

Abstract 6:

Fasting reduces metabolism of intestinal epithelial cells in piglets.

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The intestine is the primary site for absorption and digestion of food, but is also crucial for maintaining a barrier against pathogens. To support their function, intestinal epithelial cells are reliant on energy production. Insufficient energy production can diminish intestinal barrier function and thus contribute to onset of intestinal diseases such as diarrhoea, which pose a major health burden to both humans and animals. Diarrhoea is especially prevalent during the weaning transition, which is also often accompanied by decreased feed intake. We hypothesized that this decrease in feed intake causes a decrease in intestinal energy production, thereby contributing to intestinal barrier dysfunction. Therefore, we performed a pig study to investigate the effect of feed deprivation on intestinal cell metabolism. First, we optimized a technique to isolate primary intestinal epithelial cells (IECs) and measure their metabolic function using the Seahorse XF analyser, which allows for simultaneous measurement of oxidative and glycolytic metabolism. Piglets aged four and six weeks were fasted for 48 hours, to mimic feed deprivation upon weaning. Control piglets either remained with the sow (four-week-old piglets) or were fed a standard weaning diet (six-week-old piglets). IEC isolation proved to be difficult in the four-week-old fed piglets because of the thick mucus layer present, and respiration results of this group were therefore not taken into account. In six-week-old piglets, fasting resulted in significant reduction of metabolism. Both basal oxidative and glycolytic function were halved in the fasted piglets. The spare respiratory capacity, as well as compensatory glycolysis, which are measures for metabolic flexibility of a cell, were reduced by about a third in fasted piglets. Interestingly, there was no difference in contribution of either glycolysis or oxidative function to total metabolic function. Our results show that IEC metabolic function is decreased upon fasting in young piglets.