Intraperitoneal insulin administration in pigs: Effect on circulating insulin and glucose levels
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Background

Aim: Investigate the effect of intraperitoneal (IP) insulin boluses with respect to insulin absorption and the effect on blood glucose levels.

Motivation: Limited available information about glucose response and insulin changes after IP insulin administration. Previous studies have not sampled often enough to build suitable mathematical models of IP insulin absorption.

Methods

- 2U, 5U and 10U NovoRapid insulin (Novo Nordisk, Denmark) boluses administered in the upper right part of the peritoneal cavity of 6 pigs (36.0 – 42.6 kg).
- Endogenous insulin and glucagon production suppressed by a combination of octreotide and pasireotide.
- Stable continuous glucose infusion (8 g/h).
- Blood samples collected before and at least every 5 minutes for 120 min after insulin administration.
- Insulin measured with ELISA kits (Mercodia, Sweden).

Results

- Insulin levels increased after 10–15 minutes.
- Blood glucose level decreased after 20 minutes in a dose dependent way.
- Measured insulin levels increased much more after 10U than after 5U of insulin. This may be explained by the amount of insulin exceeding the threshold of the liver.
- The oscillatory insulin levels observed at 1–8 mins and 25–75 mins are mainly due to results from one pig and is considered as an incidental observation.

Discussion

- IP insulin boluses lowers blood glucose levels in a dose dependent manner.
- There seems to be a threshold to the amount of insulin that can be bound during the first pass in the liver.
- These results provide data for modelling of IP insulin absorption and effect for developing an IP artificial pancreas.

Conclusions

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