Name: _____   Date: _____   Team: _____

Lab Experiment # 5

Digital Projection Radiography
Computed Radiography

Purpose

This experiment is designed to demonstrate the effect of changes in mAs on radiation exposure to the digital image receptor, the exposure index, overall image brightness, and radiation exposure to the patient when using computed radiography.

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 imaging plate.

6. Evaluate the effect of mAs on the lgm number.

7. Explain the use of lgm 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.

Materials Needed

- ➢ 10 x 12inch standard digital (**computed radiography**) image receptors.
- ➢ Hand phantom
- ➢ Set of lead numbers and letters

Experimental Procedure

Instructions for all the Exposures

1. Place a 10 x 12 inch image receptor on the tabletop and set the SID to 40 inches.

2. Place the hand phantom in the center of the image receptor in the prone position for PA projection.

3. Direct the central ray **perpendicular** through the **center of the part and the image receptor**.

4. Tape the x-ray beam attenuating (lead) markers onto the image receptor and collimate the beam to the size of the **image receptor**.
   (The room, anatomical side, and exposure number must be labeled on **ALL** images.)

5. Set the x-ray tube, mode of operation and as indicated in the technique worksheet.

6. Expose IR number 1 using the settings indicated in the technique worksheet.

7. Process the image receptor.

8. Repeat steps 1 through 7 for Radiographs 1 through 7.

9. Expose IR 2 through 7 using the settings indicated in the technique worksheet.
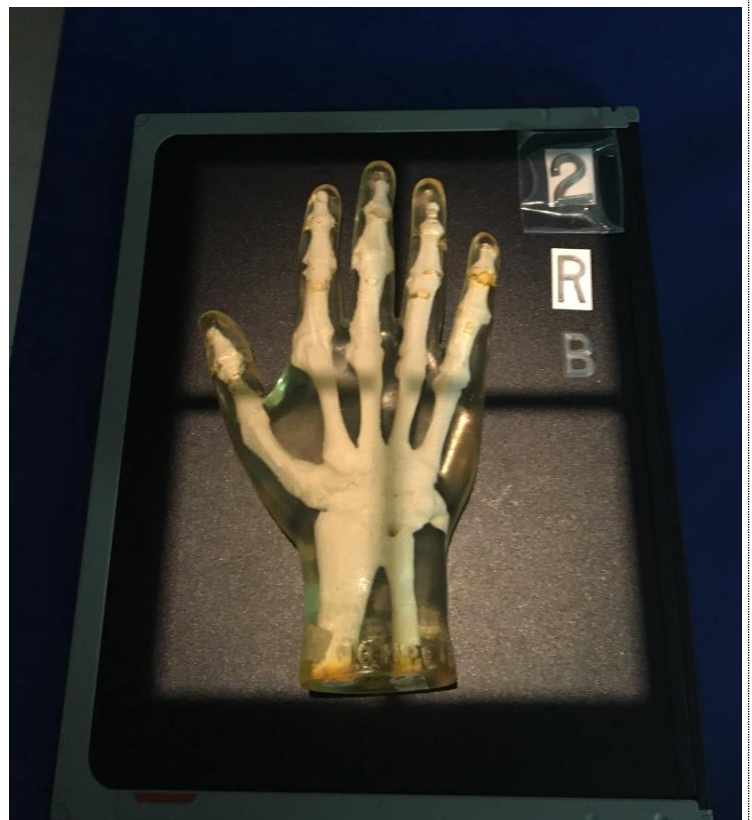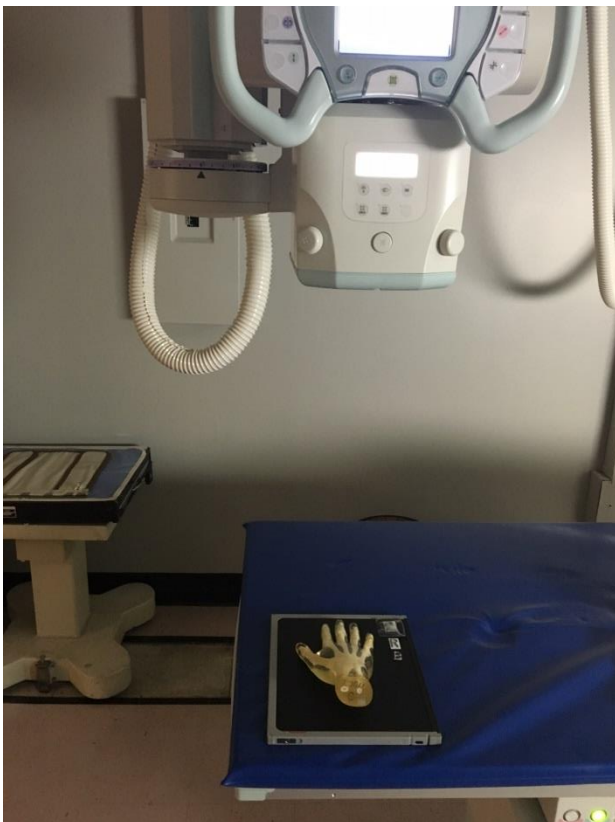
The term for exposure indicator in an Agfa (Mortsel, Belgium) system is the logarithm of the median exposure (lgM).

An exposure of 20μGy at 75kVp with copper filtration yields a lgM number of 2.6. Each step of 0.3 above or below 2.6 equals an exposure factor of 2.

Worksheet

Computed Radiography Image Receptor

	kVp	Focal Spot	SID	mAs	Bucky or TT	factor	lgm
1	64	small	40"	4	TT	X1	
2	64	Large	40"	8	TT	X2	
3	64	Large	40"	16	TT	X4	
4	64	Large	40"	32	TT	X8	
5	64	Large	40"	2	TT	X1/2	
6	64	Large	40"	1	TT	X1/4	
7	64	Large	40"	0.5	TT	X1/8	

Computed radiography image receptors can produce an image that's acceptable at:

> **50 percent underexposure   (half)**
> **100 percent overexposure   (double)**

An image **underexposed** by no more than 50% below the ideal would look the same in many respects as an acceptable image. It would provide no visual cue to a technologist that the imaging plate was underexposed.

An underexposure greater than 50% is considered a **gross underexposure error** and results in a mottled image or an image with the appearance of noise.

An image **overexposed** by no more than 200% above the ideal would look the same in many respects as an acceptable image. It would provide no visual cue to a technologist that the imaging plate and patient were overexposed.

An overexposure greater than 200% is considered a **gross overexposure error** and results in a loss of image contrast. This may be very difficult to see in the regular viewing mode; however, it can be seen when viewing the image in the magnification mode.

Worksheet

	IgM Number	Briefly describe the overall brightness and noise level of each image.
1		
2		
3		
4		

5

6

7

What was the difference in mAs and LGM between Image 1 and 2?

What was the difference in mAs and LGM between Image 2 and 3?

What was the difference in mAs and LGM between Image 3 and 4?

What was the difference in mAs and LGM between Image 4 and 5?

What was the difference in mAs and LGM between Image 5 and 6?

What was the difference in mAs and LGM between Image 6 and 7?

Lab 5