

Effect of oral IGF-I and hydrocortisone on gastrointestinal development in newborn rats

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Insulin-like growth factor-I (IGF-I) has been detected in milk of various species. The concentration of IGF-I is usually high in colostrum and often greater than the corresponding concentration in maternal circulation. The concentration of IGF-I in the milk can also be elevated by growth hormone treatment of lactating mothers. The physiological significance of milk-borne IGF-I is not fully understood yet, but it has been speculated that milk-borne IGF-I may stimulate postnatal gut development in the suckling young (1). In this study we examined the effect of oral IGF-I on gastrointestinal development in newborn rats during the first three postnatal days.

Twenty one newborn Wistar rat pups were used in the study. The animals were randomly assigned into three treatment groups: IGF-I, hydrocortisone and control. Animals in the IGF-I group and hydrocortisone group received respectively 1 µg IGF-I or 150 µg hydrocortisone daily for three days via an orogastric tube. Animals in the control group received placebo treatment. Animals were killed by ether inhalation at the end of the experiment, and the gastrointestinal tract was removed and weighed. Enzyme activities in the intestinal tissue were measured using standard methods.

	Control (n=7)	IGF-I (n=7)	Hydrocortisone (n=7)
Body weight (g) ^b	7.22 ± 0.18	7.38 ± 0.09	6.44 ± 0.22 **
Body weight gain (g) ^b	0.98 ± 0.13	1.10 ± 0.09	0.05 ± 0.16**
Intestinal weight (mg)	195 ± 15	212 ± 9	208 ± 9
Prox. intestinal lactase (unit #) ^b	0.71 ± 0.05	0.95 ± 0.09**	0.99 ± 0.03**
Dist. intestinal lactase (unit #)	0.58 ± 0.07	0.62 ± 0.03	0.65 ± 0.03
Prox. intestinal maltase (unit #) ^b	0.67 ± 0.04	0.88 ± 0.06*	1.12 ± 0.03**
Dist. intestinal maltase (unit #)	0.76 ± 0.08	0.74 ± 0.05	0.82 ± 0.05
Prox. intestine sucrase (unit #) ^b	0.022 ± 0.001	0.033 ± 0.002**	0.047 ± 0.005**
Dist. intestinal sucrase (unit #)	0.013 ± 0.002	0.012 ± 0.001	0.018 ± 0.003

Significantly different among the treatment groups when analyzed by ANOVA: ^a(P<0.05); ^b(P<0.01).

Significantly different from the corresponding mean value in the control when determined by Dunnett's test:

* (P<0.05); ** (P<0.01). # One unit of enzyme activity equals to one µmol substrate hydrolyzed per min.

The results show that oral administration of IGF-I and hydrocortisone can stimulate intestinal enzyme maturation in newborn rats. The effect of oral IGF-I and hydrocortisone is apparently region specific as the treatments significantly increased lactase, maltase and sucrase activities at the proximal, but not distal, region of the intestine. The study extends our previous report that oral IGF-I can enhance intestinal development in newborn piglets (2).

1. Xu RJ. Development of the newborn GI tract and its relation to colostrum/milk intake. *Reprod Fertil Dev* 1996;8:35-48.
2. Xu RJ, Mellor DJ, Birtles MJ, Breier BH, Gluckman PD. Effects of oral IGF-I or IGF-II on digestive organ growth in newborn piglets. *Biol Neonate* 1994;66:280-7.