

13

THE DESIGN CONSIDERATION OF ADAPTIVE FILTER IN AN ALGORITHM OF A FULLY AUTOMATED CONTOUR DETECTION FOR GATED RADIONUCLIDE VENTRICULOGRAPHY. H.Wani and M.Hosoba, Shimadzu Corp. Kyoto, M.Hiroe and K.Kusakabe, Tokyo Women's Medical College, Tokyo.

A Butterworth filter with sharp cutoff frequency is used to improve the signal to noise ratio of the gated pool image.

Statistical noise can be suppressed by attenuating higher frequency component of the image. Parameters of Butterworth filter (cutoff frequency and order) must be chosen to optimize the results for the studies performed at each facilities depending on the noise level. Our approach to optimize is to calculate the normalized power spectra and select the cutoff frequency refer to the spectra. The order of the Butterworth filter is fixed to 8th. Final results of a contour detection are evaluated by calculating the count of ED and ES, and the shape of the contour.

14

STUDY ON EJECTION FRACTION MEASUREMENT BY AUTOMATIC LEFT VENTRICULAR EDGE DETECTION S.Kitagawa, T.Maruyama, K.Koike, Hitachi Medical Corp. and K.Kimura, Y.Kuzumi, H.Omori, Y.Nakamura, Y.Ishida, BH.Kim, Y.Tsuneoka, Osaka Univ. Hospital

Manual ROI has been inevitable for obtaining LV functional parameters from a multi-gated cardiac blood pool image during an equilibrium state. This manual operation causes the reproducibility and accuracy of the results to be degraded. We have succeeded in automatization of ROI setting, whereby the measurement of LV ejection fraction can be fully automated to overcome the above-mentioned drawbacks of the conventional technique, and also the efficiency of routine studies can be improved. This will be presented here. For the automatic edge detection, we studied the following items: (1) Recognition of general LV range from stroke volume image, (2) Noise suppression by filtering, (3) Edge extraction by radial profile analysis from LV gravity, and (4) Edge smoothing by polar coordinate smoothing. For the noise suppression, a bandpass filter of 2-dimensional convolution is adopted to improve the success rate of recognition also for a case with which no sufficient counts can be obtained due to frequent occurrence of arrhythmia, etc. LV edge is extracted by recognizing the pattern of a radial profile and comparing an edge defined by differentiation of the profile from which other than the LV part is removed, with an edge defined by the cut-off method.

15

QUANTITATIVE AUTORADIOGRAPHY WITH SCANNING LASER STIMULATED LUMINESCENCE: BASIC STUDIES. Yoshiharu Yonekura, Michio Senda, Yoshihihsa Nakano, Harumi Itoh, Kanji Torizuka and Kotaro Minato. Kyoto University School of Medicine, Kyoto.

Macroautoradiography (ARG) has been used for studying biodistribution of labeled compounds in small animals with high spatial resolution. Recent development of emission computed tomography requires to study regional distribution of various compounds labeled with short-lived radionuclides in animals preceding by the clinical use. These short-lived tracers cannot provide conventional film analysis system with sufficient information. We have attempted to use scanning laser stimulated luminescence (SLSL), which was developed as a radiographic system, for the analysis of ARG. C-14 graded standards were exposed on the imaging plate with various exposure time, and digitized by SLSL with pixel size of 100x100 micron. These data were transferred to VAX for the further analysis. Linear correlation was observed between the exposure and reading in a broad range. The sensitivity was far better with this system than conventional film although the spatial resolution was a little worse. These preliminary results suggest SLSL is a promising system for the analysis of ARG with short-lived tracers.

16

SUBSTRUCTION OF COMPTON RADIATION IN PLANAR IMAGE USING SCATTER DISTRIBUTION FUNCTION. H.Seto, R.Futatsuya, T.Kamei, N.Furumoto, T.Hihara, K.Taki, M.Asou, Y.Ishizaki, M.Hada and M.Kakishita. Toyama Med. & Pharm. University, Toyama.

Compton scattered radiation reduces both spacial resolution and signal-to-noise ratio, leading degradation of image quality. At present time, however no special attention on scatter correction is being paid in planar image. We use a new technique for scatter correction in planar image and compare this with the other two techniques; two energy windows and asymmetrical window setting.

The method is based on "deconvolution" of scattered events from the measured projected data. The function defining the scatter distribution was determined from measurement with a line source (diameter 1 mm, length 100 mm) filled with a solution of Tc-99m in a rectangular water phantom as well as in air at different distances (2, 5, 10 cm), using a gamma camera interfaced with a minicomputer.

The accuracy of this new method was tested on simple phantoms filled with a solution of Tc-99m in water, using various scatter distribution functions by a pixel base (1.5 1.5 mm). The indicated ratios of the activity concentration in phantoms were nearly the same as the results measured by digital curiemeter. Furthermore image quality was significantly improved with scatter correction.