Digital Simulation of Radiocardiogram using a Mini-computer

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It is well known that the radiocardiogram (RCG) provides comprehensive information concerning with the transport process of the central circulatory system. However, to derive a quantitative parameter from the RCG recording, specialized technique such as analog simulation method should be required, which has prevented wide acceptance of the quantitative analysis of RCG. To solve this defect, the analysis of RCG by digital simulation method was attempted using a minicomputer.

After bolus administration of ^{99m}Tc-HSA 5 mCi from antecubital vein, an injection input and an initial part of RCG curve were obtained until one minute. Then final dilution value of RCG was obtained to determine cardiac output. The mathematical model was a closed loop consisted of four compartments, in which right heart and left heart compartments were represented by first order system, and lung and body compartments by first order system with transport lags. Time activity curve of RCG was transformed to the frequency domain by fast Fourier transformation and the parameters were identified on the frequency domain by means of Powell's algorithm.

It took only a few minutes to identify the parameters and the result of the extracted paraemters and the result of the extracted parameters was well conformed with the result derived from the analog simulation method. The conventional analog simulation method requires high speed analog computer which is operated by skilled operator. In the contrary, since this digital simulation method can be operated automatically by usual mini-computer, it might facillitate wide acceptance of the quantitative assessment of the RCG.

Evaluation of Photo-Sensitive Materials for The Recording Media of Scintigrams

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Image quality of scintigrams obtained by scinticameras are influenced by characteristics of CRT phosphers and photo-sensitive films. In this study, emission color spectra of CRT phosphors, spectral responses of films and resolving powers of them were investigated.

Films tested were Polaroid (type 107), Tri-X (35 mm), Double-X (35 mm), Recording (35 mm), Shellburst (35 mm), RX-S (X-ray film), KX (X-ray film) and RP/G (X-ray film). CRT were attached to the same scinticamera (Toshiba GCA-202).

Sensitivities and resolving powers of the films were evaluated by comparing them with those of the Polaroid film of which the spectral response covered the whole color range of P-11 and P-47. Resolving powers were measured by the technique of MTF using a bar phantom of 2–8 mm width lines. All films except Polaroid were developed by an automatic processor (Sakura QX-1200) designed for X-ray films.

In 35 mm films, no differences in sensitivity to the two phosphors were noticed. Tri-X was high in sensitivity but base density was also high. Shellburst had middle sensitivity but low base density even by the high temperature processing. It was also superior in sharpness.

For all X-ray films, sensitivities were higher to P-47 than to P-11. RX-S was suitable for life size imaging for its high sensitivity and KX was fit