

DIGESTIVE MICROBIOTA AND IMMUNE SYSTEM INTERACTIONS IN DOG

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Introduction

The interactions between the microbiota and the immune system are essential for the maintenance of homeostasis. The molecular mechanisms of these interactions remain unclear, but it has been established a relation between microbiota composition and the correct function of the immune system.

Gut microbiota differs in every section of the gastrointestinal system due to changes on pH, availability of nutrients and amount of oxygen.

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Objectives

The objective of this work is to conduct a review about the interactions between microbiota and immune system and how they are altered in inflammatory bowel disease and find possible new treatments based on the alteration of commensal microbiota.

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Homeostasis and dysbiosis

An equilibrium between anti-inflammatory and pro-inflammatory states is needed in order to achieve homeostasis in the gut's immune system.

This equilibrium is partly regulated by the anti-inflammatory Treg cells and the pro-inflammatory Th17 cells through cytokine secretion.

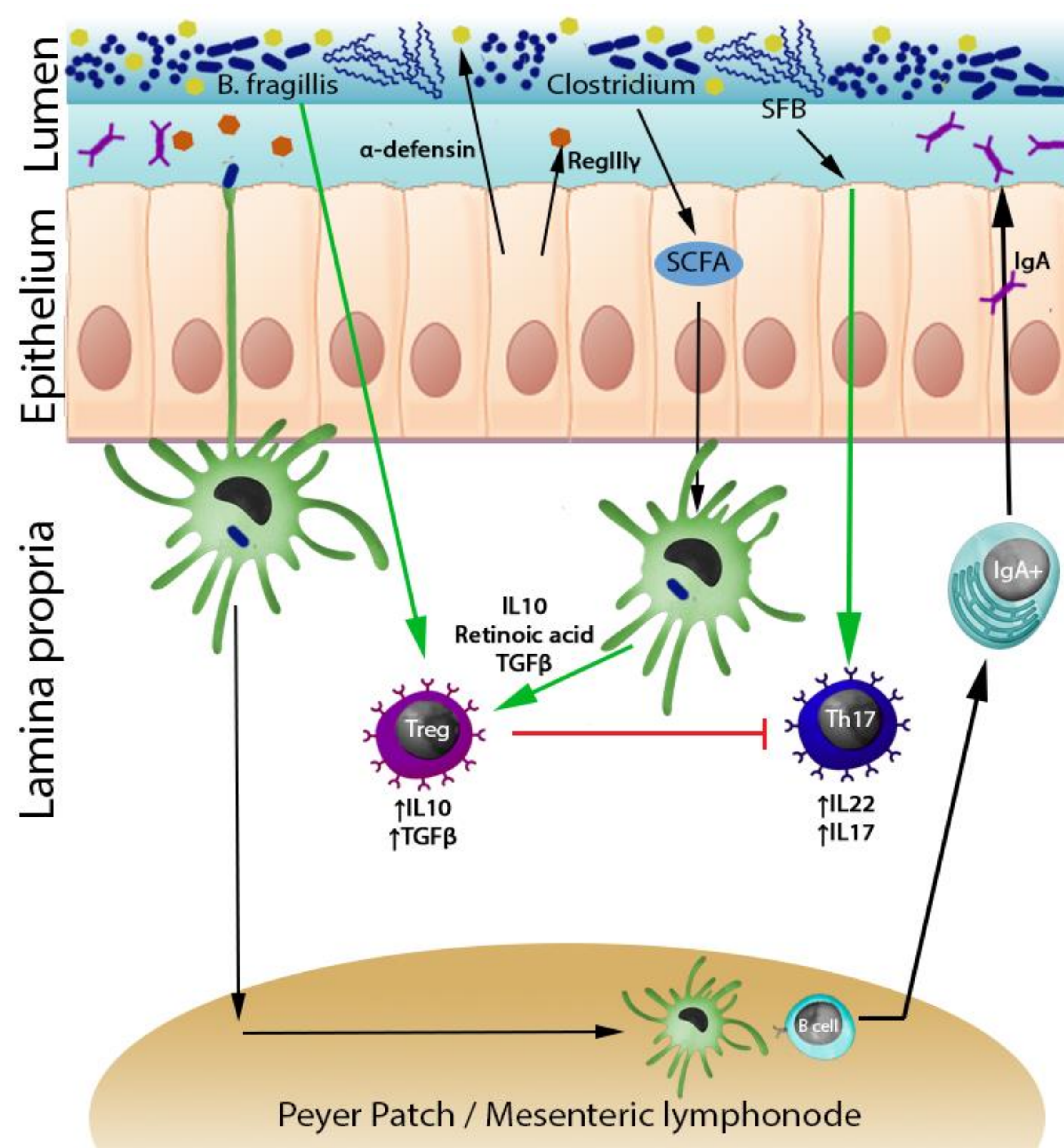


Fig 2. Interactions between commensal microbiota and mucosal immune system

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Inflammatory bowel disease treatments

Classical treatment

Nowadays the treatment of IBD in dogs is based on antibiotic therapy and anti-inflammatory drugs such as prednisone.

