of injury to the parenchyma was reduced, possibly in connection with activation of Kupffer macrophages [3]. The results indicate that prodigiosan stimulates the ingestive function of the Kupffer cells, as shown by the twofold increase in the rate of elimination of colloidal ^{198}Au from the blood of rats stimulated by prodigiosan compared with that of unstimulated animals. Meanwhile, migration of precursors of Kupffer cells into the liver is intensified by prodigiosan [4]. This effect is probably linked with the much greater accumulation of Kupffer cells in the intact areas of the liver parenchyma in the stimulated rats during the stage of acute hepatitis. On the other hand, under the influence of bacterial polysaccharide, monocytic infiltration was stimulated in the period preceding collagenization of the stroma. The process of fibrogenesis and the development of cirrhosis as a whole were appreciably retarded. Is there a relationship of cause and effect between monocytic inflammatory infiltration in the period of acute reactive structural change in the stroma of the liver and its subsequent collagenization? The results of the present experiments are in favor of a positive answer, although the internal nature of this relationship is not yet clear. It can be tentatively suggested that the slower development of fibrosis during stimulation by bacterial polysaccharide is connected with the accumulation of cells delaying fibroblast proliferation in the zone of inflammatory infiltration and (or) the absence of cells potentiating their collagen-forming function. The possibility cannot be ruled out that activated hepatic macrophages resorb collagen more effectively and destroy the collagen fibers as a result of intensified secretion of collagenolytic enzymes [2].

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NUMBER OF CELL TYPES IN RAT PANCREATIC ISLETS

A. V. Bykov

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Despite many investigations of the cell composition of the endocrine part of the mammalian and human pancreas, this problem is far from its final solution [4]. The apparent diversity of types of endocrine cells found by different workers in the pancreas can be basically reduced to four generally accepted ultrastructural types of endocrine cells: A, B, D, PP. However, in the literature reports have sometimes been published indicating that the pancreas of certain mammals (horse, dog, guinea pig, opossum) may contain other morphological types of endocrine cells, such as X, F, and G which, in the opinion of the authors cited, are independent types [2, 3, 5, 7]. Data on the presence of six types of endocrine cells, for which the hormonal profile has been determined [9], are particularly interesting in this connection. These data suggest that in other mammals types of insular cells may be more widely represented.

Department of Histology and Embryology, Faculty of Internal Medicine, N. I. Pirogov Second Moscow Medical Institute.

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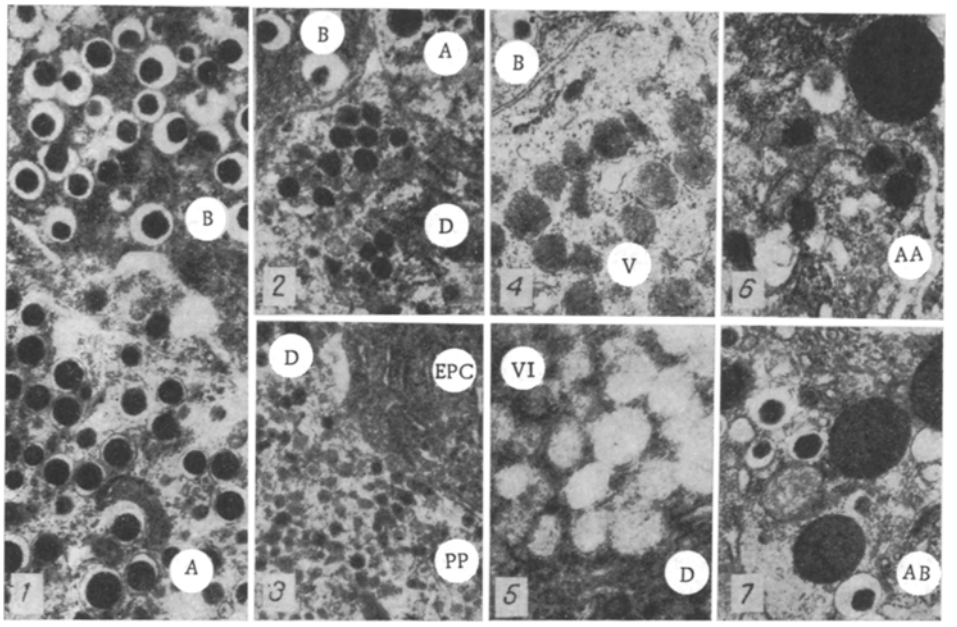

Fig. 1. Types of endocrine and acinar-islet cells in pancreatic islets of rats. 10,000 ×. EPC) Exocrine pancreatic cell. Remainder of explanation in text.

