Intestinal Microbiota During Life

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Overview

- Acquisition in the newborn
- Factors affecting the infant microbiota
- Describe the successive development
- Factors affecting the adult microbiota

Bacterial taxonomic composition of human breast milk.

Bacterial families (left) and genera (right) pyrosequencing of the 16S rRNA.

Cabrera-Rubio et al., 2012
Best hit comparison of bacterial phyla in human milk, infants’ feces, and mothers’ feces.

The percent of sequences assigned to each phyla according to MG-RAST (maximum e-value of 1x10^{-5}, minimum identity of 60%, and minimum alignment length of 45 bp).

Ward et al., 2013

Utilization of human milk oligosaccharides by bifidobacteria

Sela & Mills, 2010

Bifidobacteria in breast milk: link with allergy/atopy of the mothers

Groenlund et al. Clinical & Exp Allergy 2007; 37: 1764 - 1772

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Breastmilk bacteria should be considered an important source of bacteria in the establishment of infantile intestinal microbiota.
Microbiota at various sites for mother and infant

Figure 3. Changes in proportion of bacterial phyla.


Impact of gestation time

Microbiota of infants in Europe & Africa

Impact of antibiotics & diet on microbiota

Colicky Infants
- Slower colonization
- Lower diversity and stability
- ↑ proteobacteria (including species producing gas and inflammation)
- ↓ butyrate-producing species
- ↓ lactobacilli & bifidobacteria (including species with anti-inflammatory effects)

Window of sensitivity
around 4-6 months of age

Gut microbiota pivotal role in maturation of immune system
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Factors Impacting on Adult Gut Microbiota

- Life style choices
- Medications
- Diet
- Stressors
- Age
- Institution care or home living
- Dental health
- Infection
- Hygiene
- Sanitization
- Urban/rural

Diversity differences linked to age and culture

Mariat et al, 2009

Magrone and Jirillo, 2013

Luzupone et al, 2012
Phylum/order-like phylogroups to the microbiota of varying ages

C = centenarians
E = elderly
Y = young adults


Microbiota composition and plasma levels of pro-inflammatory cytokines.

Green = centenarians (C)
Blue = elderly/senior (S)
Yellow = young (Y)

http://www.plosone.org/article/info:doi/10.1371/journal.pone.0010667

Microbiota analysis separates elderly subjects based upon where they live in the community.

Green = community; Yellow = day hospital; orange = rehabilitation red = long stay care; purple = young healthy controls.


Transition in microbiota composition across residence location is mirrored by changes in health indices.

- Cluster according to residence location
- Composition correlates with:
  - fraility
  - nutrition
  - markers of inflammation
  - metabolism

SUMMARY

Emerging pandemic of NCDs: Allergy, obesity, diabetes, cardiovascular issues, mental health and auto-immune diseases.

Thank You