INTRAPERITONEAL AND SUBCUTANEOUS GLUCAGON DELIVERY IN ANAESTHETIZED PIGS: EFFECTS ON CIRCULATING GLUCAGON AND GLUCOSE LEVELS

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Background

Motivation:
Glucagon has received renewed interest, particularly in the development of a dual hormone artificial pancreas (AP). Slow subcutaneous (SC) dynamics motivates for exploration of the intraperitoneal (IP) space both for glucose sensing and hormone delivery. We have previously investigated IP glucagon delivery in rats [1].

Aim:
Investigate and compare glucagon kinetics and dynamics after IP and SC glucagon delivery in a swine model.

Methods

- IP and SC glucagon boluses (GlucaGen, NovoNordisk, Denmark) were administered to 11 anaesthetized pigs (36.0–42.6 kg).
- Three different bolus sizes (0.6 µg/kg IP, 0.6 µg/kg SC and 0.3 µg/kg IP) were given in randomised order and compared.
- Endogenous insulin and glucagon secretion was suppressed by octreotide and pasireotide boluses.
- Blood samples were collected from 10 minutes before to 80 minutes after glucagon administration.
- Glucagon was measured with ELISA kit (Mercodia, Sweden).

Results

- The glucagon bolus of 0.6 µg/kg IP gave a faster and significantly higher glucose response compared with the same dose given SC.
- The larger glucose response after IP delivery might be explained because glucagon is absorbed over the peritoneal lining and a large portion is directly transported to the liver, resembling glucagon secretion by the healthy pancreas.
- Prolonged fasting (~12 hours) can prevent rapid glucagon-induced glucose production in anaesthetized pigs (as seen in fig b).

Discussion

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References


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