



# Histological, histochemical and ultrastructural characterization of the pancreas of the grass carp (*Ctenopharyngodon idella*)

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## Abstract:

The purpose of this study is to describe the histological, histochemical and ultrastructural features of pancreas of the grass carp (*Ctenopharyngodon idella*), one of the common herbivorous freshwater fish of Egypt. The pancreas is divided into exocrine and endocrine portions. Exocrine pancreatic tissues consists of scattered serous acini, and is observed in two forms: 1) disseminated in the spleen tissue, in mesentery around intestine and intestinal bulb, and 2) intrahepatically, around the branches of the portal vein. Two alveolar cell types are present in pancreatic acini; centroacinar cells and typical pyramidal acinar cells. Pancreatic stellate cells (PSC) are demonstrated in the perivascular and the periacinar space of the pancreas. The pancreatic acini gave positive reaction to PAS, Best's carmine, and osmium tetroxide, and negative to alcian blue. The acini also show high lipase and alkaline phosphatase activity, and moderate activity for acid phosphatase. Scanning electron microscopy show apical microvilli of the acinar cells, and branched PSC extend their processes between the pancreatic cells. Ultrastructure of pancreatic acini reveals well-developed rER, membrane-bound zymogen granules, and abundant lipid droplets. The duct system is composed of intralobular duct, interlobular pancreatic duct and main duct opened in the intestinal bulb. The endocrine parts of the pancreas are organized as lightly staining Langerhan's islets between exocrine acinar cells found in the liver, in mesenteries around the intestinal bulb and the intestine, and consisted of three cell types. Alpha cells were the most dominant cells, and were ovoid in shape. Beta cells were polyhedral in shape, and they grouped in small clusters. Delta cells were small fusiform, argyrophilic cells. In conclusion, the present study revealed that the exocrine portion of the pancreas of the grass carp had two forms, disseminated and intrahepatic, with characteristic cellular and histochemical components, and an endocrine portion that consisted of Alpha, Beta and Delta cells.

## Keywords:

Hepatopancreas □ Grass carp □ Histochemistry □ Ultrastructure □ PSC

## Published In:

European Journal of Anatomy, 19(2), 145-153