Inflammatory bowel disease and colorectal cancer: the role of microbiota

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INTRODUCTION

- Inflammatory bowel disease (IBD) is a chronic intermittent disorder characterized by intestinal inflammation.
- IBD patients have a **higher risk** of developing **colorectal cancer** (CRC).
- Intestinal microbiota is presumed to play a large role in IBD and CRC pathogenesis.
- **Intestinal microbiota** could **contribute IBD-related CRC**.

Objectives

The aim of this review is to describe the role of intestinal microbiota in IBD-related CRC and to present molecular mechanisms whereby microbiota could drive carcinogenesis.

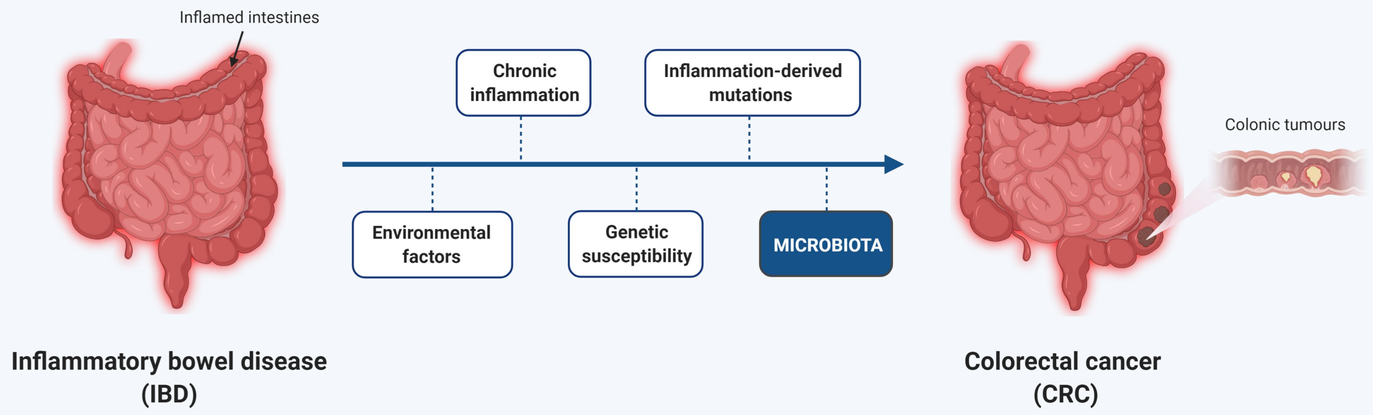

Figure 1. Factors involved in IBD-related CRC progression.

VARIATIONS IN INTESTINAL MICROBIOTA

IBD	CRC
Increased species	
Bacteroides genus	*Bacteroides* genus
Escherichia genus	*Escherichia* genus
Fusobacterium genus	*Fusobacterium* genus
Ruminococcus genus	
Decreased species	
Butyrate-producing bacteria	Butyrate-producing bacteria
Bifidocaterium genus	

IBD & CRC share similar microbial patterns

Bacteroides

Fusobacterium

Escherichia

Butyrate-producing bacteria

Figure 2. On the left, most frequent variations in intestinal microbiota of IBD and CRC patients; on the right, shared microbial pattern between IBD and CRC.

TUMORIGENESIS DRIVING DYSBIOSIS

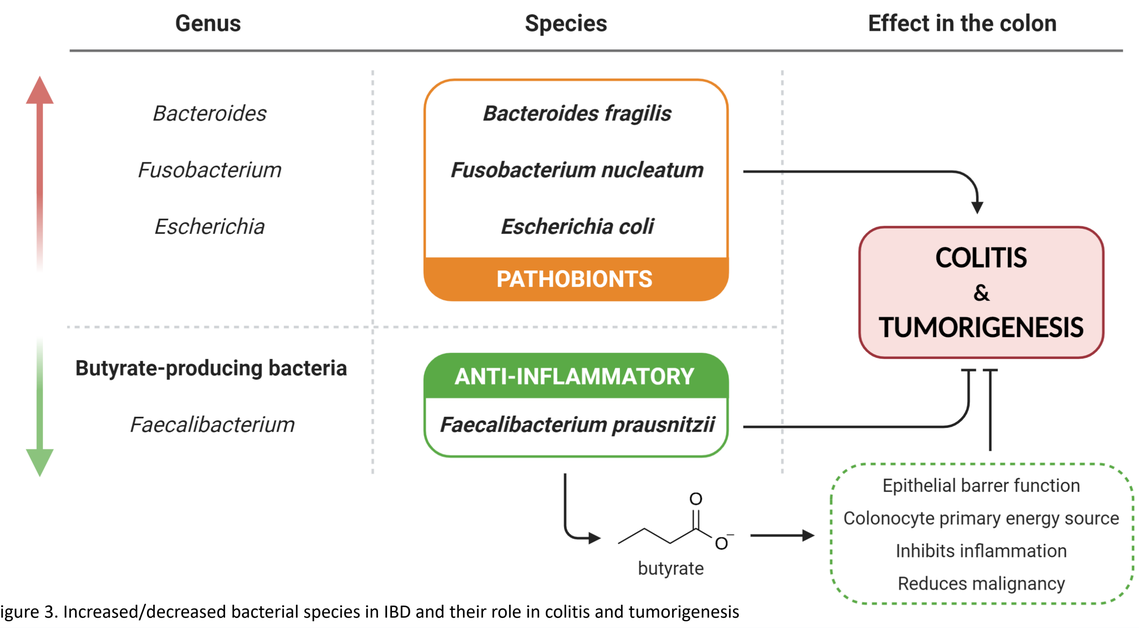

Figure 3. Increased/decreased bacterial species in IBD and their role in colitis and tumorigenesis

