Health Physics

1. Intensity of radiation
2. Energy
3. Type of radiation \(\Rightarrow\) quality factor
4. Distance from source: \(I \propto \frac{1}{r^2}\)
5. Surface area exposed
6. Shielding
7. Exposure time

Devices to measure exposure: Ideal characteristics of a dosimeter

1. Response \(\propto\) to dose
2. Wide dose response
3. Response does not depend on type of radiation

Chronic Exposure: Environmental radiation sources

- Potassium \(^{40}\text{K}\) = naturally-occurring
- Cesium \(^{137}\text{Cs}\) = fission product
- Strontium \(^{90}\text{Sr}\)
- Iodine \(^{131}\text{I}\)
- Radium = product of heavy-element decay, 1600-year half-life
- Carbon \(^{14}\text{C}\) = used for Carbon-dating
- Cosmic rays: altitude-dependent
Iodine Concentrates in the thyroid ⇒ Iodine pills saturate the thyroid with non-radioactive iodine in order to keep it from absorbing radioactive iodine.

Chronic Exposure

• Manhattan Project; few other incidents with humans receiving large whole-body doses of radiation
• dividing cells are the most sensitive to radiation
  - Bone marrow
  - reproductive system ⇒ fetus (specialized population)
  - Stomach

Dose of 1 Sv to 3 Sv: Small dose, can cause anemia

3 Sv to 6 Sv: Starts to affect the gastro-intestinal tract

6 Sv to 8 Sv: Starts to affect the central nervous system, almost no chance for survival if received in a short period of time.