
Abstract
To explain impaired intravenous glucose clearance in zinc-deficient rats, various parameters of insulin metabolism were measured. Three levels of dietary zinc were fed (1, 20, 1,200 ppm). To help distinguish between effects caused by zinc deficiency per se and inanition which accompanies zinc deficiency, a pair-fed control group (20 ppm) was included in some studies. Feeding of high or low zinc diets did not alter the insulin content of the pancreas, but immunoreactive serum insulin and total serum insulin-like activity measured by an in vitro adipose tissue assay were significantly reduced in the zinc-deficient group compared with ad libitum controls. The pair-fed control group also showed significantly reduced circulating immunoreactive insulin but not total serum insulin-like activity. High zinc diets did not affect serum insulin levels. In vitro studies of the release of pancreatic insulin during short incubation periods with glucose as a stimulant indicated that significantly less immunoreactive insulin as well as insulin-like activity was released by pancreata from zinc-deficient rats compared with pair-fed and ad libitum control rats. The pair-fed group, however, showed a significantly decreased release of pancreatic insulin compared with ad libitum-fed controls. Feeding of a high zinc diet did not affect the release of immunoreactive insulin but the release of total insulin-like activity was significantly increased above the ad libitum control value. The response of epididymal adipose tissue to insulin was significantly increased in zinc-deficient rats compared with ad libitum controls but not affected in rats fed the high zinc diet.