

Aspecte cu privire la capacitatea de reglare a gluconeogenezei hepatice în ficatul perfuzat de șobolan

Aspects regarding the capacity of gluconeogenesis regulation of the rat perfused liver

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Abstract. The liver, also known as „the living laboratory of the organism”, is a vital organ, fulfilling a variety of functions, such as gluconeogenesis, which is glucose biosynthesis starting from non-glucidic precursors such as: lactate, fatty acids, glycerol and amino acids, an extremely important biochemical process for the animal organism especially under starvation conditions, intense activity or/and pathological states (Pașca C., Kis E. 1999).

By combining the liver perfusion technique and electronic microscopy techniques, we have been able to show that the liver can synthesize the necessary glucose even under starvation conditions, from the lactate-pyruvate mixture that has been perfused (Mokuda and Sakamoto 1997; Parrilla and colab. 2003; Ross and colab. 1976; Sumida and colab. 1993; Sumida and colab. 2006). We have also highlighted the CCCP(carbonil-cianid-m-clorophenylhydrazon) effect on the gluconeogenesis process, at two different final concentrations :2 μ mol and 50 μ mol in the Krebs-Ringer serum.

The CCCP declutches the oxydative phosphorylation, making the proton gradient fade; if the concentration is low – 2 μ mol – the effect lasts in time, and at high concentration – 50 μ mol – it has an irreversible inhibiting effect on the gluconeogenesis.

Cuvinte cheie: gluconeogeneză, precursori neglucidici, CCCP, lactat-piruvat, inaniție.

Keywords: gluconeogenesis, non-glucidic precursors, CCCP, lactate-pyruvate mixture, starvation conditions.

In order to demonstrate the possibility of the liver to synthesise glucose we using the liver perfusion technique (Déry F., Burelle Y., Bélanger P., Gascon-Barré, Marielle and Lavoie J. M. 2001) experiments were undertaken on rats weighing 100-300 g, put to starvation for 48 hours, but with free acces to water.

The perfusion device is based on a Wolkoff's et. colab. (Wolkoff A. W., Johansen K. L. and Goesser T. 1978) device, but has been adapted to our study, the main change being the way of keeping steady the flow in the cannula, using a peristaltic pump, not letting it drop.

The liver perfusion technique appears to have an important advantage, that is the fact that it mostly assures the necessary physiological conditions, which can be found within the living animal (Wolkoff și colab. 1978). After the preparation of the Krebs-Ringer serum, the cannulation will be fulfilled by following these particular steps:

Also, we using the glucose dosage method (Changani K. K., Jalan R., Cox I. J., Ala-Korpela M., Bhakoo K. S., Taylor-Robinson S. D. and Bell J. D. 2001) This method is specific for glucose as the glucosoxidase only oxydates the glucose.

In order to demonstrate the possibility of the liver to synthesise glucose the liver was provided with a lactate mixture, with a final concentration of 2 mM in the Krebs serum, as well as pyruvate with a 0.1 mM final concentration in the Krebs serum.

After the lactate and pyruvate injection, the liver immediately begins the glucose synthesis, reaching a medium concentration of 70 μ mol/hour/100g body weight. By interrupting the precursors supply a rapid decrease of glucose synthesis is detected.

As a conclusion, we can say that under starvation conditions the liver is able to supply the organism with the necessary glucose.

After the 2 μ mol CCCP is introduced a rapid decrease of the glucogenesis can be observed, until reaching a certain level (close to the value before the precursors perfusion) as well as its maintenance at this level as long as the CCCP persists.

After the remove of CCCP, gluconeogenesis will gradually come back to the previous values, those registered before adding CCCP.

In another experiment we have observed the effect of CCCP at a 50 μ mol concentration.

At this concentration, the CCCP completely and irreversibly inhibited the gluconeogenesis, so as not even after the CCCP supply stop, the glucose was not synthesized.

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