PROTUMORAL PATHOBIONTS

Enterotoxigenic *Bacteroides fragilis* (ETBF)

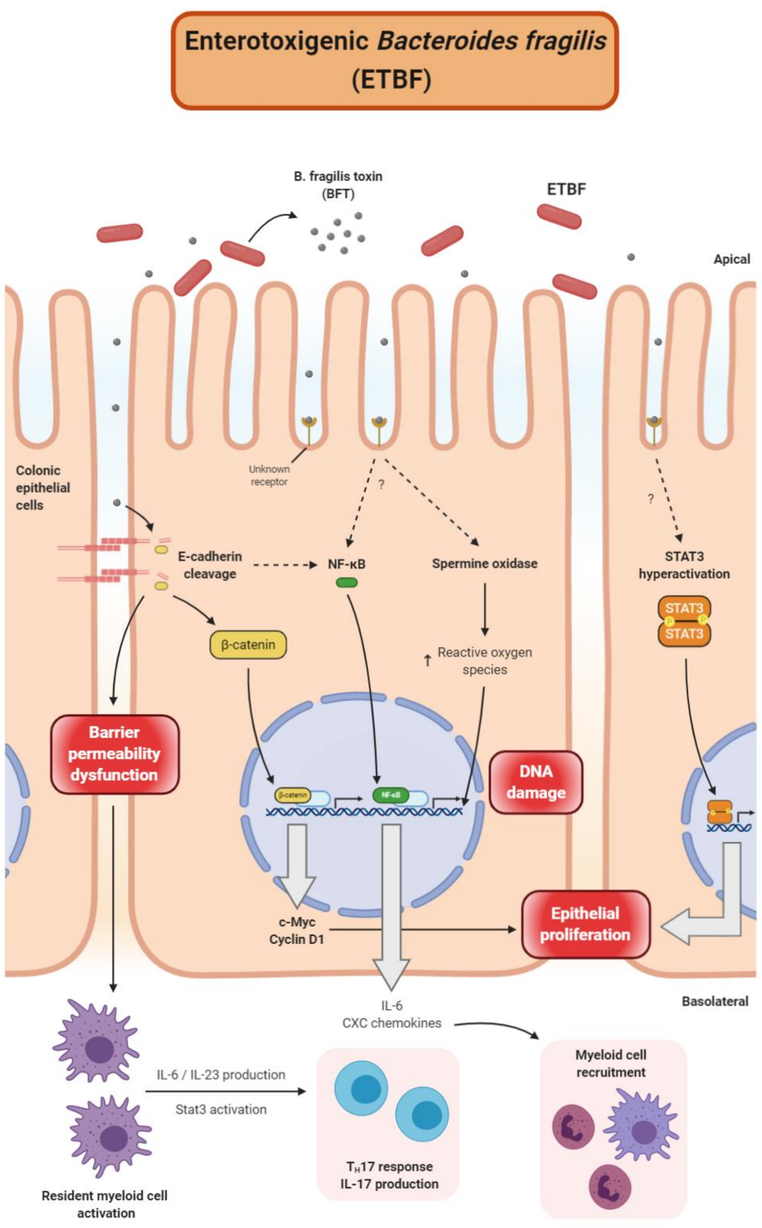

Figure 4. *ETBF* induced mechanisms involved in colitis and tumorigenesis initiation

