

Quantitative Assessment of Active Bone Marrow Distribution by Scintiphotographic Scanning Using ^{99m}Tc Sulfur Colloids

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In order to obtain more precise information for diagnosis and treatment of hematopoietic disorders, active bone marrow distribution was determined quantitatively using ^{99m}Tc -sulfur colloids with scintillation camera by measuring local radioactivity of the functioning reticuloendothelial marrow. Preset count exposure was made on 35mm photofilm with a standard sample of one fifth administration dosis at stepwisely increasing counts levels as well as over the bone marrow area at appropriate count level.

Densitometry of the film of the standard sample at various levels and of each detected part of the marrow was followed by density-counts conversion conforming to a standard curve which standard sample's data formed. Local radioactivity was thus calculated with each exposure time, then standardized by expressing each in percentage to the activity of posterior pelvic area. This relative activity was called marrow uptake index.

Mean values with standard deviation of the

uptake index of various parts in 15 normals over twenty were as follows, 2.2 ± 0.8 on parietal cranium, 15.3 ± 4.2 on upper sternum, 3.1 ± 1.5 on proximal humerus, 1.5 ± 0.6 on the elbow, 20.7 ± 1.7 on lower lumbar vertebrae, 17.4 ± 2.2 on sacrum, 8.6 ± 3.9 on femoral head and 1.6 ± 0.6 on the knee part. Graphic exhibition of these values demonstrates the distribution pattern of the radiocolloids which represents that of the active bone marrow.

In cases of myeloproliferative disorders such as chronic granulocytic leukemia, polycythemia vera or subacute erythroleukemia, and of reactive hyperplasia such as hemolytic or bleeding anemia, remarkable extension pattern to distal extremities was observed with, for instance, the knee uptake index of over 10, the value comparable to or exceeding that of femoral head or pelvic bones. Quantitation of the extent of abnormality thus achieved was also useful in the studies to follow changes induced by the specific treatment such as chemotherapy or splenectomy.