Distribution and developmental changes of transforming growth factor-β receptors in the gastrointestinal tract of pigs

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Transforming growth factor-beta (TGF-β) has been detected in the milk of various species, including the pig (1). It may play a significant role in postnatal adaptation of the gut in the suckling neonate (2). This study investigated whether TGF-β receptors exist in the gut of newborn pigs, and whether there are any developmental changes in the receptor expression during the postnatal period.

Gastrointestinal tissue samples were collected from newborn unsuckled piglets and suckling piglets of different ages. The localization and quantification of TGF-β receptors along the gastrointestinal tract were performed by immunohistochemical and Western blot analyses.

In newborn unsuckled piglets, TGF-β receptors were widely distributed along the gastrointestinal tract (Figure). In the small intestine, TGF-β receptors I and II were predominantly localized on the apical membrane of the villus epithelium, while TGF-β receptor III was predominantly localized in the crypts. The mucus glands in the esophagus and the Brunner's glands in the duodenum were strongly stained with receptor III antibody. Scattered mucosal lymphocytes located in lamina propria and in Peyer's patches were also stained positively. In suckling piglets, there was a transient decline in the density of TGF-β receptors I and II in the intestinal mucosa. The positive staining of receptor I and II on the villus epithelium and the staining of receptor III in the esophageal and Brunner's glands were less intense in 1- and 3-day-old suckling piglets than in the newborns, while more intestinal mucosal lymphocytes were positively stained in the suckling piglets.

The present study established for the first time the existence of TGF-β receptors in the gastrointestinal tract of newborn pigs, and demonstrated spatial and expression level changes of receptors following the onset of sucking. The findings support the hypothesis of a regulatory role of milk-borne TGF-β in postnatal adaptation of the gastrointestinal tract in neonatal animals.

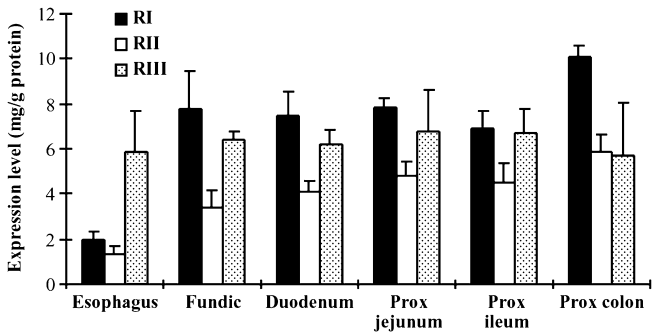

Figure. Expression levels of TGF-β receptors I (RI), II (RII) and III (RIII) in the gastrointestinal mucosa in newborn piglets determined by quantitative Western blot analysis (mean ± SEM).

References

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