4. Pain in rheumatic diseases

1 RADON THERAPY AMELIORATES DISEASE PROGRESSION AND PROLONGS SURVIVAL IN TNF α TG MICE

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Background and objectives Radon therapy as alternative therapy for rheumatic diseases in curative tunnels such as the Heilstollen Bad Gastein in Austria has been reported to reduce pain and amount of drug usage. Inhaled radon remains in the body as decaying radioactive radon progeny, and exhibits analgesic, anti-inflammatory and immune stimulating effects. In the Heilstollen the patients usually receive mean radon doses of 44 000 Bq/m³ air (dependent on the weather conditions). Placebo effects (caused by excitement, caring by the physicians, relaxations during treatment) are discussed to contribute to clinical improvement of rheumatic diseases.

To exclude placebo effects the authors analysed benefits of the radon therapy in an animal experiment performed under controlled conditions. Mice over-expressing human tumour necrosis factor α (TNF α) that develop polyarthritis served as animal model for rheumatoid arthritis.

Materials and methods Gaseous radon from water of radon galleries of Bad Gastein, Austria, was prepared using an evaporation system. In addition to the breathing air the drinking water of the animals contained radon. The dosimetry was performed by liquid scintillation with radon enrichment on an activated carbon matrix. TNF tg (n=10) and wild type (n=7) mice were 12 $\times$ exposed to radon in 3 weeks for 3 h per day. Mock treated TNF tg (n=11) and wild type mice (n=7) served as controls. The course of the disease was monitored by measurements of body weight, grip strength and mortality. All analyses were performed by two researchers blinded to the treatment conditions the mice had received.

Results The mean daily radon doses applied to the mice were 119213 ± 39113 Bq/m³ by inhalation. The drinking water contained 800–900 Bq/l. TNF tg mice showed severe illness marked by reduced body weight and decreasing grip strength compared to wild type controls. After treatment with radon TNF tg mice showed an improved body constitution and movement activity, measured by body weight and grip strength. Improvements continued until death of the mice. Interestingly, the TNF tg mice treated with radon showed an increased survival compared to mock treated TNF tg control mice.

Conclusions Radon therapy ameliorates the inflammatory processes responsible for the arthritogenic activity of human TNF in mice. The overall radon dose applied to the mice is in the same range as during the treatment of patients in the Heilstollen Bad Gastein/Austria.