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The maturation of the gut is a complex biological process, which involves cell proliferation, cell migration, cell recognition and adhesion, cell differentiation and cell death. Signals of chemical nature (growth factors, adhesion molecules, hormones, neurotransmitters), mechanical forces (stretch, muscle contraction), cell-to-cell or tissue-to-tissue interactions (mesenchymal-epithelial interface), and extracellular matrix components promote the growth, differentiation and maturation, in short, the morphogenesis of the gut.

Gut wall consists of mucosa, connective tissue, muscle layers, blood and lymph vessels and nerves. The multiplicity of components suggests the occurrence of structural and functional reciprocal interactions, controlled by extrinsic nerves (sympathetic, parasympathetic and sensory connections), by the intrinsic plexuses, together with endocrine cells that release locally bioactive substances and exogenous factors (microbial flora, luminal content) that play a crucial role in the development of the gut.

This maturation process remains largely unknown for most animals, inclusive of chickens and rabbits. Furthermore, there is little evidence correlating the anatomical and physiological changes that occur in the developing gut mucosa with the intestinal flora and the onset of local defensive mechanisms.

We use light, transmission and scanning electron microscopy, histochemistry, immunohistochemistry and morphometric techniques to reveal the 3-dimensional arrangement of the developing gastrointestinal tract and in particular,

- villus, crypts and intestinal glands architecture,
- blood and lymph vessels network,
- the development of digestive and absorptive capacities (neuro -endocrine cell coding, brush border enzyme activity and distribution),
- the influence of the digestive environment (intestinal flora, chyme synthesis) in the establishment of local specific and non-specific immune and mucin responses.

This arrangement is, however, a glance in a continuously changing structure. To reveal this magnificent plasticity one must always bear in mind the words of Heraclitus "For ever something is created and changes and nothing remains the same".

Selected publications:

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