Biomedical effects of low-dose radon/hyperthermia therapy

Gastein Research Institute
Institute of Physiology and Pathophysiology

Martin Gaisberger

VII. Hungarian Radon Forum and Radon in Environment Satellite Workshop
16-17th May 2013
Veszprém, Hungary
Paracelsus Medical University

Institute of Physiology und Pathophysiology

FMMP – Laboratory of Functional and Molecular Membrane Physiology

TIF – Laboratory for Translational Research in Immunology

FOI – Gastein Research Institute
Target of the FOI

The FOIs target is the realisation and coordination of independent clinical studies as well as basic and translational research, which lead to a better understanding, quality assurance and further development of the Gastein health offers. Main focus is set on the fields of balneology, physical therapies and pain(therapy)research in context of the natural occuring gas radon.
Indications

Rheumatoid diseases:
inflammatory, non-inflammatory
Sport accidents, rehabilitation

Disorders of blood circulation

Respiratory Diseases:
Asthma, COPD

Peripheral neuropathies,
Migraine, FMS

Inflammatory skin diseases
Aplicationforms and therapies

Balneologic application:
Radon intake: skin and lungs
3 weeks, 3 baths per week for 20 minutens followed by 30 minutes rest

Vapor application:
Radon intake: skin
3 weeks, 3 vapor baths per week for 20 minutens followed by 30 minutes rest

Radon caves:
Radon intake: lungs (skin)
3 weeks, 3 entries for 60 minutes
Evidence

- The highest evidence of the effectiveness of Radon is found for classical indications like
  - Ankylosing Spondylitis (Bechterew’s disease)
  - Rheumatoid arthritis
  - Degenerative osteoarthritis

- Standard therapy is the usage of nonsteroidal anti-inflammatory drugs (NSAR/NSAIDs). Can have severe side effects (SSE) in the gastrointestinal system with high mortality

- Balneo- and speleoltherapeutic application of Radon reduces the amount of medication and therefore lower the risk of SSE and enhance quality of life
Clinical studies show that Radon applications have....

- **Clinical effectiveness**
  pain reduction, improvement of function

- **Sustainability**
  effects detectable up to one year after treatment

- **Drug saving effects**
  reduction of painkillers

- **Biological effects**
  cell, cytokine level
Expected rheumatoid diseases in Austrian citizens from 2012 to 2050

Projected number of subjects with rheumatoid diseases in Austria (in thousands)

- **Males**
  - 15-30 years
  - 30-45 years
  - 45-60 years
  - 60-75 years
  - 75 years or older

- **Females**
  - 15-30 years
  - 30-45 years
  - 45-60 years
  - 60-75 years
  - 75 years or older

Moder, Hitzl - 2012
Meta Analysis

- 5 studies included (baths and cave)
- 338 patients
- No difference between radon and control directly after the treatment (p=0.13)
- In follow-ups the pain reduction was significantly better in radon groups
  » 3 months (p=0.02)
  » 6 months (p=0.002)

Pain, Function, Analgetic Consumption

Prospective intervention study, 222 patients – degenerative spine syndrome
– Timepoints: prior to, immediately post therapy and 3, 6 and 12 months later

Effect of Radon application on non inflammatory degenerative pain (cervical pain)

Median pain thresholds of 8 bilateral pressure points; gray: radon group, white: placebo group

Inflammatory parameters – Hormones – Cytokines – Antibodies – Gene expression → Activity of disease → Medical proof → New fields → New strategies of prevention
Biological effects -
Reduction of tissue destroying oxidative burst of circulating immunecells after Radon therapy in patients with AS

Biological effects –
Increase of anti inflammatory cytokine TGF-beta in patients with AS after therapy in Radon caves

Pilot study
Reduction of Autoantibodies after Radon therapy

Anti-cyclic citrullinated peptide antibodies are a specific marker for RA and keep the chronic inflammation upright. 35 patients driving into the Gastein Radon cave during their three week rehabilitation program were screened. A significant decrease of anti-CCP autoantibodies could be observed.

Moder, A., *Radon-Therapy in Ankylosing Spondylitis reduces auto-Antibody titers*. Open Journal of Molecular and Integrative Physiology 2011
Thanks / Team

Head: Univ. Prof. Dr. Markus Ritter

Dr. Angelika Moder
Dr. Heidemarie Dobias
Julia Landrichinger MA
Marlena Beyreis MA
Priv. Doz. Dr. Martin Jakab
Nicole Grasser
Thank you for your attention!