KIDNEY FUNCTION AND BLOOD FLOW IN THE EXPERIMENTALLY DIABETIC RAT

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Diabetic nephropathy is still a common cause of death in late diabetes mellitus. Because of this fact the study of the changes in renal structure and function which take place early in the disease is very important. These changes are thought to be the forerunner of more advanced disease which leads to renal failure. Recent workers on human diabetes have reported an increase in glomerular filtration rate (G.F.R.) (Mogensen, 1972) early in the disease but their reports are in conflict as whether this increase is due to a decreased or increased renal plasma flow (R.P.F.) (Mogensen, 1972; Ditzel & Junker, 1972). Changes in the size of the kidney were also reported to be responsible (Mogensen & Anderson, 1973). This work attempts to verify these facts in experimental diabetes and to study the effects of the two diabetogenic agents alloxan, and streptozotocin,on kidney function.

Rats of 200 g body weight were made diabetic by either alloxan (50 mg/kg, i.v.) or streptozotocin (60 mg/kg, i.v.) and tests were performed at different stages of diabetes up to 60 days. Changes in kidney size were followed at all stages and both creatinine and inulin clearance tests were used to measure G.F.R. Blood Flow to the kidney was measured by the radioactively labelled microsphere technique (Foy & Lucas, 1977).

The results confirm the high G.F.R. noticed in human diabetes and figures up to 3 times those of the controls were found in 60 days diabetic rats. A significant increase in kidney size was noticed very early after treatment with the diabetogenic agents and seem to progress with the duration of the disease up to nearly double the size of the controls kidneys.

Blood flow to the kidneys was unchanged as a proportion of cardiac output but when calculated as a fraction of the unit weight was significantly reduced in all stages of experimental diabetes.

It is suggested that in the diabetic animal increased G.F.R. is a consequence of both increased kidney size and lack of similar increase in renal blood flow. The results also show that the kidney functions well during this period of diabetes although the reduced blood flow to the kidney may indicate the growing tendency to atherosclerosis in renal vessels.

Alloxan and streptozotocin in diabetogenic doses seem to have no direct effect on kidney function.

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