In on the image. due to no tissue

In order to be a well-rounded radiologic technologist, it is important to have a basic understanding of how to to obtain a high quality radiograph. The findings in this composition will cover the types of x-ray photons necessary in the making of a radiograph, and the factors that influence differential absorption. There are three important types of x-ray photons that are required in making a radiograph; photons photoelectrically absorbed, photons transmitted through the patient without interaction, and photons that are scattered by Compton interaction. Differential absorption is the difference in these x-ray interactions with tissue. X-ray photons that are absorbed and transmitted through the patient to the image receptor are what contribute to an x-ray image.

The x-ray photons that are absorbed contribute the white areas on the image. These photons represent the anatomical structures such as bone which are radiopaque. The x-ray photons that are transmitted straight through the patient contribute the dark areas on the image. Due to no tissue interaction, these photons are not absorbed and the anatomical structures that show up black or dark gray on the image are considered radiolucent.

The photons that are scattered onto the image by means of Compton scatter have no diagnostic relevance but still contribute to the image by providing image noise. There are three factors that influence differential absorption, and therefore the production of a radiographic image; kilovoltage-peak (kVp), atomic number and mass density. A high quality radiograph must have high differential absorption. According to Bushong, pg.

154 “ Differential absorption increases as the kVp is reduced.” In other words, to increase differential absorption, kVp must be decreased. Unfortunately, in doing so patient dose will be increased. It is important to find a balance between the two. Differential absorption is also dependent on the effective atomic number.

When imaging an area with low atomic number and high atomic number such as bone and soft tissue, there will be greater differential absorption. Bone, for example has a higher atomic number of 13. 8 than that of the soft tissue, 7. 4. Because of the higher atomic number, x-rays will be photoelectrically absorbed more in bone than in soft tissue. Mass density also affects differential absorption. Mass density indicates how tightly the atoms of a tissue are packed together.

All interactions between photons and tissue are proportional to the mass density of the tissue. If the mass density increases, so does the probability of photoelectric interactions because there are increased amount of electrons available to interact. For example, we know that the ribs are more dense than air filled lungs. By increasing the mass density, the x-ray interactions is also increased, therefore increasing differential absorption. In summation, it is important to have high differential absorption to obtain a high quality radiograph. By understanding the different types of x-ray photons and the different factors that influence differential absorption, radiologic technologists are more capable of obtaining a high quality image.