

Sequential and Simultaneous Display of Both Functional Curves of Physiological Events and Radionuclide Angiocardigraphy

A. KASAHARA*, K. ASANO*, H. HASHIBA*, T. FUJINO*, T. HASAGAWA*, M. HOSOI*, S. YOKO-O*, T. SHIMOGAMA**, J. IWASAKI**, H. MIURA** and M. YAMAGUCHI**

**Department of Radiology, Kori-Hospital of Kansai Medical University*

***Developmental Section of Toshiba Medical Co.*

It was reported at the 15th Annual Meeting of the Japanese Society of Nuclear Medicine that the 'Simultaneous Display of ECG and Radionuclide Angiocardigraphy' was developed by us. In this presentation, furthermore, intracardiac pressure-curves of both ventricles were displayed sequentially and simultaneously with radionuclide cardiac pool-images of a canine heart. Toe-Plethysmographs were also done with the use of ^{99m}Tc -pertechnetate images on the bottom of a human feet. And, finally, 'simultaneous and sequential displays of four physiological curves, (including two ECG-leads, finger plethysmograph and breath-curves), and radionuclide angiocardigraphy of a man' were presented.

The method used was as follows: Together with signals from Anger camera, analog-signals from detectors for extracting human physiological events were multiplexed and transferred into AD-converter in an interface. The digitalized data of

physiological events were sequentially fed into a 16K-byte minicomputer with the data from Anger camera, which were interrupted by those of physiological events every 10 milisecond. The data-acquisition into the computer was done by a list mode. Many physiological events (except very high frequency signals such as phonocardiography) could be sequentially and simultaneously displayed with their dynamic radionuclide organ-images. The dynamic detector-CPU response of our system was 75%, with CPU counts that correlated linearly to Anger-camera-scaler counts of 12,000 cps. The image quality of our system's display was excellent with images of less than a hundred milisecond per viewing frame. Our system could display a dynamic image of 160×160 matrix-display, and physiological curves on each display-frame from 0.01 to 0.50 sec time-interval, and make 48 display-frames in seven minutes as one display-job of the minicomputer.

Radioisotopic Dynamic Study of Assessment of Peripheral Obstructive Arterial Disease

M. OHSHIMA*, K. NISHIZAWA* and S. SHINOYA**

**Department of Radiology, Nagoya University School of Medicine, Nagoya*

***Department of Surgery, Nagoya University Branch Hospital, Nagoya*

We have reported the time activity curves after injecting an intravenous bolus of 10 mCi of ^{99m}Tc pertechnetate during reactive hyperemia in calves, feet, and hands by using a Pho/Gamma III with a video-tape recorder playback system. We have also reported the correlation between those time activity curves, and 1) the sites of occlusive lesions which were proven by arteriography and 2) grades of intermittent claudication of the calves.

From April 1976 through October 1976, 30 patients with insufficiency of the hands, calves or

feet underwent this examination. We employed our large-field of view scintillation camera, and NOVA 1200 computer system. Due to the importance of ROI when analyzing the pathophysiology of Buerger's disease, we paid special attention to the evaluation of the time frame histogram of the ROI of the hands and feet.

In normal limbs the time frame histogram ("TFH") showed a marked peak at the first phase, but in abnormal limbs the "TFH" showed a gradual upward slope. The first phase of these time histograms was calculated by gamma function

by our NOVA 1200 computer. This function can be expressed in the form,

$$C(t) = K(t - t_a)Ae^{-(t - t_a)/B}$$

t = time after injection

$C(t)$ = indicator concentration at time t

K = constant scale factor

t_a = appearance time

A, B = arbitrary parameters

From these evaluations parameters A, B, K , and the mean circulating time (MCT) were calculated.

In cases with ulceration of the finger parameter A was less than normal, parameter B was greater

than normal, parameter K showed no deviation either way, and the MCT was slower than normal. The high values of B are consistent indicators of abnormal curves.

The radiation dose delivered to the patient and the dosage to the physician in administering the 10 mCi of ^{99m}Tc pertechnetate were estimated.

The radiation dose of the patient at the surface of the neck, anterior chest, abdomen, and bilateral inguinal regions was from 100 mrad to 300 mrad; the physician's right second finger, 100 mrad to 300 mrad.

Diagnosis of the Aortic Aneurysm with Sequential RI-angiography

H. OCHI*, R. YOSHIDA*, H. MITSUDA*, S. TANIGUCHI*, T. FUKUDA*, T. FURUKAWA*,
A. YAMASHITA*, M. TAMAKI*, M. NISHIMOTO**, K. TAKEUCHI** and C. TANAKA**

**Department of Radiology, Osaka City University Medical School*

***The First Department of Internal Medicine, Osaka City University, Medical School*

With sequential RI-angiography investigation was carried out on 23 cases of thoracic aortic aneurysms. Eleven were fusiform, 8 were saccular and 4 were dissecting aneurysms.

Fifteen to twenty millicuries of ^{99m}Tc -human serum albumin contained in a volume of less than 1 ml was injected as a bolus into the antecubital vein and with rapid sequence camera (35 mm film) or multiformat camera the initial bolus images were obtained, which were of better quality than static blood-pool images taken later from various angles.

This non-invasive method is capable of accurate diagnosis in the thoracic aortic aneurysms, differential diagnosis between fusiform and saccular types being without difficulty. As far as our 4 cases of dissecting aneurysm are concerned, no

clear-cut findings can be pointed out by this method.

Criteria: 1) If there is widening and blood-pooling in some part of the aorta, one can diagnose aneurysm. 2) However, even if there is no such aortic widening or pooling, one can not exclude an aneurysm filled with thrombus. 3) It is difficult to diagnose dissecting aneurysm only by this method. 4) The mediastinal tumor near the aortic arch is different from aneurysm in sequential angiographic image, so this method is useful for differential diagnosis of the mediastinal tumors.

Since most of the patients with possible aneurysm are aged and arteriosclerotic, this simple and non-invasive diagnostic method should be the first choice in evaluation of such patient.

Study on the Splanchnic Circulation Using Microspheres Labeled with Radioisotopes The Effects of Pentobarbital and Bucolome

R. MIURA, and K. KITANI

First Laboratory of Clinical Physiology Tokyo Metropolitan Institute of Gerontology

The authors previously reported the increase in portal blood flow by bucolome administration in unanesthetized rats. (Miura & Kitani, Jap. J. Nucl.

Med. 12: 598, 1975) In the present study, the effects of pentobarbital anesthesia and bucolome on splanchnic circulation in anesthetized rats were