

Analysis of thallium-201 myocardial SPECT images using fuzzy set theory

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Using the fuzzy set theory, a method was developed for analyzing the extent and severity of ischemia by comparing the exercise and delayed SPECT images with Thallium-201. For each short axial image (slice) for exercise and delayed study, a defect probability matrix (DPM) is created so that it shows the severity of ischemia of myocardium in that slice. Each slice is divided into 8 equi-angle sectors, and the left ventricle (LV) also is divided into 8 equi-angle vertical sectors from apex to base. Using DPMs, the defect probability is calculated for each slice, sectors of each slice and vertical sectors of the LV. The results are displayed on a CRT by means of images, curves and histograms. They show what percentage of the area of each slice and that of the lateral, anterior, septum and inferior portions have how much defect. They provide comprehensive and easily understood information about the condition of the LV in exercise and delayed stages. Persistent and transient ischemia can be diagnosed by visual comparison of patients' curves and histograms with their corresponding normal limits.

Key words: Fuzzy set theory, Defect probability, Thallium-201 myocardial SPECT images, Ischemic heart disease