

The role of the gastrointestinal epithelium as a possible pathway for the transfer of nutrients to the embryo's circulation

Pereda J.

Sulz L.

Monge J.I.

The endodermal cells of the human yolk sac (YS) produce non-nucleated erythrocytes (NNEs) and numerous serum proteins that are transiently storage within the YS cavity. After their transfer via the vitelline duct to the embryo gastrointestinal lumen, the nutrients' final fate is unknown. With the aim of investigate how erythroid cells and nutrients are conveyed to embryo circulation, we studied, using a morphological and immunohistochemical approach, the embryo anatomy and the serum protein α -fetoprotein (AFP) presence, in 15 human embryos and their YS, collected from tubal pregnancies from 4 to 8 wpf. We observed at 5 wpf, a strong AFP staining in the endodermal cells of the YS, thereafter AFP was only present in the YS cavity and the gastrointestinal lumen. During 7 wpf, AFP expression declined and disappeared, concomitant with YS regression. Between 5 and 7 wpf, NNEs were observed in the gastrointestinal cavity, where they accumulate in the stomach. Here, the cells were attached to the endodermal epithelial cells or were free in the lumen. By scanning electron microscopy, we identified signs of NNEs phagocytized by endodermal cells. Those NNEs free in the lumen, after hemolysis, were probably removed by endocytosis (cell debris). Taking all together, we postulate that after reaching the endodermal epithelial cells of the stomach, nutrients are transferred to the embryo by a phagocytic/endocytic mechanism that is operative until the end of 6 wpf. After absorption, NNEs are probably degraded within phagosomes, nutrients delivered to the cell cytoplasm and then transported towards the embryonic circulation. © 2015

Wiley Periodicals, Inc.

Embryo nutrition

Erythrocyte endocytosis

Gut endoderm

Human embryo

Non-nucleated erythrocytes

alpha fetoprotein

animal embryo

embryo development

embryology

erythrocyte

gastrointestinal tract

human

immunohistochemistry

metabolism

nutrition

phagocytosis

scanning electron microscopy

ultrastructure

yolk sac

alpha-Fetoproteins

Embryo, Mammalian

Embryonic Development

Erythrocytes

Gastrointestinal Tract

Humans

Immunohistochemistry

Microscopy, Electron, Scanning

Nutrition Processes

Phagocytosis

Yolk Sac