TABLE 1. Relative Percentages of Different Types of Cells in Pancreatic Islets and Five of Their Secretory Granules

Type of cells	Size of secretory granules (M ± m), nm	Frequency of cells, %
A	280±5.9	19.8
B	275±7.0	71,6
D	158±5.7	6,6
PP	98±4.9	0,7
V	315±6.9	0,5
VI	398±5.4	0,4
AA		0,1
AB		0,3

Legend. Total number of cells examined was 680.

In view of the contradictory nature of existing information on the number of types of endocrine cells in the composition of mammalian pancreatic islets it was decided to study the cell composition of the rat pancreatic islets in more detail.

EXPERIMENTAL METHOD

Experiments were carried out on 45 male albino rats weighing 120-320 g. The animals were decapitated. Pieces of pancreas for electron-microscopic investigation were prefixed in 2% glutaraldehyde, fixed in osmic mixture [6], and embedded in Epon-Araldite [10]. Ultrathin sections were cut on the LKB III Ultratome, stained, and examined in the HEM-100B electron microscope. For objective evaluation of cell types in the pancreatic islets the diameter of 100 secretory granules of each type was determined on plates obtained with a magnification of 10,000 times; an ocular-micrometer was used for measuring. The results were subjected to statistical analysis.

EXPERIMENTAL RESULTS

The four generally accepted types of endocrine cells (Fig. 1: 1-3) could be identified in the composition of the pancreatic islets at the submicroscopic level, with the B-cells the most numerous of them, followed in second place by the A-cells; D and PP cells were seen

much less frequently (Table 1). Cells of this last type also were found among the exocrine pancreatic cells. Besides the types of endocrine cells mentioned above, cells conventionally described as of the V type were found extremely infrequently (0.5%) in the islets; these cells contained numerous large secretory granules (315 ± 6.0 nm), with contents of average electron density, in close proximity to the limiting membrane (Fig. 1: 4). Organelles in these cells were very poorly developed. This type was located in the central part of the pancreatic islet, in the immediate vicinity of the B cells. Cells which were described as type VI endocrine cells were detected less frequently still (0.4%) in the composition of the islets. The largest secretory granules (398 ± 5.4 nm), with contents of extremely low density, so that they appeared like empty, inflated membranous saccules (Fig. 1: 5) were present in their cytoplasm. These cells were arranged nearer to the peripheral part of the islet, on the boundary between the A and B cells, where D cells are most frequently found. Besides the cells mentioned above, the pancreatic islets also included acinar islet cells containing zymogen granules and A granules [type A(AA)] [1], and also acinar-islet cells of type B (AB), whose cytoplasm contains both exocrine secretory granules and B granules (Fig. 1: 6, 7). Cells of this last type were found more frequently (Table 1). Both types of cells were located at the periphery of the islet. No acinar-islet cells containing other types of endocrine granules were found.

The results of this investigation thus showed that at the submicroscopic level six different types of cells can be distinguished in the endocrine portion of the rat pancreas: Besides the four generally accepted types [8] cells of another two types are occasionally found. Since they differ considerably from the other types mentioned above in their ultrastructural organization and in the size of their secretory granules, as well as in the frequency with which they occur, there is reason to regard them as independent morphological types and not as the structural reflection of differences in the functional state of the islet cells. Support for this view is based on the principle that submicroscopic characteristics are all important when determining types of endocrine cells of the gastroenteropancreatic system [8]. However, the final solution to this problem must await determination of the hormonal profile of the cells described above.

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