Glucagon-Like Immunoreactivity (GLI) in Blood Plasma of Partially Hepatectomized Rats

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The concentration of substances with glucagon-like immunoreactivity (GLI) was determined in arterial blood plasma of rats up to 4 weeks after partial hepatectomy. 10 h following surgery a more than 18-fold increase in GLI + glucagon immunoreactivity could be observed. About 2/3 of the maximum activity seems to be of non pancreatic origin. The levels returned to normal about 22 h after surgery.

There is major evidence that glucagon is related to the regulation of liver cell proliferation, glucagon's effect being mainly directed to the hepatocyte [1, 2]. Liver cell proliferation is stimulated by glucagon on its infusion into rats in combination with triiodothyronine, amino acids and heparin [3]. Furthermore, a 5-6-fold increase in immunoreactive glucagon (IRG) could be detected in rat plasma 12 h after partial hepatectomy [4]. However, if glucagon was infused in a certain rhythm during the first 25 h after partial hepatectomy, the incorporation of [^{3}H]thymidine into the remaining liver decreased significantly and concentration-dependent [5]. The lower concentration limit for glucagon's effectiveness is yet still unknown. Thus, the question as to whether or not this glucagon effect is of physiological importance cannot be answered at present.

In this context it appeared to be of interest to determine the concentrations of glucagon-like immunoreactivity (GLI) [6, 7] after partial hepatectomy in rats.

Materials and Methods

The experimental set-up including animal surgery, blood drawing and processing was outlined in a recent publication [4]. Glucagon-like immunoreactivity was measured radioimmunologically in the same assay system used for the determination of IRG [8], the glucagon-specific antiserum 30 K, however, being replaced by the non-discriminating antiserum K 4023 (Novo Industries A/S, Bagsvaerd, Denmark), which equally reacts with true glucagon and with GLI. Highly purified crystalline beef-pork glucagon (a gift of Eli Lilly Co., Indianapolis, Indiana, USA) was used as standard. Therefore, GLI concentrations should be expressed in pgeq/ml.

Results and Discussion

10 h after partial hepatectomy the mean plasma concentration of GLI + IRG increased to a maximum level of 5500 pgeq/ml. This represents an 18 to 19-fold increase above the mean control level of 295 pgeq/ml. The plasma concentration reached control levels 22 h postoperatively, but was found to be slightly elevated during the following week (Fig. 1). The concentration of GLI + IRG in Portal plasma was 6100 (mean) pgeq/ml 10 h and 4400 pgeq/ml 12 h postoperatively. These data reveal that even taking into account the simultaneously occuring specifically measured increments in true IRG concentration [4], there is substantial release of material with GLI, presumably derived from the gut, follow-

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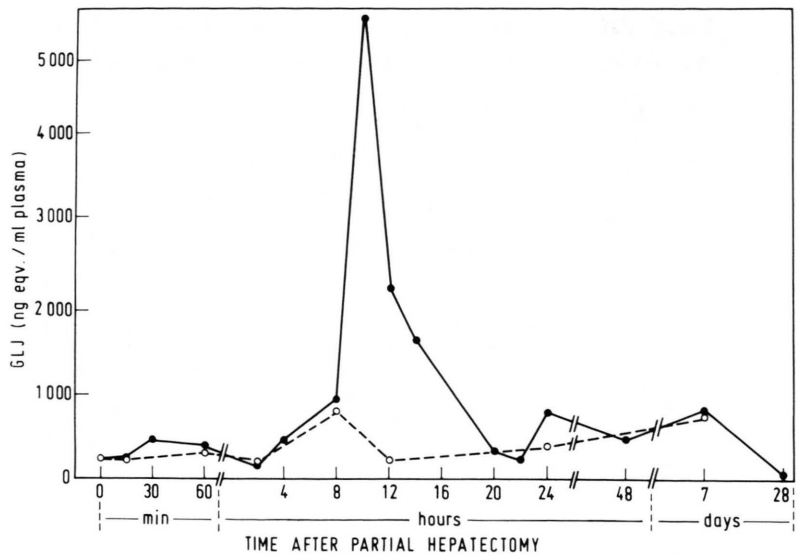

Fig. 1. Concentration of glucagon-like immunoreactivity (GLI) and immunoreactive glucagon (IRG) in pgeq/ml as determined with a non-discriminating anti-glucagon-antiserum in arterial blood plasma following partial hepatectomy in rats (●–●–●). Sham operation (○- -○- -○). Each point represents pooled plasma obtained from 2 to 8 animals (mean = 3.7). All data consist of the average of two experiments.

ing partial hepatectomy in rats. About 2/3 of the maximum activity seems to be of non pancreatic origin [4]. The role of GLI, if any, in liver regeneration [9] remains to be determined as glucagon's role has not been resolved.

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