The use of quantitative scintigraphy in the measurement of portal-systemic shunting in rats

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Portal-systemic shunting was studied in 54 portal hypertensive rats both in vivo and in vitro using radioactive microspheres. The animals underwent partial portal vein ligation around needles of varying diameter to produce a wide range of shunting. Two to four weeks later, quantitative lung-liver scintigraphic and whole body images were obtained in vivo following ileocolic vein injection with 99mTc-MAA. After sacrifice, the lung and liver activities were determined by the gamma camera, a dose calibrator, and a well counter. Portal-systemic shunting ranged from 0.1–97.6%. When shunting was compared in vivo and in vitro, an excellent correlation was found (r=0.99, p<0.001). A subgroup of 24 animals had consecutive injections of 99mTc-MAA and 51Cr-labeled 15 μm microspheres, which, although different in size, yielded similar results (r=0.89, p<0.001). We conclude that in small laboratory animals a wide range of shunting can be measured accurately in vivo by quantitative scintigraphy.

Key words: portal hypertension, portal vein ligation, portal-systemic shunting, microspheres, 99mTc-MAA, quantitative scintigraphy