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# Probiotics and Prebiotics: the New Therapeutic Options

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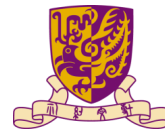
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11/12/2024

# Outline

- **Background**
- **Probiotic & Prebiotic in Disease Treatment**
- **Future Perspective**





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# Background

# Probiotic

## Probiotics in Dairy

Dairy products like yogurt, kefir, and certain cheeses contain probiotics, beneficial for gut health.



## Nutrient-Rich Dairy

Dairy is rich in calcium, protein, and vitamins essential for bone health and overall well-being.

## Probiotic Dairy Options

Yogurt, kefir, and some cheeses provide probiotics, supporting digestion and immune function.



## Incorporating Probiotic Dairy

Add yogurt or kefir to smoothies, use yogurt in breakfast bowls, and include cheese in snacks and meals. Soy beverages and yogurt are recommended for those with lactose intolerance..



# Probiotic benefits

- Reducing the incidence of antibiotic-associated diarrhea
- Managing digestive discomfort
- Reducing colic symptoms in infants
- Reducing necrotizing enterocolitis in infants
- Reducing symptoms of lactose maldigestion
- Treating acute pediatric infectious diarrhea
- Reducing upper respiratory tract or gut infections



# Probiotic therapy

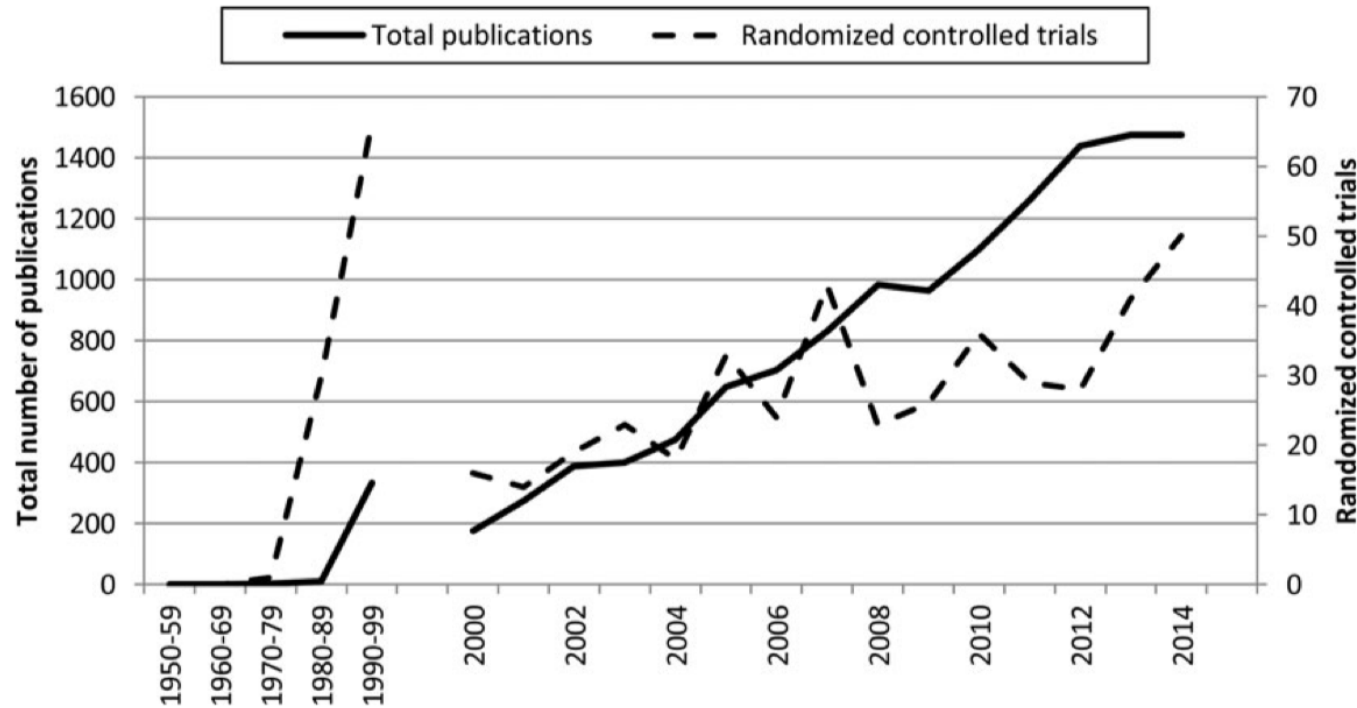


Figure 1. Number of publications and randomized controlled trials on probiotics from PubMed search

