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Early life stress alters the development and neural regulation of nutrient transport in porcine small intestine

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The enteric nervous system (ENS) controls nutrient absorption by regulating the activity of nutrient transporters, which could play a pathophysiologic role in disease pathogenesis associated with early-life stress (ELS). However, the effects of ELS and ENS alterations on development of intestinal nutrient transport function is poorly understood. In the present study, 16 female piglets were randomly assigned between early weaning (EW) and late weaning stress groups (LW). At 70 days of age, small intestine samples were collected to evaluate the electrogenic nutrient transport activity using the Ussing Chambers technique. Neural regulation of nutrient transport was evaluated by pretreatment of intestinal tissues with neural blockers: tetrodotoxin, atropine, hexamethonium, and propranolol prior to addition of luminal glucose and selected amino acids. The short-circuit current (Isc) response of serial addition of nutrient treatments was recorded and delta Isc of each nutrient response was calculated. We hypothesized that ELS will induce chronic impairment to glucose and amino acid transporters mediated *via* the ENS. Our results showed a significant suppression of glucose, alanine and glutamate transport, but a significant enhancement of lysine transport in EW compared to LW control pigs. Interestingly, atropine-treated tissue reduced lysine transport in EW, but not in LW pigs. Together, these data suggest that ELS has long lasting effects on nutrient transport in the small intestine, which may be regulated by alterations in cholinergic nervous system activity. These results provide new insight into the pathophysiology of intestinal diseases associated with ELS, which could lead to novel nutritional strategies for humans and animals.

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