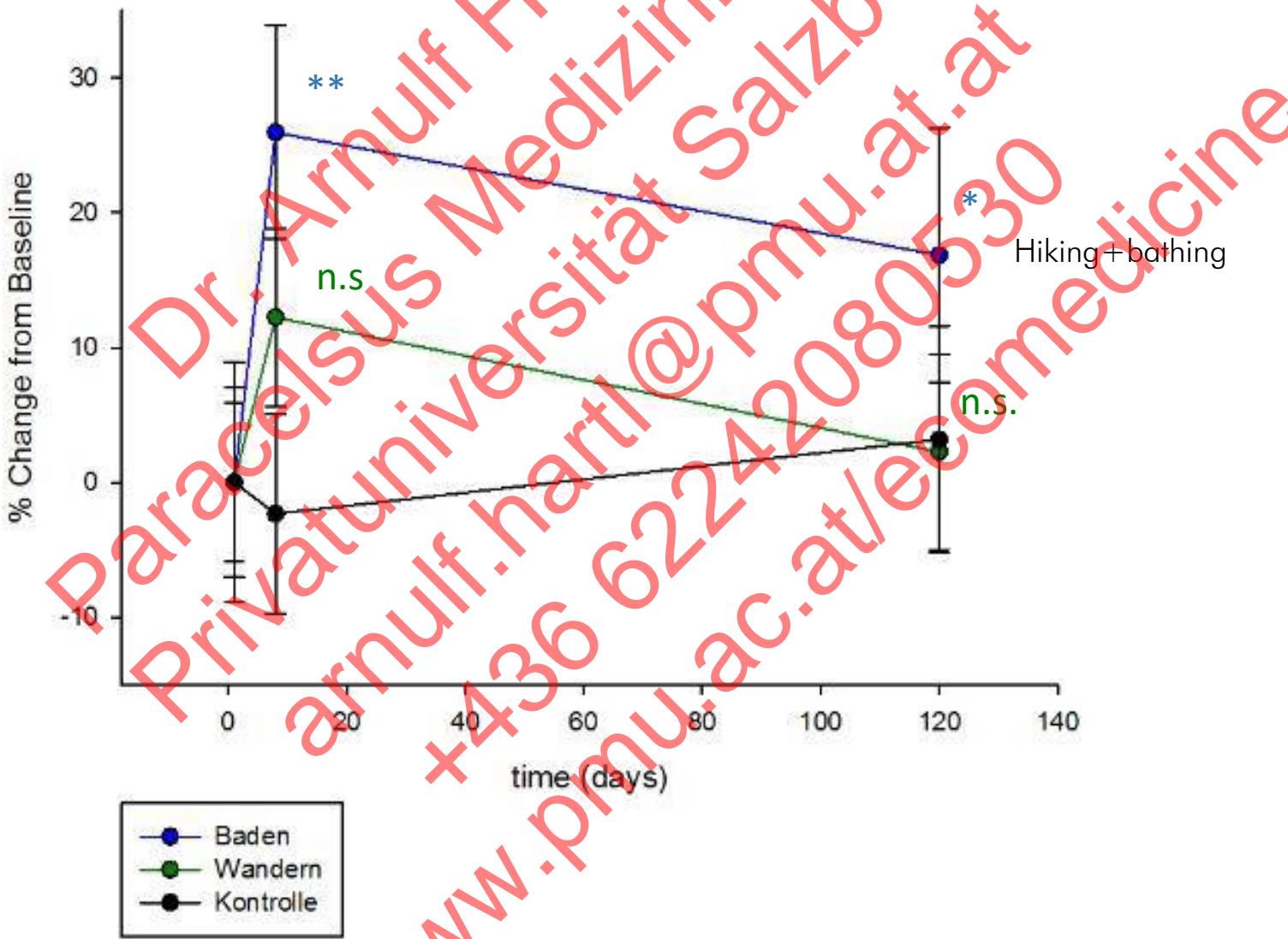
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Pain reduction, immediate and long term