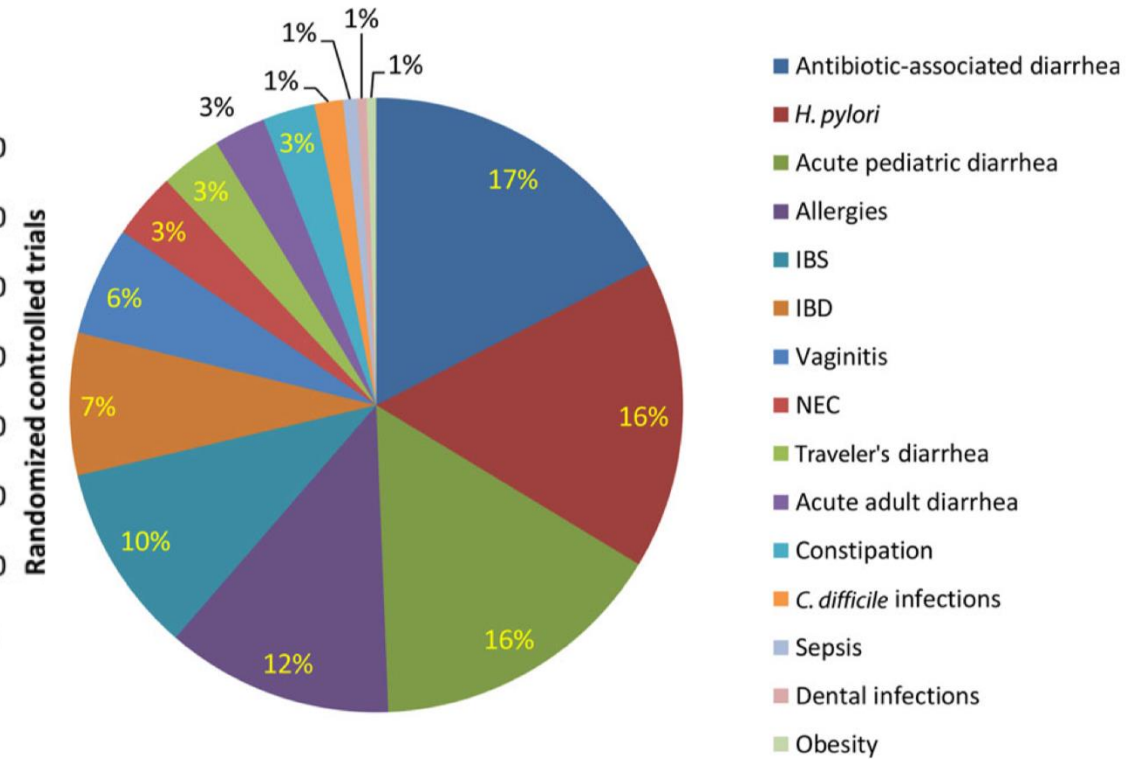
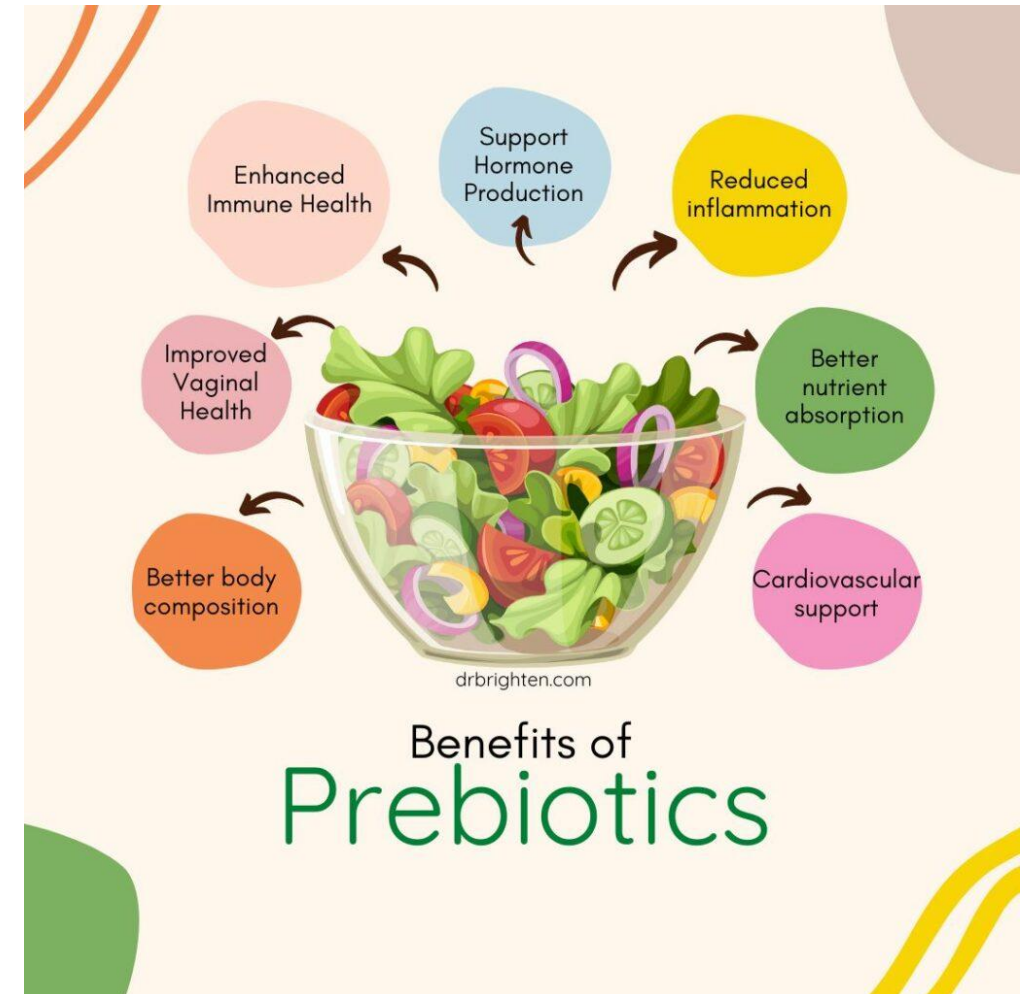
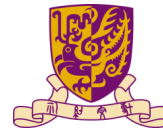


