

THE IMPACT OF MICROBIOTA AND DIET ON ASTHMA

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Review

Introduction:

Asthma prevalence has dramatically increased over the last decade in Westernized societies.

Purpose of the review:

- State-of-the-art of the asthma
- Find new lines of investigation
- Reach to write a Review following the guidelines from editorial BioMed Central

Methodology:

- Database: PubMed, WOS and Google Scholar
- Key words: asthma, diet in asthma, and microbiome
- Publication data: 3-5 years

Background Asthma affects 300 million individuals worldwide, approximately. Usually, asthma manifests in early childhood with a hyper-activation of the T-helper 2 arm of the adaptive immune response, and an over-expression of the pro-inflammatory cytokines IL-4, IL-5 and IL-13, as well eosinophilia and mast cell infiltration of the airways. Furthermore, asthma development is closely related to the altered microbiota in childhood. The microbiota changes over time in response to environmental factors.

Microbiota

Gut microbiota

RESIDENT

- Bacteroidetes
- Firmicutes
- Proteobacteria
- Actinobacteria
- Verrucomicrobia
- Fusobacteria (lower)

Lung microbiota

EPHEMERAL

- Bacteroidetes
- Firmicutes
- Lactobacillus* (↑)
- Proteobacteria (↑)
- Haemophilus*
- Pseudomonas*
- Actinobacteria (↓)

*Green-marked microbes only modified in asthmatic patients

They resemble due to **microaspiration** (gut to lung) and **breathing** (environment to lung), but at the same time **differ** due to **clearance** (coughing, mucociliary clearance, immune response)

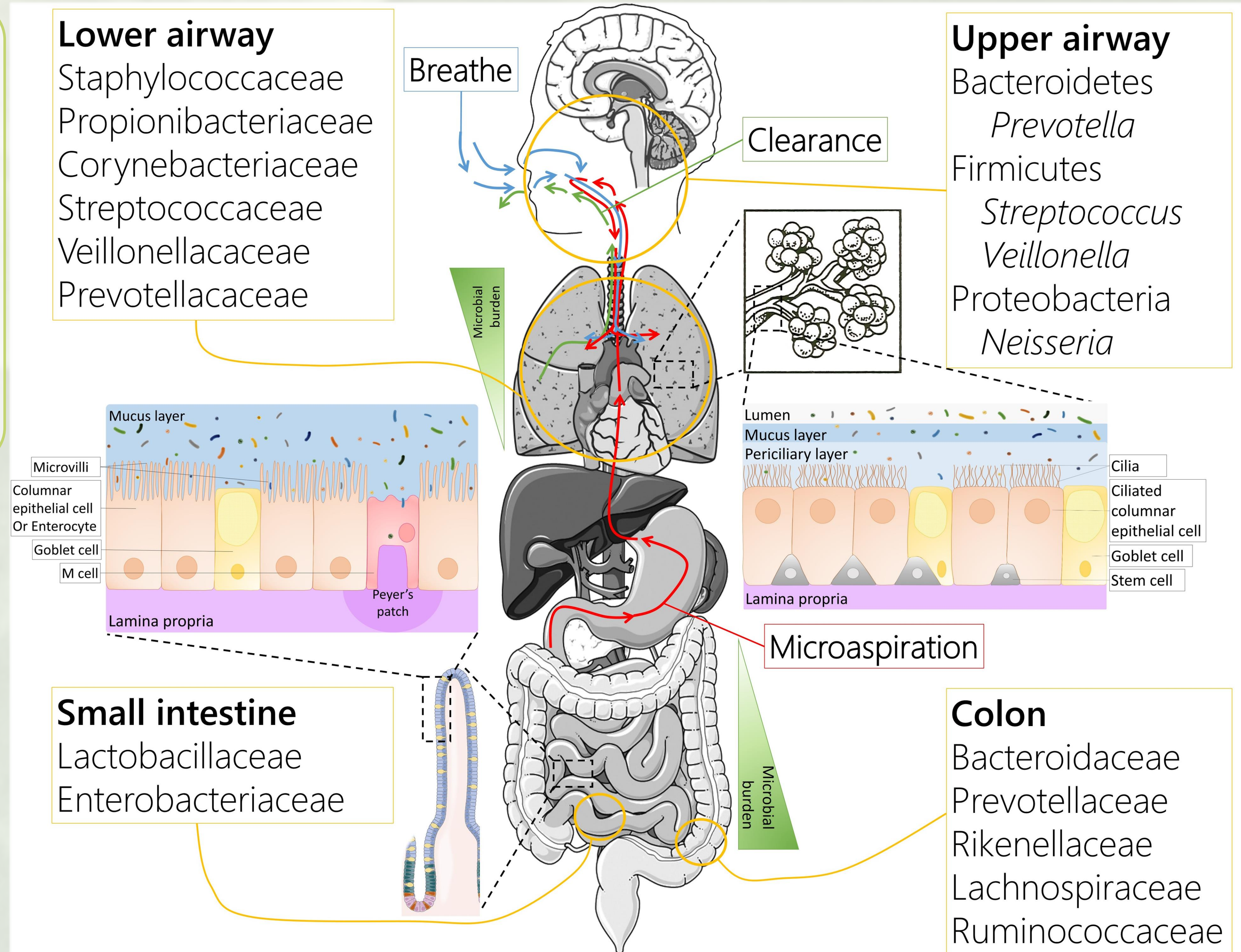


Image exclusively elaborated for this poster

The following microbiota modifications during **early life** are related to increased risk of asthma:

Nasopharyngeal microbiota: dominance of *Moraxella*, *Streptococcus*, *Corynebacterium*, *Staphylococcus*, *Haemophilus*, or *Alloicoccus*

Faecal microbiota: (↑) *Bacillus fragilis* and (↓) *Faecalibacterium*, *Rothia*, *Veillonella*, *Lachnospira* species

Early life critical window

↓
Dysbiosis

Formula feeding

Diet can only modify microbiota in a **long-term** form applied during **pregnancy**; other situations (**childhood and adult life**) does in a **transient** form.

Diet recommendations to reduce exacerbations:

- **Balance of polyunsaturated fatty acids**- omega-3 promotes T helper-1 phenotype and stimulate regulatory T cells (Tregs)
- **Vitamin D intake**- it has a receptor in many immune cells and promote specific Tregs population
- **High-fibre consumption**- production short-chain fatty acids, energy source for colonocytes, reduce pH and other immune benefits

Mediterranean diet (Intangible Cultural Heritage of Humanity by UNESCO, 2010):

- high intake of unrefined plant-based foods (fruits and fresh vegetables, whole grains, legumes, olive oil and nuts)
- low to moderate consumption of foods of animal origin
- low intake of sugar, refined flour and fast food

Conclusions

- **Asthmatics** present an **increased burden**, and higher **diversity** (number of different species not balanced population) during bronchial hyperreactivity
- Needed to define microbiota in order to **diagnose** and **avoid dysbiosis** state
- First efforts focused on **gut microbiota** → **GUT-LUNG AXIS**

References

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