Statistics: linear mixed models for continuous longitudinal data

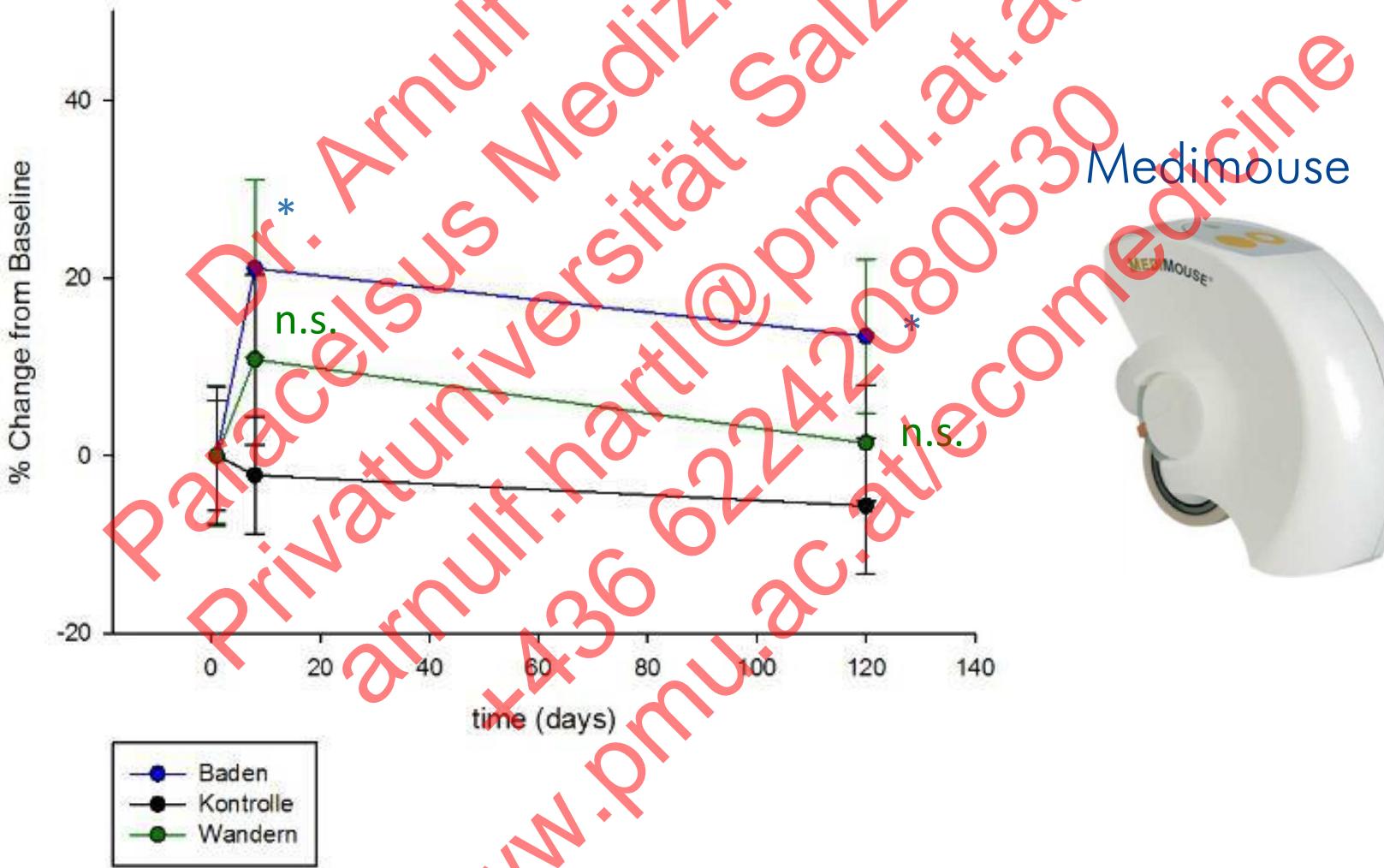




SF-36 Total Score



Mobility of the spine



Exercise in Alpine landscapes in combination with a local healing water

In comparison to a control group, a multimodal nature intervention (hiking + bathing) induces:

