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Developmental changes in intestinal fucosylation: regulatory factors.

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During postnatal development, some modifications of the different systems involved in intestinal fucosylation are observed at the end of the 3rd week:

- a rise in fucosyl-transferase activities, in mucosal fucose content and in synthesis of the substrate GDP-fucose;

- a decrease in GDP-fucose degradation by pyrophosphatases and in the activity of proteinic endogenous inhibitor of the fucosyl-transferase.

Many physiological regulatory factors could be evoked to explain these changes. Two factors were studied: glucocorticoids and modifications in the diet at weaning.

Glucocorticoids

A rise in corticosterone blood level was observed at the 16th d of life just before the increase in fucosyl-transferase activity.

Before the 16th d, fucosyl-transferase activity was increased by hydrocortisone treatment and

an antiglucocorticoid displayed an antagonist effect. On the contrary, after the 16th d of life, hydrocortisone had no effect on fucosyl-transferase activity. Injections of the antiglucocorticoid did not prevent the normal rise in fucosyl-transferase activity.

Moreover, animals submitted to adrenalectomy at the 15th d of life had a very low corticosterone level as compared to sham-operated animals, but the normal rise in fucosyl-transferase at 20 d was not prevented by the operation.

Effect of dietary modifications at weaning

The solid diet given to animals at weaning is rich in carbohydrates and poor in lipids as compared to milk. Early weaning induced an early rise in fucosyl-transferase activity, whereas delayed weaning induced a delayed increase in fucosyl-transferase activity. Prolonged nursing maintained the fucosyl-transferase activity at a low level, as for suckling rats; it also prevented the decrease in GDP-fucose degradation and in the activity of the fucosyl-transferase inhibitor.

During postnatal development, a concerted evolution of the different systems involved in intestinal fucosylation processes is observed and results in a significant rise in fucosylation at the weaning period. Glucocorticoids play a minor part in these physiological variations, whereas dietary modifications seem to be an important factor in these variations.