

Radon exposure setup for cells and small animals *

A. Maier¹, C. Fournier¹, M. Durante^{1,2}, M. M. Günther^{1,3}, and G. Kraft^{†1}

¹GSI, Darmstadt, Germany; ²TU Darmstadt, Germany; ³Helmholtz-Institut Jena, Germany

Introduction

There is large interest in the understanding of the radiobiological response to radon exposure. This has several reasons: Radon is a main contributor for the natural exposure to radiation. For chronic exposure radon is probably the most important reason for lung tumor induction after smoking [1]. Radon exposure is also used in therapy of inflammatory diseases [2]. In the GREWIS project both, the genetic effects and anti-inflammatory action of radon and its progenies (see Fig. 1) are studied in vitro and in vivo under precisely controlled conditions.

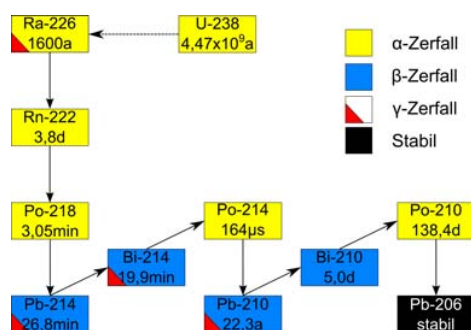


Figure 1: Decay chain

Requirement for measurement setup

For these experiments we constructed a radon exposure chamber (see Fig. 2) where measurements with cells and small animals can be performed. The following exposure parameters can be adjusted and monitored:

- Activity concentration of radon
- Temperature
- Humidity
- CO₂-concentration (only during cell experiments)

γ-Spectroscopy

A sample of 5g of activated coal was exposed to a radon activity of 620kBq/m³ for 1h. A γ-spectrum was measured immediately after exposure using a HPGe-Detector. In the

* Work is supported by BMBF project funding reference number 02NUK017A

† g.kraft@gsi.de

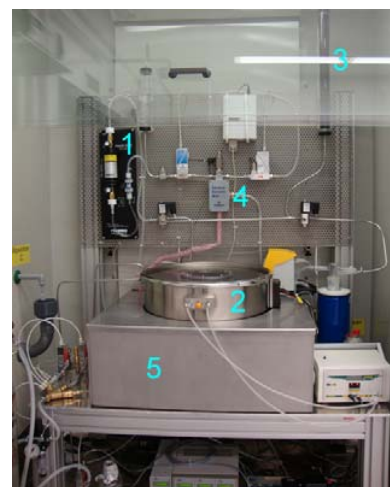


Figure 2: Radonchamber with (1) Radon source, (2) Chamber, (3) Filter, (4) Air moistening system, (5) Waterbath

spectrum (Fig. 3) the energy lines with the highest emission probability are marked for the short-living decay products Pb-214 and Bi-214 which are clearly distinct from the background. With these measurement we could show the feasibility of this method. Our next goal is to measure the distribution of the decay products in different materials like sections of animal tissue.

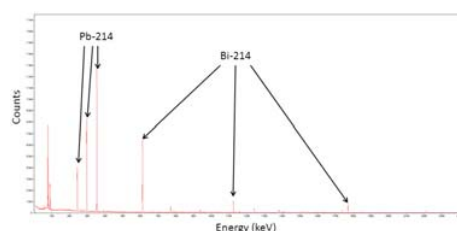


Figure 3: γ-spectrum of activated coal with energy lines of the decay products Pb-214 and Bi-214

References

- [1] E. Radford, Potential Health Effects of Indoor Radon Exposure, *Experimental Health Perspectives*, Vol. 62, pp.281-287, 1985
- [2] P. Deetjen et. al., Radon als Heilmittel: Therapeutische Wirkung biologischer Wirkungsmechanismus und vergleichende Risikobewertung, Verlag Dr. Kovac, 2005