Proposal of the fluoroscopes using gamma rays generated from electron positron pair annihilation with low exposed dose

X-ray Computed Tomography (CT) is the important equipment in medical care today. However, its exposed dose is very high. We propose two fluoroscopes using gamma ray generated from electron positron pair annihilation. Compared to X-ray CT, they have good ability to see through the organism. In addition, the exposed dose of them is less than 1/10 or 1/100 of that of X-ray CT. Positrons generated from 68Ge are irradiated to the inorganic scintillator. Annihilation points are measured using sheets of wavelength-shifting fiber in both fluoroscopes. The position resolution of annihilation is 0.2 mm. When a positron is annihilated, two gamma rays with energy of 511 keV are generated back to back. One gamma ray is irradiated opposite to a living body. By measuring a point where the gamma ray is irradiated, we can identify the expected point where gamma ray is irradiated to the living body. The position resolution of irradiation is 0.2mm. But absorbed or scattered gamma ray can't be measured. As a feature of one fluoroscope, it is possible to measure transmittance of gamma ray, by measuring existence or absence of gamma ray at the expected arriving point. Therefore, most part of scattering events in the organism can be removed. As a result , the exposed dose of the fluoroscope is less than 1/10 of that of X-ray CT. As a feature of the other fluoroscope, it is possible to measure the point where a gamma ray is scattered by measuring the energy and the arriving point of the gamma ray. Therefore, most of the noises due to Compton scattering is removed. As a result, the exposed dose of the fluoroscope is less than 1/100 of that of X-ray CT.