Intestinal Blood Flow Measurements Using Xe-133 Clearance Technique in Man

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The use of Xe-133 external counting technique seemed well suited to the estimation of functional perfusion rates in the gastrointestinal tract. The purpose of this investigations is to make comparative blood flow measurements of various segments of the intestines in both physiologic and pathologic conditions.

Studies were carried out on 25 cases, such as colon carcinoma, radiation enteritis and various intestinal disorders. First, arteriography was performed using Seldinger's technique. Second, after performing the angiography 3 to 5 m Ci per 3 ml were counted for 10 minutes employing a scintillation camera (Picker Dyna, Model 2 C). Data were calculated using a newly developed digital computor program (NEAC type 2200–150 was used).

The following results were obtained. In 12 normal subjects, the jejunum had the highest blood flow per unit mass (70 ml/100 g/min.). The rectum was less than half as well perfused. The remainder of the tract, covering ileum, cecum, assending, transverse, descending and sigmoid colon to the rectum showed a progressive decrease. In 4 cases of colon cardinoma and 3 cases of radiation enteritis, the regional blood flow of the invaded portion was significantly increased about 30 to 50%. However, the definite blood flow gradient through the small and large intestine was not observed in 2 cases of peritonitis.

Our computer program indicated that the Xenon clearance curve from the intestine might be expressed as three components in majority of cases studied in our hospitals. It would seem to represent a mucosal-submucosal flow, muscle layer flow and mesenteric fat layer flow, respectively.

With the results of this study, it will enable to proceed the future studies to examine the effect of drugs on the intestinal diseases and also make it possible to correlate intestinal circulation with functions such as absorption, secretion and motility.