Figure 2. The 15 most commonly studied indications for probiotic therapy from 420 randomized controlled trials

# Prebiotic





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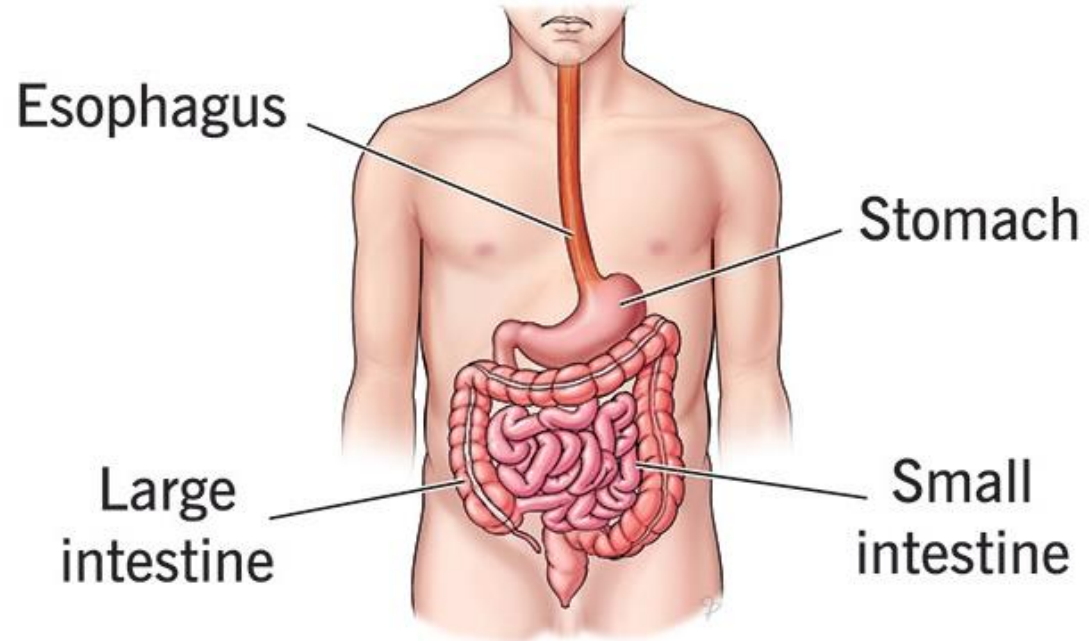


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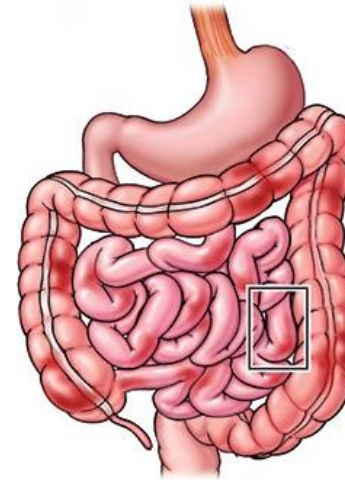
# Probiotic & Prebiotic in Disease Treatment