- Long term bettering of orthopedic parameters (4 month)
- Sustained improvement of wellbeing and health related quality of life (4 month)
- Sustained pain reduction (4 month)



Huber et al. BMC Musculoskeletal Disorders
<https://doi.org/10.1186/s12891-019-2582-4>

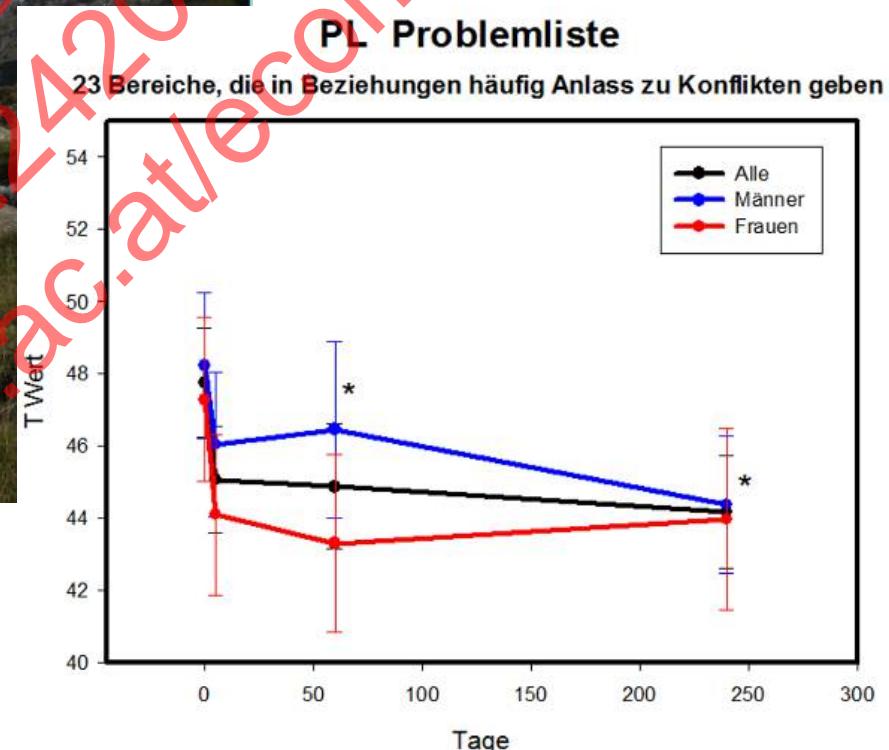
RESEARCH ARTICLE

Open Access

Green exercise and mg-ca-SO₄ thermal balneotherapy for the treatment of non-specific chronic low back pain: a randomized controlled clinical trial



A week of mountain/thermal holidays in the Alps sustainably improves the quality of marriage/relationships (but only for 50-65 year olds)



