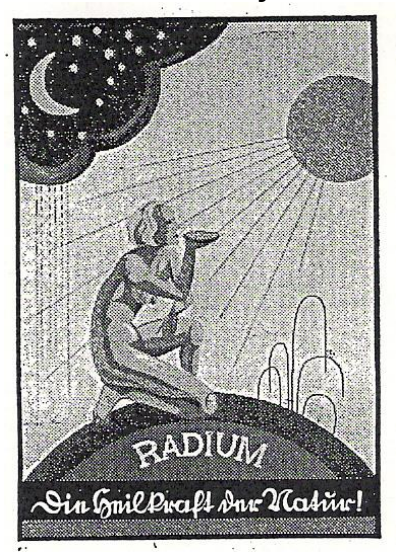
# Radiological investigation of a *Radium-Drinking-Cure*

## Radon as a remedy




After the discovery of radium by the Curies, the commercialization of radioactive substances began. Many applications were promoted, especially on the health sector. One of such a practice was the *radium drinking cure* or *emanation cure*. This procedure is based on the emanation principle, where radium disintegrates under emission of an alpha particle to radon. By exposing a small piece of a radium containing mineral (e.g. pitchblende) to water this water is enriched with radon. The promoters of this cures promised the healing or relief of rheumatism, tuberculosis and respiratory diseases. When such a cure was applied over months, the gastro-intestinal tract was strongly irradiated.

Cover of the instruction manual of a *radium-drinking-cure* praising the healing power of nature.

## Emanation process

Such a *radium-drinking-device* consists of a nice metal holder containing a drinking glass. The cap of the device contains a hollow, conical pearl of clay, which contains a small piece of pitchblende. This radium source is immersed in water for 12 hours under airtight conditions. The disintegration of $^{226}Ra$ produces radon ($^{222}Rn$), which is solved in the water.
The investigated source showed an activity of about $10^5$ Bq of $^{226}Ra$. According to the manual, radon water had to be consumed twice a day during 2-3 months. The fact that radon also decays to further radionuclides, such as $^{218}Po$, $^{214}Pb$, $^{214}Bi$, is not mentioned in the manual.

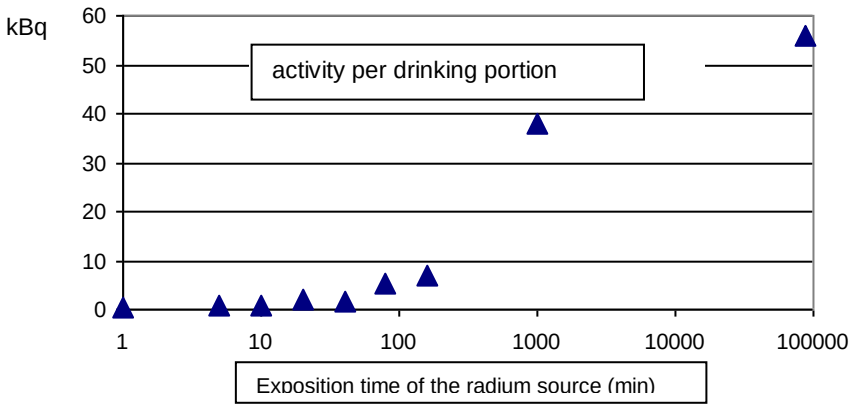
*Device of aRadium-drinking-cure*(left) and the radium-source placed in the cap of the device (right).

## Radiological investigation

Drinking water was enriched with radon with means of the 100 kBq source during different times (1 minute to 24 hours). The radon activity in the water was counted with a liquid scintillation counter.

## Results

The following figure shows the mounting radon activity with longer exposition times.
The activity after 24 hours reached more than 50 kBq. The proposed preparation time of 12 hours in the device's manual resulted in a radon water of about 50 kBq $^{222}Rn$ per 100 mL drinking portion.




**Dose estimation**

The proposed 12h preparation time for the radon water resulted in an activity of about 50 kBq per drinking portion. So, every day 100 kBq of radon is consumed. We estimated the ingested dose by a consummation of radon water during two months. With the conversion factor of $1 \times 10^{-8}$ Sv/Bq for the ingestion of $^{222}Rn$ (UNSCEAR[1]) the dose was calculated to about **60 mSv**.
According to the Swiss Radiological Protection Ordinance, the effective admitted, yearly dose for the population is set at 1 mSv. The application of such a *radium-drinking-cure* leads to a 60fold limit value, a high internal radiation.

**Conclusions**

Today, the therapeutic effects of such *radium-drinking-cures* are controversial. In addition, to our knowledge, such cures are no more applied today. Such devices are only part of collections of curiosities. When still equipped with the original radium source, they pose a high health risk.
We strongly advice to deliver suspect objects to a professional institution for investigation.

[1] United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR): Sources and Effects of Ionization Radiation. UNSCEAR 1993 Report to the General Assembly.