No Decrease of the β-Cell Mass in Type 2 Diabetic Patients

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BACKGROUND AND AIMS

Both insulin resistance and a β-cell defect contribute to type 2 diabetes. The nature of this β-cell defect is unknown, and the eventual role of a β-cell mass decrease remains controversial, probably due to differences in methodology, sampling, and ways of expressing the results between the studies. Only total β-cell mass per pancreas has been thoroughly evaluated. The oldest studies did not distinguish between type 1 and type 2 diabetes, and in many cases, they only considered small groups of patients. The present study aimed to quantify total β-cell mass in a large series of diabetic patients in relation to obesity and treatment.

MATERIALS AND METHODS

Total β-cell mass, proinsulin, and relative insulin content were evaluated in pancreata obtained at autopsy from 39 type 2 diabetic and 28 normoglycemic patients on consecutive sections stained by hematoxylin-eosin, proinsulin, and insulin antibodies. Total β-cell mass was calculated from the weight of the pancreas and from the β-cell volume density measured by point counting, and the relative insulin content was evaluated by insulin immunodensitometry. Diabetic patients were subdivided into four groups according to their BMI (> or <25 kg/m^2) and their eventual insulin requirement.

RESULTS

Pancreatic weight was significantly lower in the group of lean insulin-requiring type 2 diabetic patients than in others. β-Cell volume density and insulin content were similar in all groups. Mean total β-cell mass did not significantly differ in normoglycemic and type 2 diabetic patients when not subdivided according to the treatment. However, it was significantly lowered in obese and lean type 2 diabetic patients who required insulin treatment. Whether this is the cause or the consequence of the insulin treatment is uncertain. Proinsulin synthesis was still active in islets of type 2 diabetic patients.

CONCLUSIONS

Because β-cell mass was preserved in 82% of type 2 diabetic patients, and because β-cell insular stock and cellular synthesis capacity were maintained, it is likely that the pathogenesis of type 2 diabetes results from an abnormal coupling of the insulin secretion to glycemia rather than to a significant β-cell loss.

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