potential value of angiography has not been fully exploited in the quantitative measurement of the shunt flow of the arteriovenous malformations. For the purpose of quantitative measurement of the shunt flow of the arteriovenous malformation, a new radioisotopic technique using ^{131}I labeled macroaggregated human serum albumin (MAA) has been developed.

^{131}I-MAA was percutaneously injected into the common carotid artery of the patient with arteriovenous malformation on the affected side. Because of its particle size (20~100 micron), some amounts of ^{131}I-MAA can not pass through the capillary vessels and will lodge in the hemisphere while others transit the arteriovenous anastomosis and will lodge in the capillary vessels of the lungs finally.

After the carotid injection radioactivity of the skull and lungs was measured with the wide angle collimated scintillation detector. The blood flow through the arteriovenous shunt can be calculated from the following equation in terms of percentage of the total blood flow in the one side of the common carotid artery.

$$\text{relative shunt flow} = \frac{f \times L}{S + f \times L}$$

where S and L mean the radioactivities of the skull and lungs of the patient after carotid injection of ^{131}I-MAA and f is a calibration factor which is obtained from the angiographically normal subject and was calculated as follows:

$$f = \frac{S_1}{L_2 - L_1}$$

where, S_1 is radioactivity of the skull after intracarotid injection and L_2-L_1 is the net radioactivities of the lungs as a result of intravenous injection of the same dose.

Seven cases of arteriovenous malformation were investigated by means of this method. Technical details and results were presented and hemodynamic aspects of arteriovenous malformations were discussed in comparison with angiographic findings.

The Relationship between the Circulation and Disease of the Stomach

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The gastric blood flow and its distribution in rabbit and human were measured by means of scintiscanning and measurement of radio activity of ^{131}I-MAA administrated into the abdominal aorta.

The scintigram of rabbit and human have shown the difference of distribution of blood flow between antrum and corpus, and between anterior and posterior wall of corpus. The surrounding region and peripheral tissue of stomach cancer have been observed the abundant distribution of blood flow.

The gastric scintigram by RISA does not show the difference of distribution of ^{131}I between the antrum and corpus. The difference of distribution of gastric artery is not observed by means of angiography by softex. The size and distribution of mucosal capillary measured histologically is about the same between antrum and corpus.

The average stomach weighing approximately 28.4 g consisted of mucosa (51.4%) and muscularis (48.6%). The mean distribution of ^{131}I-MAA in mucosa was 71.4% and muscularis 28.6%. The gastric wall was weighed: antrum 23.3% and corpus 76.7%, the latter being partitioned between the gastric wall in the proportoin: anterior 40.6% and posterior 36.0%. The mean distribution of ^{131}I-MAA was found: antrum 20.1%, anterior corpus 47.6% and posterior 32.3%.

The response of the gastric blood flow to drug has been studied. Gastrin tetrapeptide affects the distribution of blood flow in the stomach, in which the blood volume shift from antrum to anterior wall of corpus.

Suggested conclusions include the following:

(1) The distribution of gastric blood flow are maximum in the anterior wall of corpus

and minimum in the antrum, (2) Gastrin tetrapeptide affects the distribution of blood flow in the stomach, thereby the warp of flow are stimulated by agents or stress, (3) The incidence of peptic ulcer are caused by the warp of blood flow in the gastric mucosa, (4) Mucosal capillraies play a quantitatively significant role in the control of gastric circulation, (5) The gastric scintigram by ^{131}I-MAA is available for the diagnosis of stomach cancer.

Hemodynamic Studies of the Abdominal Organs by the Use of ^{131}IMAA and ^{85}Kr

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1) Splenic blood flow was measured in 29 patients (5 controls and 24 patients with portal hypertension or splenomegaly) by the use of ^{85}Kr clearance method. In 5 control cases, the average splenic flow per 100 g tissue weight (SBF100g) was 118.6±29.1 ml./min. and total splenic flow (SBFt) was 145.8±14.2 ml./min. and SBFt remained in normal range (159.5±58.7). In other patients with gross splenomegaly such as idiopathic portal hypertension (10 cases), Wilson's disease (2 cases) liver cirrhosis with splenomegaly (2 cases) and extrahepatic portal obstruction (2 cases) SBF100g were mostly remained in normal range. Consequently, SBFt in these disorders showed conspicuous increase largely in proportion to the spleen size. This increase of the splenic blood flow can not be explained by the portal congestion. And the increase of the SBFt was suggested to be a potential factor for the development of portal hypertension in these disorders. Also the enlargement of the spleen accompanied by the proportionally increased splenic blood flow suggested the proliferative process for the development of the splenomegaly in these disorders.

2) The intrasplenic injection of ^{131}I-MAA and following scintiscanning of the liver and lungs (shunt scintigram) permit the semi-quantitative evaluation of the shunt ratio of the splenoportal system. By this method, 50% of shunt ratio in average in 29 patients with liver cirrhosis, and 28% of shunt ratio in 10 patient with idiopathic portal hypertension were found. Consequently, the portal flow of idiopathic portal hypertension is considered to be increased, although it was previously reported to be decreased by the intrahepatic portal obstruction.

3) The perfusion scintiscanning by the intravascular introduction of ^{131}I-MAA, provides useful informations concerning the circulatory pattern of the liver in hepatic neoplasm. Malignant liver tumor (primary or metastatic) has been shown to be predominantly perfusued by the hepatic artery resulting in the formation of regional separation of blood flow partition of the two afferent vessels into the liver.

4) Intra celiac arterial introduction of ^{131}I-MAA is useful for the diagnosis of the arterial systemic venous communications in various disorders. One case with liver cirrhosis and hepatoma and another case with stomach varices of unkown origin showed the accumulation of radioactivity in the lungs indicating the presence of arterial portal and portal systemic venous shunts, which was comfirmed later by autopsy and operation.