Hello, my fellow workers. Today I am going to talk about my favorite book. The title of the book is Handbook of medical imaging. The authors of the article are Jacob Beutel , J. Michael Fitzpatrick (Vanderbilt University), Steven C. Horii (University of Pennsylvania Health Systems), Yongmin Kim (University of Washington), Harold L. Kundel (University of Pennsylvania Health Systems), Milan Sonka (University of Iowa), Richard L. Van Metter (Eastman Kodak Company). The book is published by Spie Press in 2000.

The book consists of two parts and twenty chapters. I want to abstract one section from the first chapter.  
The title of this section is X-ray interactions. The main idea of the section is to show that X rays (and gamma rays) interact with matter in several different types of interactions. Interactions, in general, can result in the local deposition of energy, and in some cases an x ray will exist after the initial interaction in the form of a scattered x ray, a characteristic x ray, or annihilation radiation photons.

The authors explain us that there are several different types of interactions: the photoelectric effect, Rayleigh scattering, Compton scattering, pair production, and triplet production. The mechanism for each of these interactions is described below.

In the first subsection, it is spoken in details about *The photoelectric effect*. In the photoelectric

interaction, the incident x ray interacts with an electron in the medium. The incident x ray is completely absorbed, and all of its energy is transferred to the electron. If the electron is bound to its parent atom with binding energy *E*BE, and the energy of the incident x ray is given by *E*0, the kinetic energy

*T* of the photoelectron is: *T =* *E*0 –*E*BE*.* It is specially noted that If the energy of the incident x ray is less than the binding energy of the electron photoelectric interaction with that electron is energetically unfeasible and will not occur.

In the second part mention was made of *Rayleigh scattering*. The mechanism of Rayleigh scattering involves the elastic (coherent) scattering of x rays by atomic electrons. The unique feature of Rayleigh

scattering is that ionization does *not* occur, and the energy of the scattered x ray is identical to that of the incident x-ray. There is no exchange of energy from the x ray to the medium. However, the scattered x ray experiences a change in its trajectory relative to that of the incident x ray, and this has a deleterious effect in medical imaging, where the detection of scattered x rays is undesirable.

The following part is *Compton scattering.* Compton scattering involves the inelastic (incoherent) scattering of an x-ray photon by an atomic electron.Here mention was made of relationship between the fractional energy loss and the scattering angle *theta.*

The next part is *Pair and triplet production.* Pair production involves the interaction of an incident x ray with the electric field of the nucleus. It is specially noted that Pair production does not occur at diagnostic x-ray energies.

In conclusion, the article is well illustrated with diagrams of different mechanism of the incident x ray interactions with the medium. The information of the article may be recommended to specialists in medical physics.

The information of the article is useful for my work.