

AbstractID: 2862 Title: The Effects of Magnetic Field on Energy Resolution and Linearity in SPECT System

Purpose:

Inside a Photomultiplier tube (PMT) electrons are accelerated. When directions of electron are perpendicular to earth magnetic field, Lorentz force could be equivalent to 10V cross voltage applied to PMT. Such force divers electrons and considerably change the electron multiplication, hence the gain of PMTs. In this study, we evaluated the effects of magnetic field in photo peak , energy resolution and line spread shifting in three SPECT systems when the heads rotate in different angles..

Method and Materials:

Three SPECT system available in our department were examined. One Pointe source including 5 mCi of ^{99m}Tc were fixed on the face of collimators (LEHR). The peak and FWHM of energy spectrum were determined. Then two Line sources of 5 cm long including 150 μCi of ^{99m}Tc were fixed on the face of collimators (LEHR). The linearity were determined. The procedure was repeated while heads rotate in different angles. One air conditioner was placed at 3-meter distance from the camera gantries and the whole procedures were repeated .

Results:

In all three systems the maximum variations observed in energy photo peak ,peak of LSF and linearity are statistically significant ($p < 0.01$) when the heads rotate in earth magnetic field. when the air conditioner was functioning, the height of energy spectrum peak was less than when the AC was off. In one of the system variation were much more prominent than the two other systems. This most probably was due to orientation of the system not to intrinsic construction.

Conclusion:

When the heads of SPECT systems rotate ,the magnetic field can vary energy resolution and linearity of systems. It is suggested that when SPECT systems are installing, the setting orientation be noted more accurately.

Conflict of Interest (only if applicable):