Analysis of scintigrams by singular value decomposition (SVD) technique

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The singular value decomposition (SVD) method is presented as a potential tool for analyzing gamma camera images. Mathematically image analysis is a study of matrixes as the standard scintigram is a digitized matrix presentation of the recorded photon fluence from radioactivity of the object. Each matrix element (pixel) consists of a number, which equals the detected counts of the object position. The analysis of images can be reduced to the analysis of the singular values of the matrix decomposition. In the present study the clinical usefulness of SVD was tested by analyzing two different kinds of scintigrams: brain images by single photon emission tomography (SPET), and liver and spleen planar images. It is concluded that SVD can be applied to the analysis of gamma camera images, and that it provides an objective method for interpretation of clinically relevant information contained in the images. In image filtering, SVD provides results comparable to conventional filtering. In addition, the study of singular values can be used for semiquantitation of radionuclide images as exemplified by brain SPET studies and liver-spleen planar studies.

Key words: brain, decomposition, factorization, filtering, spleen