

ANSWER KEY: Calculation of Tissue Sensitivity
A Chest X-Ray Is Equal to 10 Days of Natural Radiation.

Based on the lecture notes, fill in the tissues under their proper column to indicate their radiation sensitivity.

EFFECTIVE DOSE will be quantifying different tissue's susceptibility in the absorption of radiation and biological damage.

> Units will be in rads/gys

<u>0.01</u>	<u>0.05</u>	<u>0.12</u>	<u>0.20</u>
Skin	Chest	Stomach	Gonads
Bone Surface	Liver	Lung Tissue	
	Breast	Bone Marrow	
	Esophagus		
	Thyroid		
	Bladder		

To calculate the answers, use the dose stated in the question and multiply it by the tissue factor in the chart above.

Calculate

1. During an extended OR case, a patient received the following doses: 15 mrad to their gonads, 10 mrad to their lung, and 5 mrad to breast. Calculate the EfD.

$$15 \text{ mrad} \times .20 = 3$$

$$10 \text{ mrad} \times .12 = 1.8$$

$$5 \text{ mrad} \times .05 = .25$$

$$\text{Total patient dose} = 5.05 \text{ mrad}$$

2. During an extended hip pinning due to major complications, the patient had multiple surgeries to fix the problem. The patient received 5 grays to the skin area, 6 grays to the bone marrow, 15 grays to the gonads, and 6 grays to the bladder. Calculate the EfD.

$$5 \text{ gy} \times .01 = .05$$

$$6 \text{ gy} \times .12 = .72$$

$$15 \text{ gy} \times .20 = 3$$

$$6 \text{ gy} \times .05 = .3$$

$$\text{Total patient dose} = 4.07 \text{ gy}$$

3. During a hospital stay, a patient received 12 chest exams that exposed the lungs to a total of 8 mrad and 8 mrad to the thyroid.

- a. Calculate the specific tissue's sensitivity

- i. $8 \text{ mrad} \times .12 \text{ (lung)} = .96$

- ii. $8 \text{ mrad} \times .05 \text{ (thyroid)} = .4$

- b. Both areas had the same amount of radiation exposure to the tissue, why were the outcomes different? Explain based on the Law of B & G

- i. The lung tissue replicates at a faster rate than the thyroid tissue; therefore, the lung tissue will be more sensitive to radiation than other tissues such as thyroid.
- ii. The lung tissue and other organs in the grid above in .12 column is more sensitive than the .01 and .05 tissues.
- iii. The gonads .20 are the most sensitive based on how fast the cells replicate.