Dynamic Cardio-Angio-Scintiphotography with Scintillation Camera

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Employing the gamma-ray scintillation camera, manufactured by Nuclear Chicago, serial cardiac scintiphotos with 5 seconds intervals were taken following rapid intravenous injection of 10 millicuries of $^{99m}$TcO$_4$ into the right antecubital vein.

In patients with normal heart, the superior caval vein was visualized within 5 seconds after injection. $^{99m}$Tc was seen in the right atrium and ventricle, as well as in the pulmonary arteries between 5 and 10 seconds, thereafter radioactive material was distributed in the lung, left side of the heart and aorta.

Projecting areas of each atrium and ventricle on the scintiphotos were measured to estimate the sizes of intracardiac spaces. In patients with mitral valvular diseases, the areas of the left atrium were larger than those in normals.

Using a 35 mm time lapse camera, scintiphotos with more rapid exposure intervals, e.g. four pictures in a second, could be obtained. This allowed us to develop a device permitting to take serial cardiac scintiphotos corresponded to each phase of cardiac beat.

Two phase signals which synchronized with either mid-systole or mid-diastole of the heart were conducted from an electrocardiography by means of two delay circuits. Exposure intervals of 35 mm, time lapse camera were automatically adjusted by these signals. Applying this device, one can obtained serial cardiac scintiphotos in systole and diastole, alternatively.

This technique, to be called “Programing Radioisotope Cardiophotography”, would permit visual monitoring of dynamic cardiac functions in health and diseases without any tedious and time-consuming manipulations.

Clinical Applications of Dynamic Studies with the Scintillation Camera

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The gamma-ray scintillation camera employed in this study was the PHO/GAMMA manufactured by Nuclear-Chicago. The test agent used was technetium 99m pertechnetate in doses of 10mCi. To visualize the superior vena cava, innominate, subclavian, axillary veins, thoracic aorta and common iliac arteries etc. a rapid injection of 10mCi of $^{99m}$Tc was made into an appropriate antecubital vein and serial imaging exposures of 2-4 seconds are obtained with the Polaroid Camera or a programmed 35 mm camera. A superficial dorsal vein in the foot were used to obtain the radionuclide angiograms of the inferior vena cava, deep and superficial femoral, and iliac veins.

We have been studying the values of the radionuclide angiogram of major vessels and trying to determine its merits relative to roentgen angiography.

1) A case of vena cava superior syndrom was shown. Chest roentgenograms depicted...