# Inflammatory bowel disease(IBD)

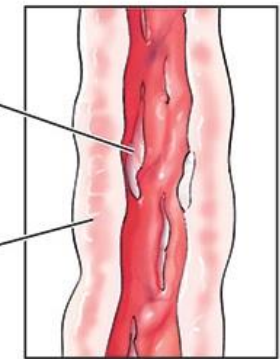
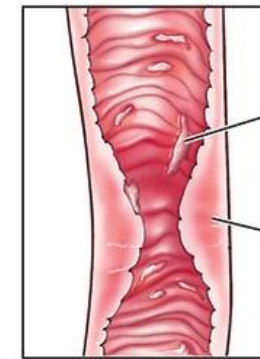
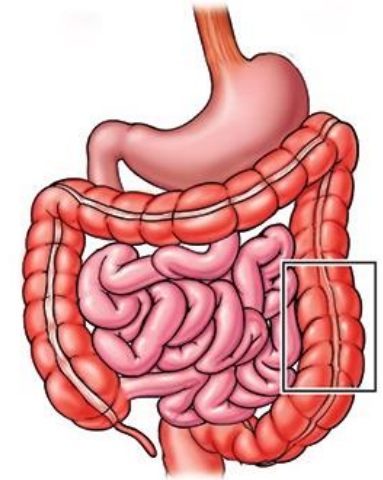
## Inflammatory bowel disease (IBD)



