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Pediatric Nutrition

Glucagon-Like Peptide 2 (GLP-2) Stimulates Intestinal Function During Weaning

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Objectives and Study: Transition from milk to solid food can be associated with intestinal atrophy and malfunction. The gut hormone, glucagon-like peptide 2 (GLP-2) stimulates gut adaptation. We hypothesized that post-weaning gut adaptation is improved by GLP-2 administration, and that GLP-2 effects vary according to differences in disease sensitivities (e.g. sanitary environment). We used piglets as models for infants.

Methods: In Exp. 1, three week old pigs were weaned in a high-sanitary environment and injected with native GLP-2 (80 µg/kg/12h, n=8) or saline (control, n=8) and compared with preweaning pigs (n=6). In Exp. 2, pigs were weaned in a low-sanitary environment and injected with native GLP-2 (150 µg/kg/12h, n=11) or saline (control, n=11) and compared with preweaning pigs (n=8). In Exp. 3, pigs were weaned in a low sanitary environment and injected with a stabilized acylated GLP-2 analogue (25 µg/kg/12h, n=8) or saline (control, n=8).

Results: Pigs injected with acylated GLP-2 (Exp. 3) showed a lower diarrhea score (2.3 vs. 3.5, $P<0.01$), higher intestinal weight, villi and crypts in the proximal intestine (+20-25%, $P<0.01$) and marked increases in 6 digestive enzymes (+50-100%, all $P<0.05$). Native GLP-2 used in low-sanitary conditions (Exp. 2) increased the density of goblet cells ($P<0.05$), reduced colonic short chain fatty acid levels ($P<0.01$) but did not prevent weaning diarrhea. In the absence of diarrhea in high sanitary conditions (Exp. 1), native GLP-2 injections did not improve gut function. Relative to suckling pigs, intestinal atrophy was similar between controls and GLP-2 treated pigs in both Exp. 1 and 2. In the high-sanitary environment (Exp. 1), the activities of 5 brush border enzymes were markedly increased in both GLP-2 and controls compared with suckling pigs (>300 %, $P<0.05$). In contrast, activities of 3 peptidases were markedly reduced in both GLP-2 and controls in the low-sanitary environment (Exp. 2, -50%, $P<0.001$) compared with suckling pigs. Plasma GLP-2 levels were highest in Exp. 3 (constant levels of ~20 nM), lower in Exp. 2 (daily cycles of 5-30 nM) and lowest in Exp. 1 (daily cycles <1.0 nM).

Conclusion: Exogenous GLP-2 treatment improves gut digestive function during the dietary transition from milk to solid food, but the effects are most pronounced with high-dose GLP-2 and high disease sensitivity. Improved digestive function toward adult type diets may play an important role in the prevention of diarrhea, which is a common clinical response to the weaning transition in both infants and animals.

Disclosure of Interest: None Declared