

A Computer Program for Dynamic Analysis of Regional Blood Flow of Hepato-Potal System
Koji Yamamoto, Masahiro Ishine, Shuji Tanada, Tadashi Kawamura, Atsushi Iio, Ken Hamamoto
 Department of Radiology, Ehime University School of Medicine, Ehime

It is of great importance to obtain a simple method by which one can estimate regional variations of hepatic artery and portal venous blood flow in the liver. As a first step to search such a method, we attempted to simulate hepato-portal system in the Laplace transformed space.

After Laplace transforming the data obtained by intravenous injection of ^{99m}Tc -albumin, the characteristic function $H(s)$ of the hepato-portal system is obtained numerically for some values of s_k , $k=1, \dots, n$ with sufficiently large n . Here s_k are chosen in advance such that $H(s)$ would not differ significantly from the exact characteristic function due to finiteness in sampling interval and in number of data. $H(s)$ is thereafter approximated by a model $H^*(s)$ which is a parametric representation of the system. The parameters included in $H^*(s)$ are then determined so that

$$\sum_k [H(s_k) - H^*(s_k)]^2$$

has a minimum value. They are supposed to have their physical meanings and diagnostic significances. The above mentioned algorithm is written in BICOM language of scintipac 230.

The present technique has, theoretically, a large applicability of analysing any kinds of data. It is suggested that determination of the regional hepatic blood flow may be possible by using blurred data such that obtained by antecubital venous injection technique.

A COMPATATIVE STUDY OF FOUR METHODS OF QUANTIFYING LEFT TO RIGHT SHUNTS IN CONGENITAL HEART DISEASE.
Keiji Nakazawa, Katsumi Ishii, Takeshi Kobayashi, Shoichi Kusano, Shigeharu Horiike, Kazushige Yoda, Takashi Matsubayashi,
Satoru Hiraishi, Hidehiko Nakajima and Kimio Yashiro.
 School of Medicine, Kitasato University, Kanagawa.

A method to detect and quantify left to right shunts using radionuclide angiocardigraphy is a noninvasive, rapid and simple technique.

In 1962, Folse and Braunwald suggested the C2/C1 ratio as a simple index indicating left to right shunts. Thereafter, two different area-ratio methods were developed by Anderson et al. in 1974 and by Maltz et al. in 1973. In 1977, we also reported the height-ratio method (H2/H1 ratio).

In this paper, about each of four methods we compared the results obtained by radionuclide angiocardigraphy with those of oximetry determinations.

Fifty-nine patients were studied. All studies were performed with the patient in supine position under a Nuclear Chicago HP gamma camera interfaced to a Informatek Simis 3 digital computer. A rapid intravenous injection of ^{99m}Tc -pertechnetate from 3 to 6 mCi in amount was performed using saline-flush technique with a three-way stopcock through the antecubital vein. Digitalized data were collected by list mode and stored on magnetic disk for 30 second. Two areas of interest were defined over the right lung field and the superior vena cava using functional image of peak arrival time. A pulmonary time activity curve was obtained about the defined area of interest over the right lung field, then left to right shunt ratios using four methods were calculated.

In the count-ratio method, the correlation coefficient (r) between data by radionuclide angiocardigraphy and those by oximetry determination was 0.893. In the area-ratio method, $r=0.884$. In the gamma-function method, $r=0.90$. In the height-ratio method, $r=0.937$.

Though the height-ratio method showed the highest correlation coefficient among those four methods and the area-ratio method showed the lowest, the differences between those coefficients were not statistically significant.