A Histochemical Study of the Visceral Organs in Malnourished Rat

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Histochemical demonstrates of malnourished rat and controls were studied for SDH, ACPase, G6Pase and Peroxidase activity in the liver, stomach, duodenum, large intestine, kidney, cardiac muscle, gastrocnemius muscle, and diaphragm.

Liver: ACPase activity of the pericanalicular parenchymal region in the hepatic cell of the malnourished rat showed an increase and the enlarged granules were dispersed in the hepatic cytoplasm. SDH activity in the hepatic cell was moderately decreased. G6Pase activity was diffusely increased.

Kidney: ACPase activity was increased in the cytoplasm of tubular cell and dispersed in small granules. G6Pase activity was increased in the outer cortex of the tubular cell, especially in the apical region.

Duodenum: ACPase activity was decreased in the malnourished epithelial cell, appearing as irregular-sized granules localized in the juxtanuclear region. SDH activity showed an overall decrease in the basal and apical regions. Peroxidase activity was decreased in the eosinophilic leucocytes of the submucous layer.

SDH activity was decreased in stomach, cardiac muscle, gastrocnemius muscle, and diaphragm.

Studies on Normal and Regenerating Mast Cells, Using Electron Microscopic Acid Phosphatase Reaction and Alcian Blue-Safranin Stain

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Mast cells of normal rats showed acid phosphatase(AcP) reaction in the Golgi area, in the cytoplasmic matrix between the specific granules and occasionally on the surface of granules. Usually no reaction was found within the granules. Mast cells had occasionally a few granules with the positive reaction. These granules had a fine reticular structure, in contrast to compact appearance of AcP negative granules. With alcian blue(A1B1)-Safranin(Saf) stain almost all mast cells of normal rats were stained with Saf, but not with A1B1. A few mast cells had A1B1 positive granules of varying number. In the regenerating mast cells which began to appear one week after an intraperitoneal injection of distilled water, almost all granules were stained with A1B1, but not with Saf. Two weeks

after the injection there appeared many mast cells. Among these cells there were cells only with A1B1 positive granules, cells only with Saf positive granules and cells with both types of granules. AcP reaction in this stage showed cells in which almost all granules were compact and AcP positive, cells in which almost all granules were fine reticular and AcP negative, and cells with both types of granule. From these results it seems that AcP negative and compact granules are Saf positive and A1B1 negative, and AcP negative and coarse granules are A1B1 positive and Saf negative. Further it was suggested that with an increase of the reaction within the granules the content of granules becomes fine reticular and with subsequent decrease of reaction the content appears to be degraded. This sequence of change seems to indicate the secretion process of content of granules of mast cells. In this process AcP may play an important role. The large number of AcP positive granules of regenerating mast cells will indicate an active secretion which contributes to restore the normal ascitic condition.

Histochemical Demonstration of Rat Liver Fructose-1,6-diphosphatase

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The light microscopic demonstration of the activity of fructose-1,6-diphosphatase(FDPase) in the rat liver tissue was done by employing the Taketa and Pogell's coupling assay system using nitro-blue tetrazolium(NBT) as hydrogen accepting reagent. Male Sprague-Dawley rats were killed by blows on the head and exangunation. Small blocks of liver were frozen in the isopentane well kept in dry ice acetone. Fresh frozen sections(8 μ) were prepared in a cryostat and immersed in a cold acetone for 30 min at $-20°C$. The sections were incuvated for 30 or 60 min by overlaying the incuvation medium containing 50 mM Tris-HCl, pH 7.5, at 25°C., 10 mM $MgCl_2$, 10 mM KCN, 0.3 mM NADP, 2.8 U/ml PGI, 3.5 U/ml G6PDH, 0.4 mg/ml NBT, 0.5 mM FDP and 2% gelatine. For the blank staining the substrate was omitted from the standard incuvation medium.

The activity of FDPase was demonstrated homogeneously distributed in the lobule as a dark blue deposition of the formazan in the liver cell. The deposition was not obtained when any one of the following components was lacking in the developing solution(FDP, Mg^{++}, NADP, G6PDH, PGI). The concentration above 0.4 mM 5'-AMP in the developing solution almost completely inhibited FDPase activity as observed in the kinetic study.

The results strongly suggested that the deposition of the formazan appeaed to represent the FDPase activity in the rat liver tissue at the neutral pH.