Crohn's disease



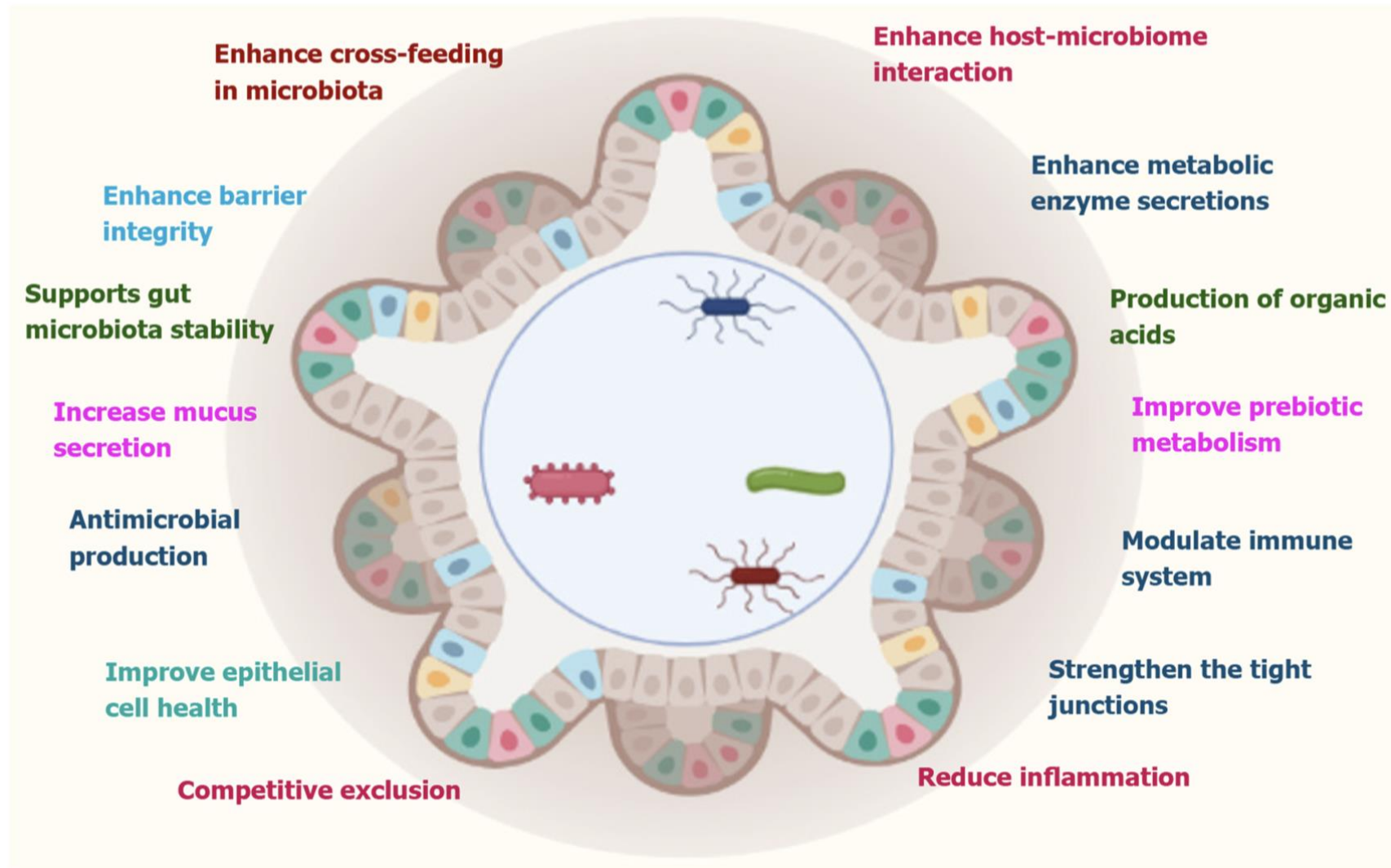
Ulcerative colitis



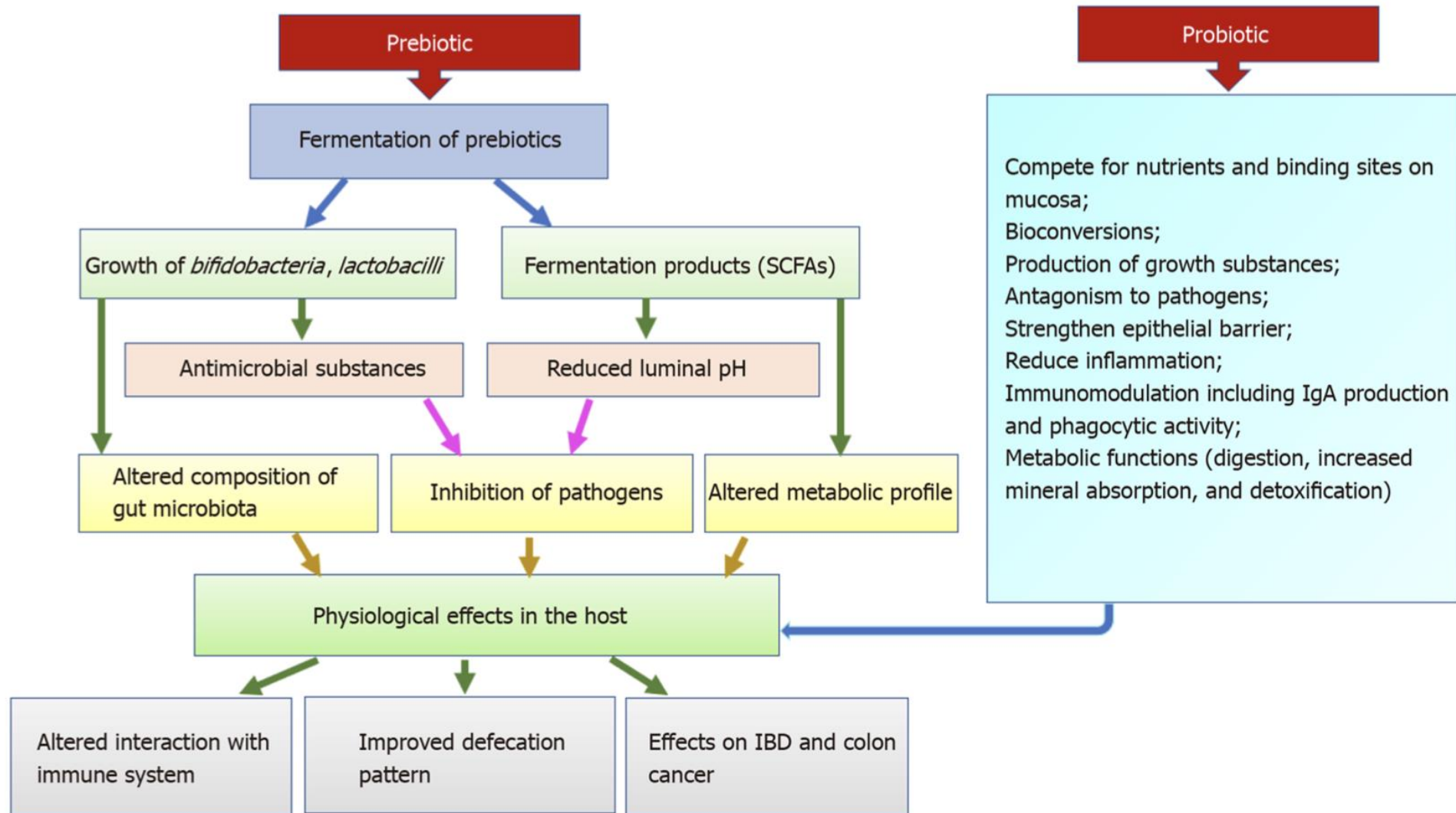
Ulcers

Inflamed tissue

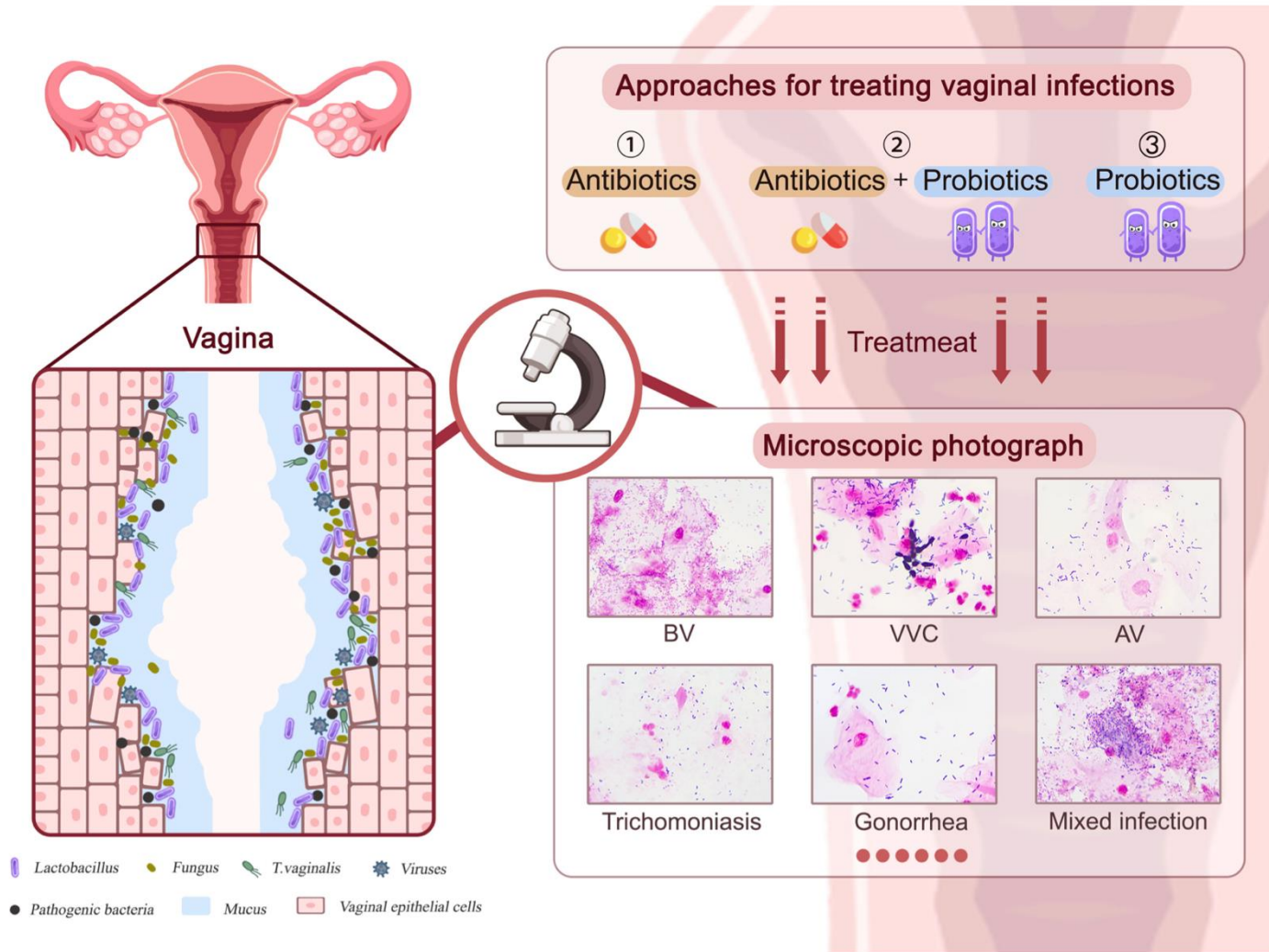
# Mechanisms of action of probiotics in IBD



# Mechanisms of action of prebiotics in IBD



# Vaginal infections



- BV: Bacterial vaginosis
- VVC: Vulvovaginal Candidiasis
- AV: Aerobic Vaginitis
- Epithelial cell and mucosal damage