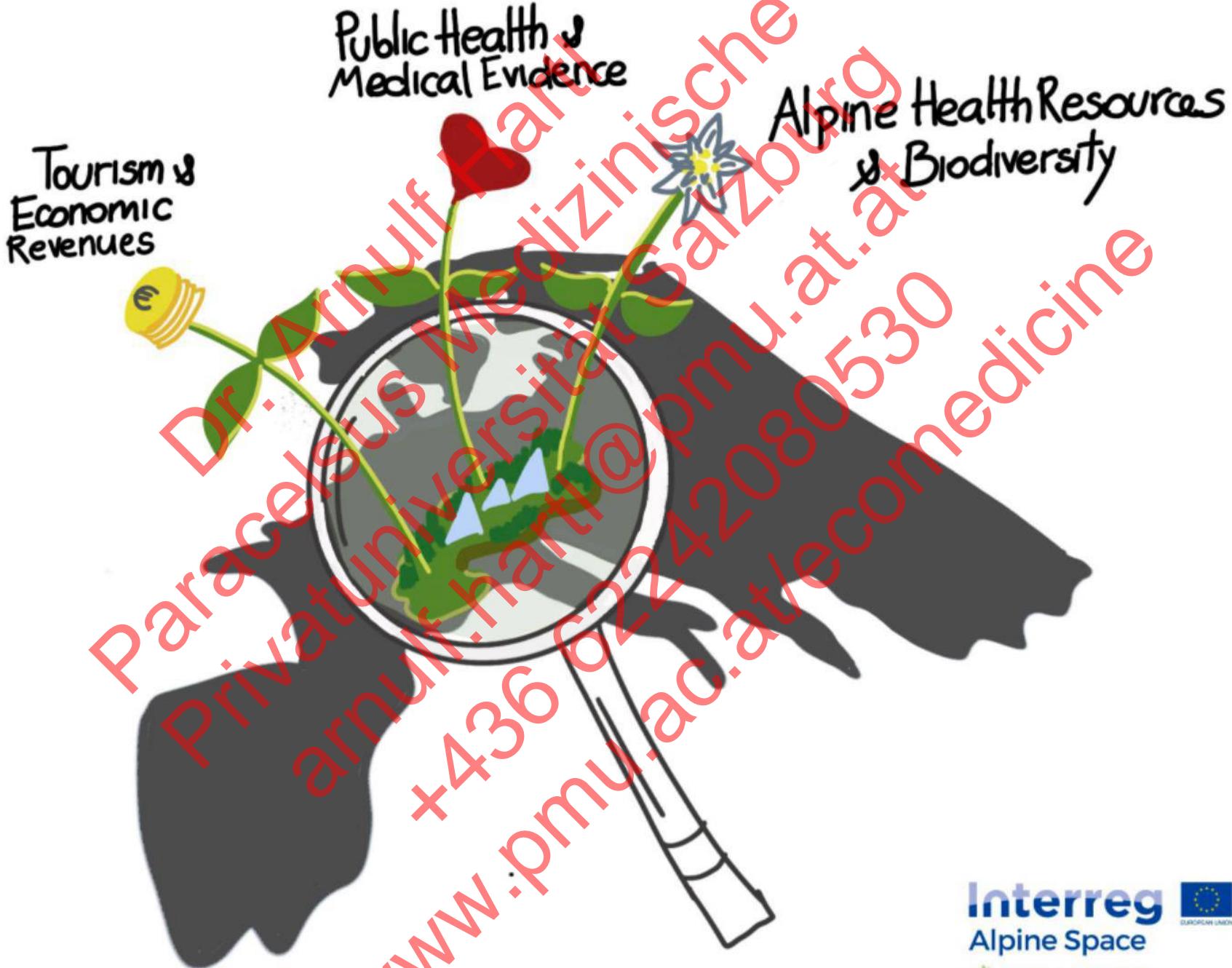
Winkelmayr et. al. Radon balneotherapy and physical activity for osteoporosis prevention: a randomized, placebo-controlled intervention study. Radiat Environ Biophys. 2015 Mar;54(1):123-36

Pichler C. & Hartl A. Evidenzbasierter Tourismus als Chance für den Alpenraum, 2017 in « Alpenreisen » (K. Luger/F. Rest)

Résumé – Alpine Nature works..

- Therapeutic: Back pain, Allergy & Asthma, ADHD, Immunosenescence
- Preventive: Immune-boosting, Burnout-preventive, Cardiorespiratory fitness, Balance-fall prevention
- Rehabilitative: Depression/suicide, Metabolic syndrome, Cognitive performance, Quality of life
- Health tourism and regional value added: Job creation, higher qualification, quality improvement and cross-sectoral innovation
- Nature conservation to preserve an important European health remedium – the Alps!





Thank you for your attention!

Fachkongress Alpiner
Gesundheitstourismus
Heilkraft der Alpen
7.- 8. Oktober 2021
Bad Hofgastein



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