XII. Bone and Bone Marrow

Pharmacological and Electron-Microscopic Studies on the New Marrow Scanning Agent, ^{113m}In-Chondroitin Sulfate Colloid

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The preparation of ^{113m}In-colloids with chondroitin sulfate (^{113m}In-ChS) was shown to be one of the best that yield extremely high uptake of the radiocolloids by marrow RES and described elsewhere. The present studies were undertaken to learn its underlying mechanisms by pharmacological and electron-microscopic means.

Rabbits were intravenously injected with various colloidal preparations, and sacrificed at 15 min. Their organ distribution was studied. The highest marrow uptake was observed with ^{113m}In-ChS. In this case liver and marrow took up 50 and 30% of the given dose respectively, while 96 and 3% respectively with ^{198}Au. When ratio of cpm per gram of marrow to that of liver (M/L) was computed, it was 1.02 with ^{113m}In-ChS and 0.26 with ^{198}Au.

Immediate pharmacological effects of ChS upon the colloidal phagocytosis of RES were examined by injecting the agent intravenously prior to administration of the test colloids. Least changes in M/L ratio in individual preparations were seen.

Effects of ChS and a prior RES-feeding with carrier-dose non-radioactive In-ChS upon hepatic and marrow blood flow rates were studied at 15 min post-injection. Hepatic flow was estimated from disappearance of ^{113m}In-colloids of Wagner from blood, and that of marrow, from ^{113m}In-EDTA washout from the iliac marrow. Neither was affected.

Colloidal particle size was estimated on electron-microscopic photographs. Particles of ^{113m}In-ChS were rather uniform in size, and their average diameter was 11.2 mμ. Those of ^{113m}In-gelatin and ^{198}Au-colloids revealed similar values, but were less uniform.

The high marrow uptake of ^{113m}In-chondroitin sulfate is concluded not to be related to the pharmacological effect of chondroitin sulfate, but to the physicochemical properties of the colloids per se.