The approaches to treating various vaginal infections

# Lactobacilli exhibit antibacterial activity in BV

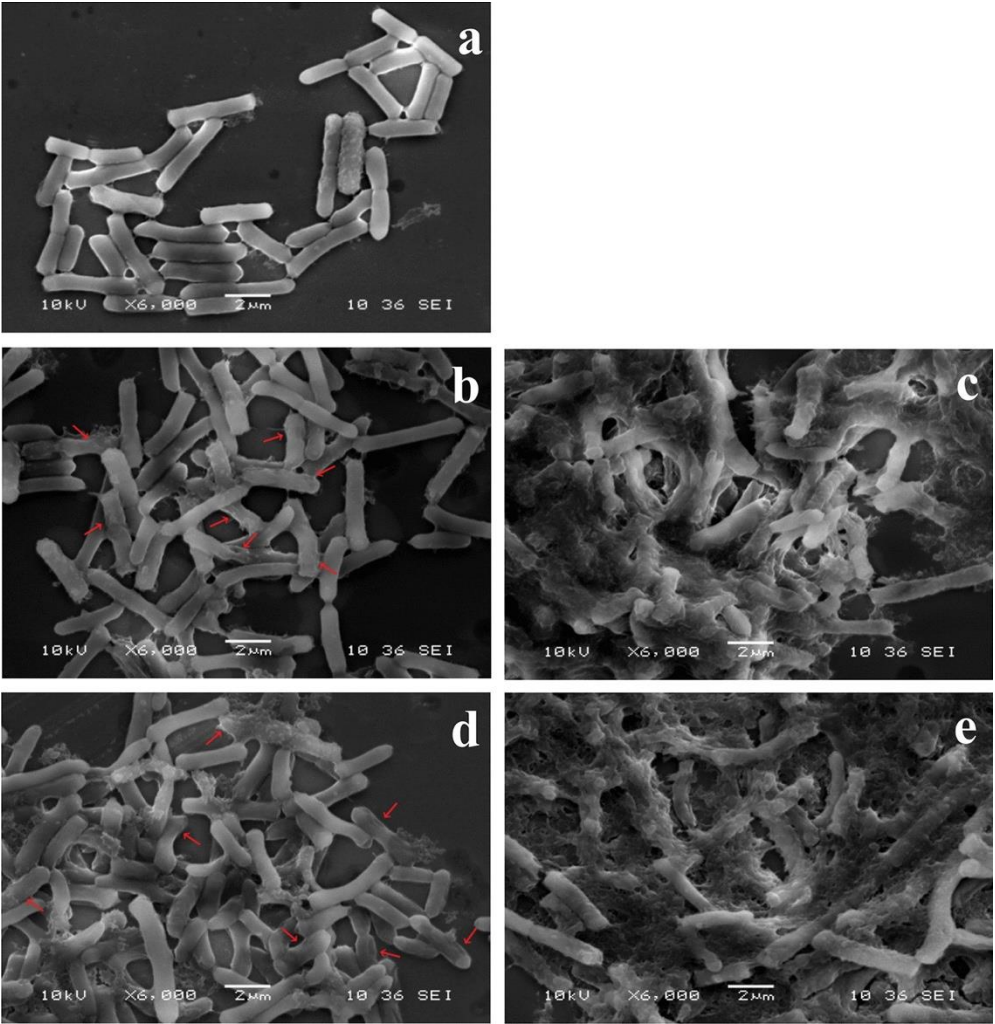


Figure 1. SEM images of *G. vaginalis* treated with acetic acid or lactic acid for 2 h

