

Insulinogenesis in genetically obese homozygous fa/fa and lean Fa/Fa rats

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Hyperinsulinemia is one of the profound characteristics in the genetically obese rats. This study has been performed to assess the insulin secretory process in obese and lean rats. Twelve week old obese homozygous fa/fa (n=14) and lean Fa/Fa (n=12) female rats were used. Rats were fed Purina chow and water *ad libitum*, and were maintained in a 14 hr light-10 hr dark cycle, at a temperature of $21 \pm 2^\circ\text{C}$. They were divided into the central nervous system-intact (INT) and ablated (ABL) groups. The mean body weight of the obese rats ($309 \pm 7\text{g}$) was significantly greater ($P < 0.001$) than that of the age-matched lean ($215 \pm 4\text{g}$) rats. Within the same genotype, mean body weights of the INT group and the ABL group were comparable. Pancreatic secretory process was stimulated with 200 mg/dL glucose solution for 60 min. Amount of pancreatic insulin before (PI_{init}) and after (PI_{final}) glucose stimulation, as well as total insulin release (TIR) during the 60 min were measured using radioimmunoassay. It has been found that PI_{init} per one gram pancreas from obese rats was 1.47 times greater than that from lean rats ($P < 0.05$), and there was no difference between the INT and ABL group. Similarly, PI_{final} per one gram pancreas from obese rats was 1.52 times greater than that from lean rats ($P < 0.05$), and there was also no difference between the INT and ABL group. TIR per one gram of pancreas from obese rats was significantly greater than that from lean rats ($P < 0.05$). TIR of the INT and ABL group in the obese rats were 51.5 ± 6.7 and $40.3 \pm 6.5 \mu\text{g/g}$ pancreas, respectively. Meanwhile, TIR of the INT and ABL group in the lean rats were 6.1 ± 0.5 and $11.4 \pm 1.0 \mu\text{g/g}$ pancreas, respectively, and there was a significant difference between these two groups ($P < 0.001$). The amount of insulinogenesis was 24.49 times greater in obese INT rats than in lean INT rats, and 1.42 times greater in obese ABL rats than in lean ABL rats. The present research indicates that insulinogenesis capacity and insulin secretion are greater in obese fa/fa rats than in lean Fa/Fa rats. Therefore, both of insulinogenesis and secretory process seem to be important contributing factors to the hyperinsulinemia in the obese fa/fa rats.