

## For General medicine

### Topic of section: Ionization radiations

### Topics of seminar: Radiation dosimetry

#### Answer the questions:

1. What is the exposure dose? Specify units of an exposure dose and a relationship between them.
2. What are the absorbed dose and the absorbed dose rate? Specify their units.
3. Calculate the coefficient for a relation between the exposure dose and the absorbed dose for the air.
4. Give a definition of the relative biological effectiveness. What does the equivalent dose mean? Specify units of the equivalent dose.
5. Write formula for the effective equivalent dose. What does this dose characterize?
6. What is the collective effective dose?
7. What is the difference between a dosimeter and a radiometer?
8. What does a background radiation consist of?

#### Solve problems:

1. The average exposure dose rate is equal to  $6 \cdot 10^{-12}$  A/kg in an X-rays room. A physician stays in this room for 5 hours. What the exposure dose will he receive within 6 days?  
*Answer: 0.025 mSv*
2. A homogeneous object with mass of 50 kg absorbs the energy 4 J per 8 hour. Calculate the absorbed dose and the absorbed dose rate.  
*Answer: 0.08 Gy, 2.8  $\mu$ Gy/s*
3. Tissue with mass of 10 g absorbs  $10^9$   $\alpha$ -particles with energy of 5 MeV. Calculate the absorbed dose and the equivalent one.  
*Answer: 8 rad, 1.6 Sv*
4. The equivalent dose in the thyroid gland is equal to 8 mSv due to the

introduction of radioactive iodine. Tissue weighting factor for thyroid gland is 0.03. Calculate the effective equivalent dose.

*Answer: 0.24 mSv*

### **Literature**

1. Medical and biological physics for medical students, pp. 242-253.