Fecal microbiome transplantation (FMT)

Based on the administration of fecal matter from a healthy donor into the intestinal tract of a patient in order to restore their damaged microbiota.

Probiotics

The goal of probiotics is providing the bacterial species that had been altered in a dysbiosis in order to restore the healthy microbiota.

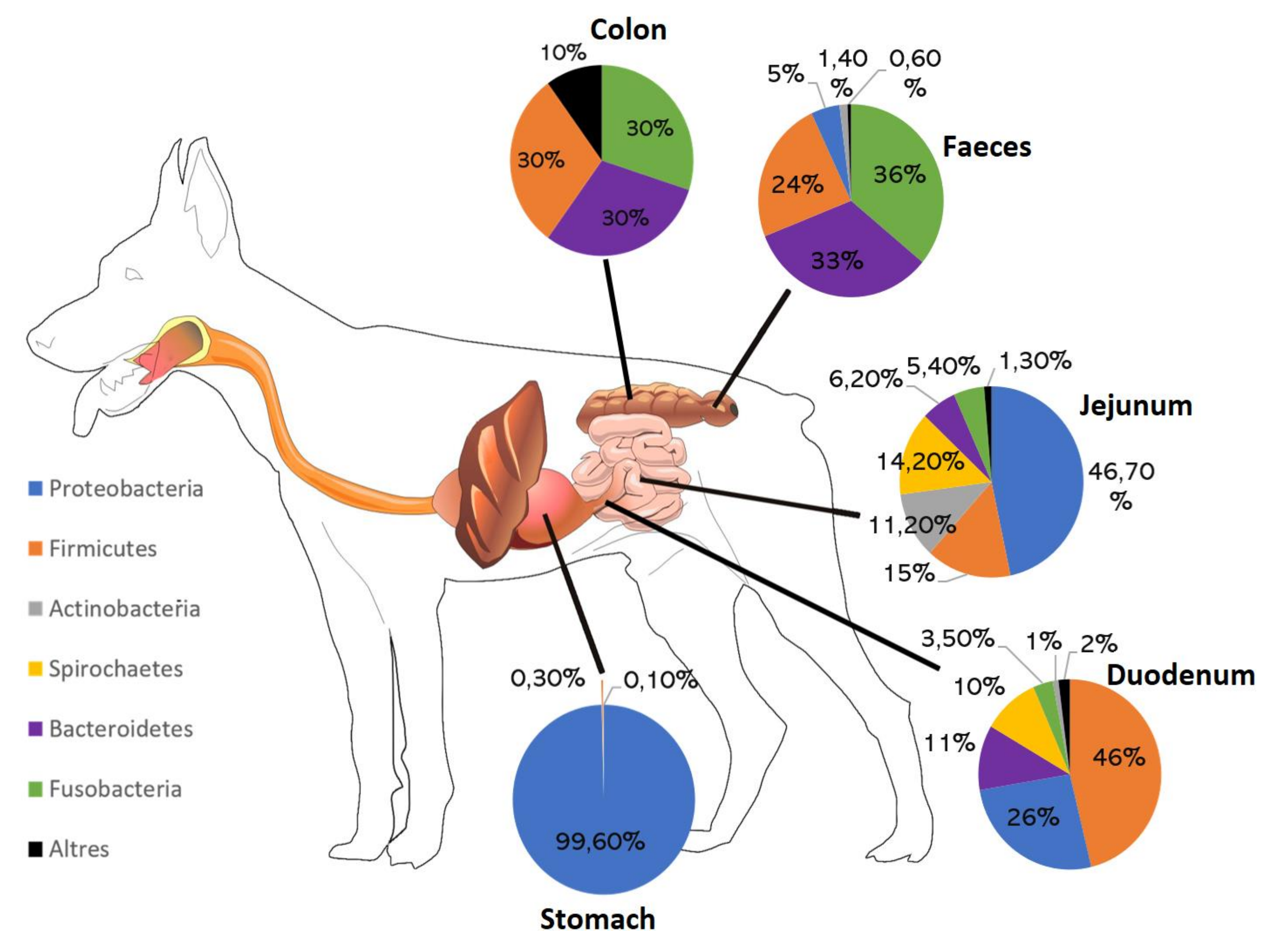


Fig 1. Microbiota composition in different localizations of the gastrointestinal system

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Inflammatory bowel disease

Inflammatory bowel disease (IBD) is an autoimmune disease where tolerance to luminal antigens is lost. Idiopathic IBD is the most common cause of diarrhea in dogs.

