Deadtime Loss in a Dynamic Study with a Scintillation Camera System

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Two-correcting methods for the deadtime losses in a quantitative dynamic study with a scintillation camera system and multimillicurie injection of short-lived radionuclides were studied.

The first one was based on an assumption that a deadtime was caused according to the whole counting rates over the detection field. Then, the correction factor(Ci) was presented by the following formula, $Ci=\frac{1}{1-Ni(1/s)\tau}$ where Ni was measured counting rates over the whole field in an image of a time serial study, s was the interval of data sampling and τ was a resolving time of the system. In the primary procedure, the resolving time was determined by the two-source method. And it was about 7 μsec. in scintillation camera only, but it was about 25 μsec. in addition of a computer-controlled data processing system.

The second one was a fixed source method in which a small sized source was put on the detector surface, and the correction was done to keep the decreased counting rates due to the deadtime loss at the initial counting rates.

A source with 200～500 μ Ci of Tc-99 m covered with 4 mm thick lead plate was adhered at the portion of scintillation camera surface where examinations were not disturbed.

The correction factor (Ci) was presented $Ci=\frac{No}{Ni}$ where Ni was a counting rate of the source area in an image, No was a counting rate before injection of radioisotope.
In the second method, there was no need for obtaining the resolving time before hand, and the correction procedure was simpler than the first method.

As an example, radiocardiogram data were corrected by the second method. In cardiac output, there was a difference of 13% between calculation with corrected data and non-corrected ones.

The second correcting method using a small source was a simple and useful for a clinical dynamic study.