Name: _____ Date: _____ Team: _____

Lab Experiment # 1

Digital Radiography

Exposure Compensation Using DI and EI/TEI

Direct Radiography (DR)

Purpose

The purpose of this lab is to calculate the new mAs needed to achieve the target exposure and to determine the **Exposure Factor (EF)** using both the **EI/EIT method** and the **DI method**, then compare the results to understand the relationship between linear (EI/EIT) and logarithmic (DI) exposure correction methods.

Learning Objectives

After completing this lab, you should be able to:

1. Use the laboratory equipment properly.
2. Set up the control console and ceiling tube mount correctly.
3. Function effectively in group work.
4. Perform the experiment independently.
5. Explain the effect of mAs on the radiation exposure to the IR.
6. Evaluate the effect of mAs DI numbers.
7. Explain the use of DI numbers to improve image quality and reduce patient exposure.
8. Predict the effect of the change in mAs on digital image quality and patient exposure.
9. Calculate new mAs that would generate DI of less than 0.5.

Materials Needed

- 14 x 17-inch wireless digital (DR) image receptors.
- Abdomen phantom
- Set of lead numbers
- Lead rubber sheets

Procedure Direct Radiography

Various Body Parts

Instructions for Exposures 1 through 9

1. Place the wireless digital (DR) image receptor in the table bucky and set the SID to 40 inches.
2. Position the Body phantom on the table.
3. Direct the central ray **perpendicular** to the **sagittal plane at the level of the iliac crest.**
4. Tape the appropriate ID markers onto the image receptor within the collimated light field so they do not obscure any areas of interest.
   (The room, side and exposure number must be labeled on **all** radiographs.)
5. Set the x-ray tube, mode of operation and focal spot size as indicated on **Worksheet**.
6. **Determine new mAs for all the exposures that would generate a DI of less than 0.5. Do not use a Technical Chart to determine the proper technique.**
7. Make all the exposures using the settings indicated on **the Worksheet**.

Determine new mAs using the formula below. Write new mAs values in the **Worksheet and repeat the exposures 1 through 7.**

$$\text{New mAs} = \frac{\text{Old mAs}}{\text{EF}}$$

$$\text{EF} = 10^{\left(\frac{\text{DI}}{10}\right)}$$

Exposure Factor (EF) from EI and Target EI

The Exposure Factor (EF) can also be determined directly from the **measured Exposure Index (EI)** and the **Target Exposure Index (EIT)**, rather than using the Deviation Index (DI).
The relationship is similar to the DI-based calculation.

$$\text{EF} = \frac{\text{EI}}{\text{EIT}}$$

$$\text{New mAs} = \frac{\text{Old mAs}}{\text{EF}}$$

Comparison with DI Method

When using **DI**, EF is derived from the logarithmic relationship:

$$\text{EF} = 10^{\left(\frac{\text{DI}}{10}\right)}$$

Both methods produce the same correction result — the **EI/EIT ratio** is the linear equivalent of the **10^(DI/10)** expression.

Calculate the Exposure Factor (EF) using the **EI/EIT method**, where EF = EI ÷ EIT, and compare your result to the DI method, where EF = 10^(DI/10), to confirm that both give the same exposure adjustment.

Worksheet

Direct Radiography Image Receptor

	kVp	Body Part	SID	Old mAs	New mAs	EI old EI new	Old DI new DI
1	**75**	Abdomen	40”	**60**			
2	**115**	Chest AP	max	**4**			
3	**70**	T -spine	40”	**2**			
4	**75**	Pelvis	40”	**2**			
5	**70**	Hip R	40”	**40**			
6	**65**	Knee	40”	**1**			
7	**90**	L-Spine	40”	**4**			
8	**68**	Ankle	40”	**8**			
9	**65**	Hand	40”	**3**			