Specific gene expression in pancreatic beta-cells: cloning and characterization of differentially expressed genes.

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Abstract
Identification and characterization of genes expressed preferentially in pancreatic beta-cells will clarify the mechanisms involved in the specialized properties of these cells, as well as providing new markers of the development of type 1 diabetes. Despite major efforts, relatively few beta-cell-specific genes have been characterized. We applied representational difference analysis to identify genes expressed selectively in the pancreatic beta-cell line betaTC1 compared with the pancreatic alpha-cell line alphaTC1 and isolated 26 clones expressed at higher levels in the beta-cells than in the alpha-cells. DNA sequencing revealed that 14 corresponded to known genes (that is, present in GenBank). Only four of those genes had been shown previously to be expressed at higher levels in beta-cells (insulin, islet amyloid polypeptide, neuronatin, and protein kinase A regulatory subunit [RIalpha]). The known genes include transcription factors (STAT6) and mediators of signal transduction (guanylate cyclase). The remaining 12 genes are absent from the GenBank database or are present as expressed sequence tag (EST) sequences (4 clones). Some of the genes are expressed in a highly specific pattern-expression in betaTC1 and islet cells and in relatively few of the non-beta-cell types examined; others are expressed in most cell types tested. The identification of these differentially expressed genes may aid in attaining a clearer understanding of the mechanisms involved in beta-cell function and of the possible immunogens involved in development of type 1 diabetes.