

Topographic Localization of Islet Cells of Rat Pancreas

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Abstract

Microscopic studies were performed on the islets of langerhans of the rat. Three types of islet cells were distinct. Alpha cells were differentiated at the margins of the islets. Beta cells were numerous and centrally located. Delta cells were distributed among alpha and beta cells.

Introduction

Pancreas is a compound acinar gland that resembles the parotid gland in its microscopic appearance (1). The lobules of the pancreas contain acini that secrete a variety of digestive enzymes and islets of langerhans which produce peptide hormone-secreting substances. Histochemical study of islets of langerhans becomes more widely accepted and careful evaluation of adult pancreatic tissues stained showed three distinct cells types (2,3,4,5,6). The present work indicates the profitable use of some Histochemical methods to determine the topographical localization of islets cells of rat pancreas.

Materials and methods

The pancreatic lobes were excised immediately from six rats. Pieces of pancreatic tissue were fixed in Bouin's fluid and blocks were serially sectioned at five micrometers, processed and stained with aldehyde fuchsin and chrome alum hematoxlin phloxin, for microscopic study (7).

Result

The information concerning the histology of rat pancreatic islets under normal circumstances had been obtained from examination of section stained with selective

histological methods which give reproducible results.

The staining of the islets cells was predominantly cytoplasmic and different cells, types of the islets could be distinguished on the basis of staining. The islets were usually elliptical or circular in shape and were separated from the exocrine portion by an extremely thin collagenous capsule. Adult rat pancreatic islets stained with aldehyde fuchsin or chrome alum hematoxilin phloxin stain displayed arrangements of alpha and beta cells (Fig. 1). The alpha cells were occurred as single cells or small groups distributed around the periphery of islets. Alpha cells were stained green yellowish with aldehyde fuchsin and bright red with chrome alum hematoxlin phloxin stain. Beta cells were mostly confined to the center of the islets, appear relatively more numerous cell type in the islets than the peripherally located alpha cells, and had a round or oval nuclei. Beta cells stained deeply purples when were stained with chrome alum hematoxilin phloxin stain. Delta cells were roughly spherical or polygonal in shape and weakly stained compared with that of alpha and beta cells.

Discussion

Histochemical study of rat pancreatic islets could help to distinguish the different cell type by using special stains. Thus there

was a peripheral of alpha cells, central aggregation of beta cells and mainly single of delta cells were found among both alpha and beta cells. Delta cells were also found at the islets periphery, but less frequent than alpha cells. These finding were in agreement with those finding of Findlay and Thomas in the Mongolian gerbil (8). Indeed, various methods were widely present for the identification of islet cells. Distinction between alpha and beta cells was made possible in animals by the selective necrosis of beta cells following alloxan injection (9).

Furthermore, it had recently been proposed that there are two types of alpha cells and the differences existed between the two types is according to the localization within the islets and the size and eccentricity of their nuclei. This is the pattern observed by Al-Ani and Ferreira (10,11) in rat. No evidence to support this view was obtained.

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Fig. 1 : Islet of langerhans of the rat which shows :-

- 1- Alpha cells that tend to be distributed towards the periphery of the islets.
- 2- Beta cells were confined to the center of the islets.
- 3- Delta cells were found among alpha and beta cells chromes alum hematoxylin\phloxin method x500.