The three main factors in the development of IBD are genetic predisposition, environmental factors and microbiota.

Bacterial composition is altered in dogs with IBD:

- ↑ *Proteobacteria*
- ↓ *Bacteroidetes*, *Firmicutes* and *Fusobacteria*

These changes break homeostasis in the gut barrier and promote a pro-inflammatory effect with:

- ↑ Th17 and Th1 cells
- ↓ Treg cells, IL10 and RegIII

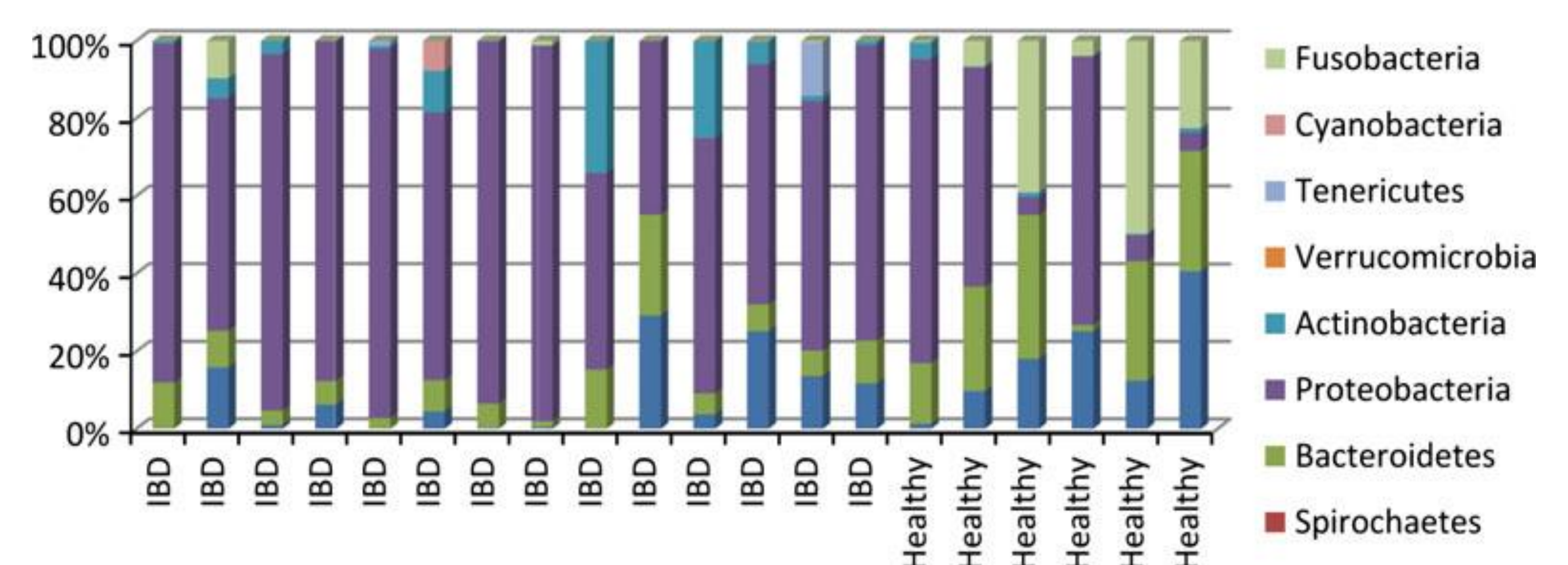


Fig 3. Distribution of bacterial phylums in dog's duodenum (n=14)⁴

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Conclusions

Commensal microbiota in the digestive system has a high relevance in maintaining the correct function of the barrier, especially the *B. fragilis* species, the order *Clostridiales* and segmented filamentous bacteria.

Th17 and Treg cells are essential in the regulation of the gut mucosal immune responses.

The possibility of altering the microbiota with probiotics or fecal microbiome transplantation seems to be a viable approach in preventing and treating IBD.