**OBJECT-IMAGE RECEPTOR DISTANCE**

**Laboratory Experiment #14**

**PART A: GEOMETRIC INTEGRITY**

**Procedure:**

Take three exposures tabletop using a coin, a small dry bone (e.g., a metacarpal), and a resolution test pattern. Use a 14 x 17-inch 400-speed screen masked off into three sections labeled with lead markers, 40-inch SID, 2 mAs, and 56 kVp, changing only the OID as listed below:

Alternate Technique = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Exposure #1: Place objects directly on the cassette.

Exposure #2: Place your objects on radioglucent sponges

to produce an OID of 4 or 5 inches

Exposure #3: Place your objects on radiolucent sponges

to produce an OID of 8 or 10 inches; double

the OID on Film #2

**Analysis:**

1. Observe the radiographic images of the bone. Is there a visible difference in details and sharpness of edges? If so, which is the sharpest?

2. What is the greatest number of LP/mm that you can see clearly defined in each resolution template image?

Exposure #1:\_\_\_\_\_\_ Exposure #2:\_\_\_\_\_\_ Exposure #3: \_\_\_\_\_\_

As object-film distance increases, does geometric

sharpness increase, decrease, or not change?

3. Accurately measure the coin’s width in mm. Measure the width of each of the recorded images on the radiograph. Record this information.

4. Using the information provided in Question #3, determine the percentage of magnification for each exposure using the formula:

Larger width - smaller width

Smaller width x 100 = M

5. As the object-film distance is increased, what happens to the recorded size of the image (increase, decrease, or no change)?

6. Is the relationship between OID and magnification directly proportional (did the size double 100 percent with double OID)?

7. Observe the shape of the coin and its images. Does OID affect shape distortion?

8. Considering the effects of OID upon both the sharpness of recorded detail and magnification, what general rule can you make for controlling these with OID?

**PART B: VISIBILITY**

**Procedure:**

Using two 14 x 17-inch 400-speed cassettes tabletop, expose an abdomen phantom at 40 inches SID and label each film with lead markers. The exposure factors are 2 mAs at 110 kVp. Adjust you OID as listed below:

Alternate Technique = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Exposure #1: Phantom directly on film

Exposure #2: Place phantom on 6-8-inch sponge

**\*NOTE: Area “A” on Exposure #1 must have a density of at least 2.0; if not, re-shoot at a higher technique.**

**Analysis:**

1. Using a densitometer, measure and record two different homogeneous densities at selected areas in the phantom image for each radiograph. Calculate the contrast for each exposure by dividing the smaller number into the greater, and record.

2. Compare the Area #1 densities between Film #1 and Film #2 on #1. As OID is increased, what happens to film density (increase, decrease, or no change)?

3. Why does OID have this effect on density?

4. Compare the contrast ratio for each film in Question #1. Which film has higher contrast? (Remember that the effect measured would be much greater on a very large real patient than it is here on a medium-thickness phantom.)

5. As OID is increased, what happens to image contrast (increase, decrease, or no change)?

6. Why does OID have this effect on contrast?

7. The *air gap technique* employs an increased OID for very large patients. What is the purpose of this in terms of image quality?

8. Based on your results from Part A, what two problems must be compensated for when using high OID Air Gap Technique?

9. What factor would you use to partially solve *both* of the problems in Question #8?

10. Now, you must compensate for the change made in Question #9 by increasing technique. Would you use mAs or kVp to do this? Why?