Measurement of Pancreatic Blood Flow with $^{133}$Xe Clearance Method in Dogs

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A new technique to measure the pancreatic blood flow with $^{133}$Xe clearance method was reported. Using the adult dogs, a thin catheter was inserted to the branch of the pancreaticoduodenal artery, into which 300 $\mu$Ci of $^{133}$Xe solution was delivered. The wash-out curve obtained from the uncinate portion of the pancreas consisted of two components, $T_{1/2}$ of which was 22 ± 3.3 seconds and 237 ± 106 seconds, respectively. Partition coefficient between blood and pancreas tissue ($\lambda$) measured by our Conn's modified method was 0.62 ± 0.05. Consequently, the pancreas blood flow estimated by the first component of the clearance curve was 117.2 ml/100 tissue·min. In order to evaluate these results, radioactive microsphere method using $^{85}$Sr microspheres was applied. By means of the latter technique, estimated blood flow in the same portion of the pancreas was 96.2 ml/100 tissue min., which appeared to be fairly correspondent to the results determined by $^{133}$Xe clearance method.

As is well known, exogenously administered secretin gives rise to increase in the pancreatic blood flow. Both 0.5 and 3.0 units per kilogram of body weight of secretin was respectively administered in the dogs with normal pancreas and 60% pancreatectomy. In the latter, the pancreatic blood flow after secretin stimulation showed remarkable increase in comparison with that in the untreated pancreas. Secretory rate of the pancreatic juice following administration of each dose of secretin was also much enhanced in the 60% pancreatectomized dogs. These data suggest the facts that there is the close relationship between exocrine function and blood flow not only in the normal pancreas but in the remnant pancreas after pancreatectomy.

Determinations of Peripheral Blood Flow of Legs in Patients with Diabetes Mellitus by $^{133}$Xe Clearance.

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$^{133}$Xe saline solution was injected rapidly into femoral artery in normal subjects and in patients with diabetes mellitus. $^{133}$Xe clearance curves were recorded by scintillation counter placed on toes of these subjects. The curves were plotted semilogarithmically and were resolved by the peeling procedure into three components. The mean blood flow (MBF, ml/100g/min.) in toes was calculated as follows: $\text{MBF} = 100 \times \lambda \times \text{Km}$, where $\lambda$ is the tissue blood partition coefficient and Km is the mean fractional disappearance rate of $^{133}$Xe. Furthermore, in some subjects studied in