

Cesium and cobalt irradiators

Cesium and cobalt irradiators

Cesium and cobalt emitters are devices that produce high-energy electromagnetic radiation. They are a source of gamma radiation. They are sources of so-called tele-curie-therapy, ie irradiation with radioisotope sources from a distance. An important parameter of radioisotope irradiators is the appropriate energy and physical half-life of radionuclides. Today, however, they are used mainly in palliative and non-cancerous radiotherapy, they are gradually being decommissioned.

Cobalt (^{60}Co)

- Half-life - **5.29 years**
- Energy of emitted radiation - **1.33 and 1.17 MeV**
- Cobalt irradiators are considered to be large irradiators (high source activity of at least $3.7 \cdot 10^{13}\text{Bq}$) and are intended for deep radiotherapy.

Cesium (^{137}Cs)

- Half-life - **30.07 years**
- Energy of emitted radiation - **0.66 MeV**
- It is used to irradiate pathological deposits to a depth of max. 5 cm.
- It is also used in non-cancerous radiotherapy



Cobalt 60 Cancer Therapy

Irradiator construction

The irradiation device is called a **cobalt cannon**. The radioactive element is in the form of small rollers or flat rings with a size of 1×1 mm, enclosed in an aluminum or steel container (24×24 mm). Everything is enclosed in a protective lead head in the shape of a sphere with a diameter of 60 cm. Inside is a core of tungsten alloy or uranium, which absorbs radiation better than lead. A beam of gamma radiation emerges from the head through a channel-shaped opening.

Irradiation mechanism

- the source remains at rest, the primary beam of gamma radiation is released by a movable diaphragm located under the outlet channel of the cover
- the source moves, rotates, or is pushed out of the center of the head above the output channel

Use

Radiotherapy: the second most effective method in the treatment of malignant neoplasms after surgery. It is a method that effectively destroys the tumor and at the same time reduces the damage to healthy tissues. Ionizing radiation mainly causes breaks in DNA molecules, which prevents further cell division. Thus, the effect only becomes apparent during cell division, which may take some time from the start of treatment.

Links

Related articles

- Gamma radiation in medicine
- Gamma knife
- Ionizing radiation
- Irradiation disease

External articles

- Gamma radiation (česká wikipedie) (https://cs.wikipedia.org/wiki/Z%C3%A1%C5%99en%C3%AD_gama%7C)
- Gamma knife (česká wikipedie) (https://cs.wikipedia.org/wiki/Gama_n%C5%AF%C5%BE%7C)

Sources

- NAVRÁTIL, Leoš a Jozef ROSINA, et al. *Medicínska biofyzika*. 1. vydání. Praha : Grada, 2005. s. 383-384. ISBN 80-247-1152-4.
- FREITINGER SKALICKÁ, Zuzana. *Radiobiologie* [online]. [cit. 6.12.2014]. <<http://fbmi.sirdik.org/4-kapitola/43/431.html#ozarovace>>.

- ŠLAMPÁ, P.. *Radiační onkologie - učební text pro studenty 5. roč. LF MU Brno* [online] . 1. vydání. 2013.
Dostupné také z <<https://www.mou.cz/radiacni-onkologie-ucebni-text-pro-studenty-5-roc-lf-mu-brno/t2068>>.