J. Blood and Bone Marrow

Quantitative Assessment of the Active Marrow Distribution by Scintigraphy —Application of Multivariate Analysis to Elucidate the Characteristic Feature—

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Distribution abnormality of the "active marrow" observed in several blood dyscrasias was assessed quantitatively and subjected to multivariate analysis in order to summarize the complexed informations and to elucidate the characteristic feature of pathologic alterations.

The distribution of the active marrow was demonstrated by scintigraphy using ^{99m}Tc sulfur colloid, with the scintigrams being recorded on 35 mm photofilms. Twenty-six marrow portions were selectively identified in the scintigrams with a scinticamera by the preset count mode. By the densitometric technique and density-count conversion, the local degree of radioactivity was calibrated and then expressed in a relative amount to that of the posterior pelvic area in order to standardize the data for comparison among cases. The ratio of pelvic-area activity to the administration dose and that to the liver-area activity were added to the 26 values of local marrow activity and with these 28 explanatory variables multivariate analysis was achieved in 139 studies in 99 cases including 35 nomral controls.

In the control group, the activity of the capitulum femoralis was correlated positively, while that of the middle humerus and that of the skull were correlated negatively to age. The results of principal component analysis revealed two components.

Considering the values of factor loading of each loal activity on these components, it can be assumed that one concerns centralization and the other does periphery extension. In reference to these findings, the centralization process of the active marrow distribution with aging became obvious and was quantitatively evaluated.

When those cases showing several patterns of pathologic alteration were included, the factors of centralization or periphery extension or of hyperplasia or hypoplasia were more clearly figured out. Then the local marrows could be ranked functionally, not necessarily in anatomical manner, from the center to the peripery. We could also recognized the relationship among local marrow activities in which changes in their distribution take place in several dyscrasias. Then simple representative indices were found out for these dyscrasia patterns to express their characteristic features or to be discriminated among them.