Exfoliated epithelial cells, a source of information on clock gene expression by preterm infants to explore the onset of metabolic syndrome


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Introduction

Purpose: In translational research, ethics as well as legal reasons are limiting the use of biopsies in favor of non-invasive technology like the recovery of exfoliated cells from digestive fluids.

Our major goal is to study the link between perinatal denutrition and the regulation of clock genes.

In previous work we found by RT-PRC that clock, period1, period2, rev-erb-alpha transcripts are expressed by gastric exfoliated cells of preterm infants (Ped Res (2007) 62: 564-569)

Methods

Immunodetection & confocal microscopy:
gastric markers, clock and npas2

Animal model of nutritional induction of exfoliation


Results: Exfoliated epithelial cells from preterm infant's fluid aspirates (A, C) or from an adult buccal mucosa (B, D) with associated bacteria (C) or yeast (D)

Results: Enumeration of exfoliated epithelial cells by 5 preterm infants over 30 days

Schematic view of the nasogastric tube equipping a preterm-neonate (adapted from Mother & Child hospital of Nantes)
Results: surface distribution of H+/K+ ATPases on a positive cell compared with a negative cell

Results: Isolated exfoliated cells expressed H+/K+ ATPases (parietal origin), stem cell markers: survivin & Pouf5F1-Oct4 and for less than 10% Tryptophane Hydroxylases

Results: CLOCK quantification by exfoliated epithelial cells related to the 24-h variation in buccal cells of a human volunteer

Expression of CLOCK localized in nuclei of exfoliated epithelial cells of babies (b) compared to similar detection in adult buccal cells over 24-h

Results: NPAS2 in gastric cells of preterm infants?

Results on 6-day rat pups (5-h without milk, 1-h free-access - sacrifice & in vitro induction by placing stomach in medium: 0-30-60-90 min)

Perspectives

(1) As gastric fluids are collected every 3 hours in neonatal intensive care unit, the technique is relevant to explore the acquisition of circadian rhythmicity by the gastric epithelium of preterm infants.

(2) Induction of exfoliation has been adapted on rat pups to manipulate exfoliation and study chronobiological parameters involved in gastric epithelium renewal.