Fusobacterium nucleatum

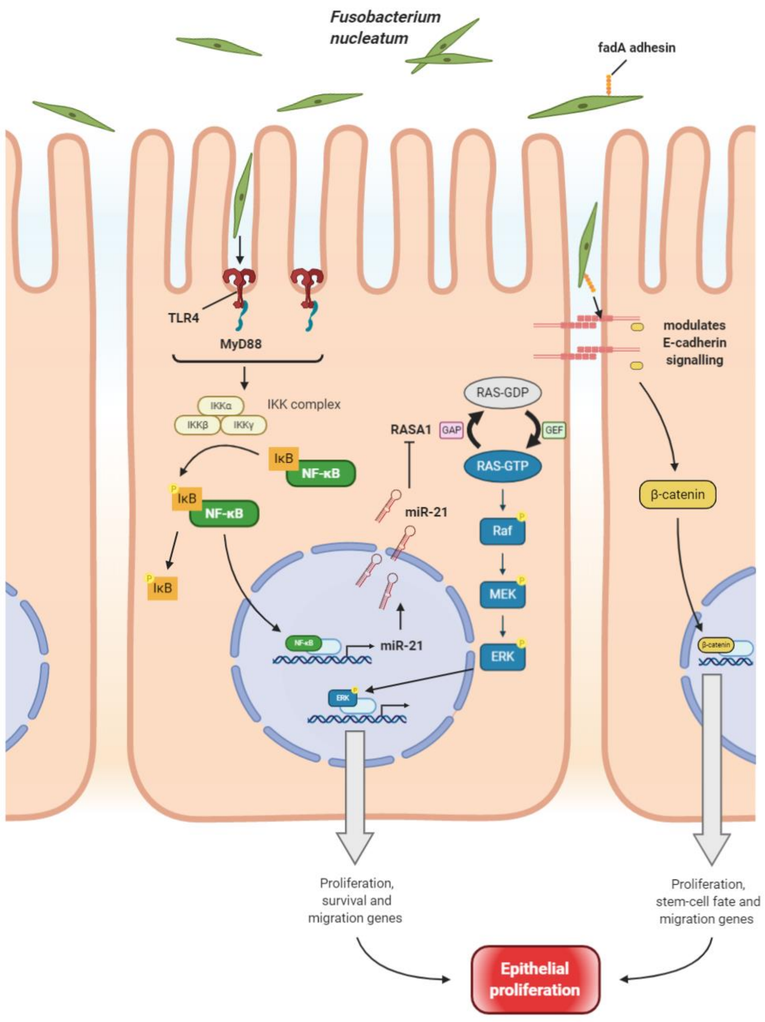

Figure 5. *F. nucleatum* role in tumorigenesis. IκB: inhibitor of κB; IKK: IκB kinase. *Adapted from Yang Y, et al.*

Adherent-invasive *Escherichia coli* (AIEC)

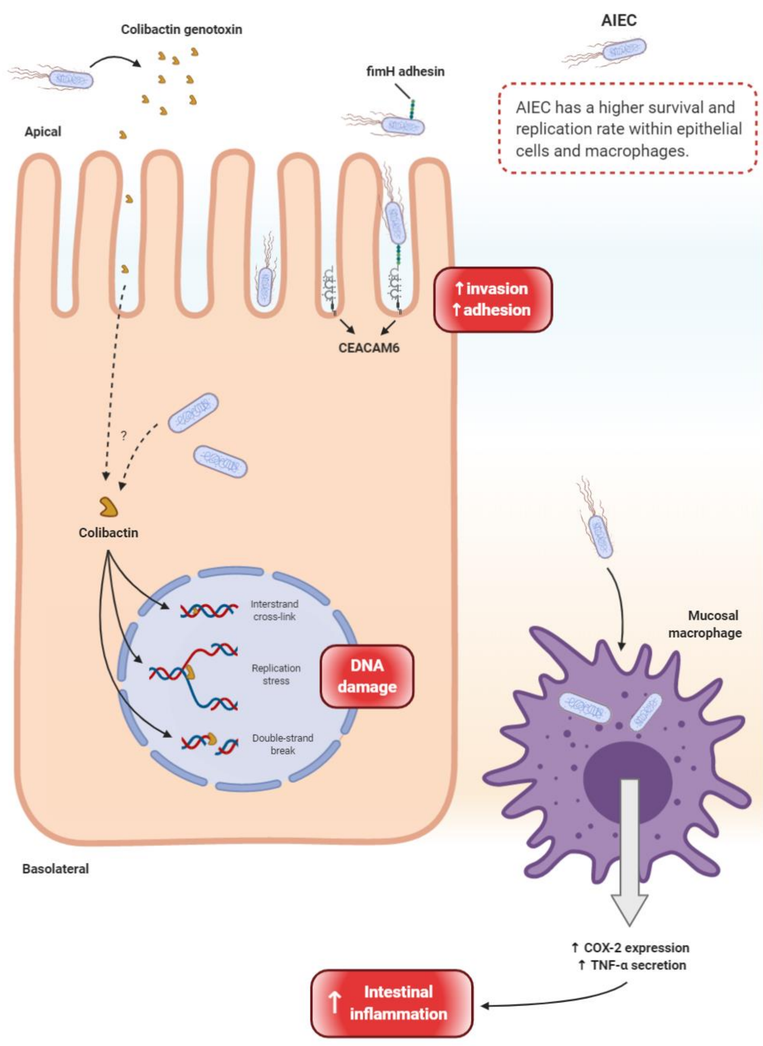

Figure 6. AIEC role in colitis chronification and its contribution to tumorigenesis initiation

CONCLUSIONS

- IBD patients have a protumoral microbial pattern that brings CRC susceptibility.
- Microbiota seems to contribute IBD-derived CRC, but it may not play the main role.
- ETBF and *F. nucleatum* seem to be more related to tumorigenesis initiation.
- AIEC mainly promotes colitis exacerbation and has a slight effect in tumorigenesis.
- Synergistic effect of microbiota, combined with other factors, could drive IBD-related CRC.

FUTURE PERSPECTIVES

- Monitoring IBD patients microbiota could help us understand the role of microbiota in IBD-related CRC, especially in those patients who develop CRC.
- Pathobionts could be potential prognosis markers and therapeutic targets in both IBD and CRC.

References

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