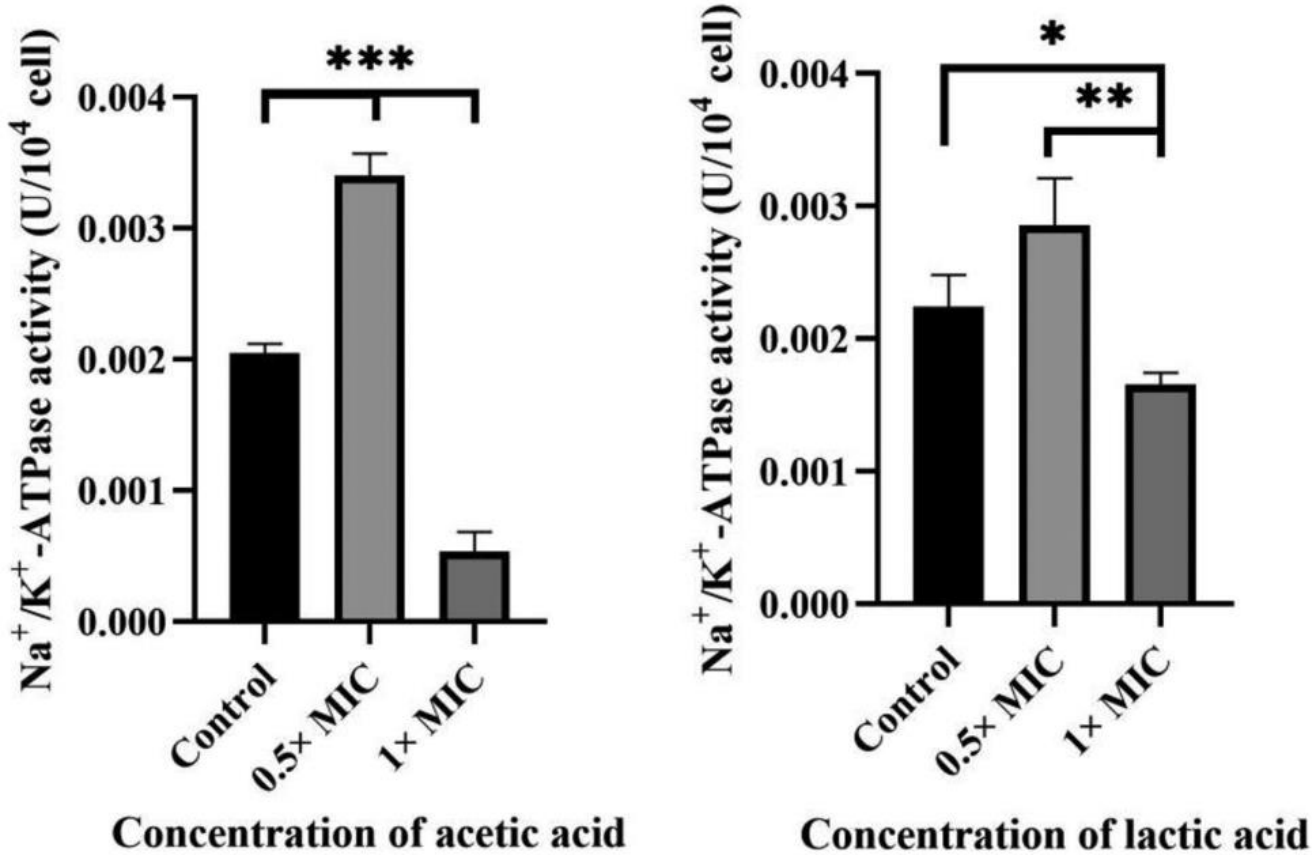


Figure 2. The effects of acetic acid and lactic acid on ATP concentration in *G. vaginalis*

# Prebiotics promote vaginal lactobacilli growth

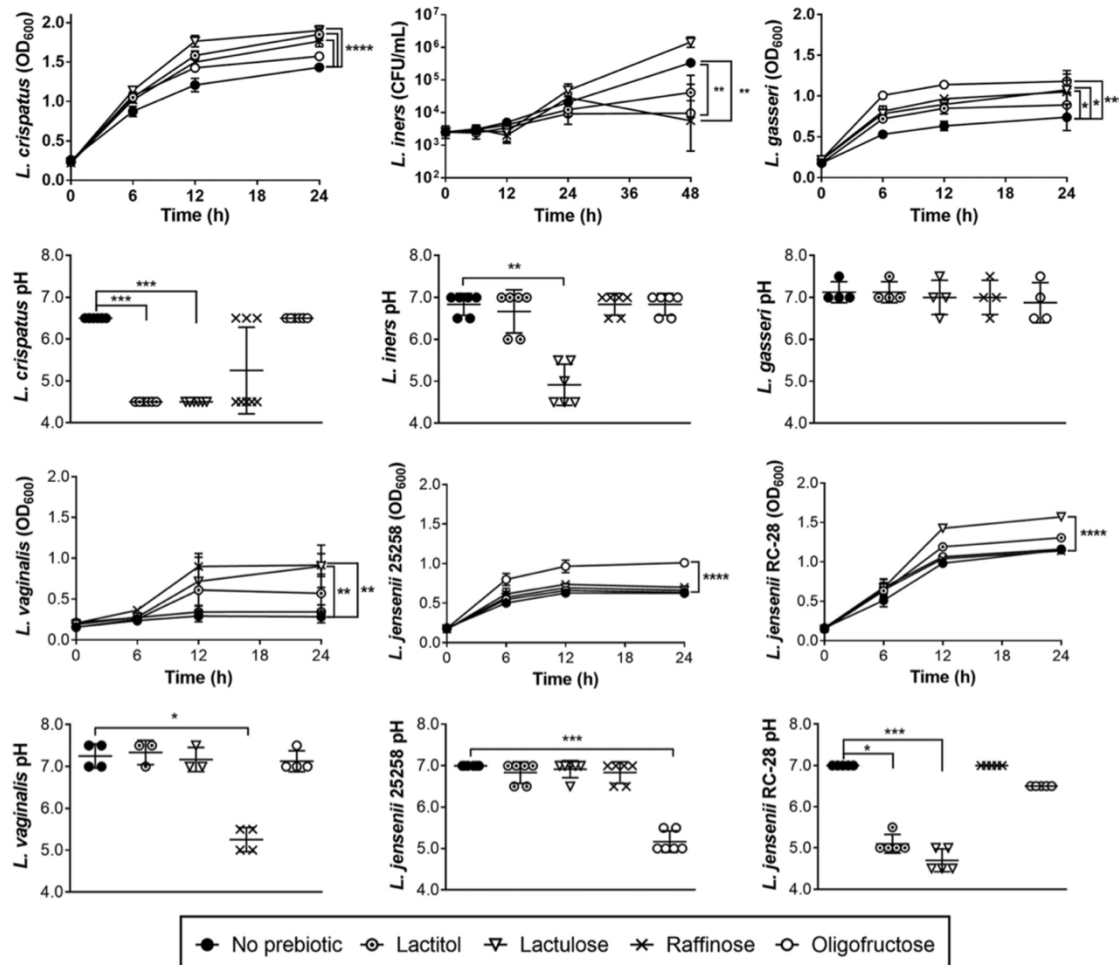


Figure 1. Growth and pH of vaginal lactobacilli cultured in prebiotics (lactitol, lactulose, raffinose, and oligofructose)

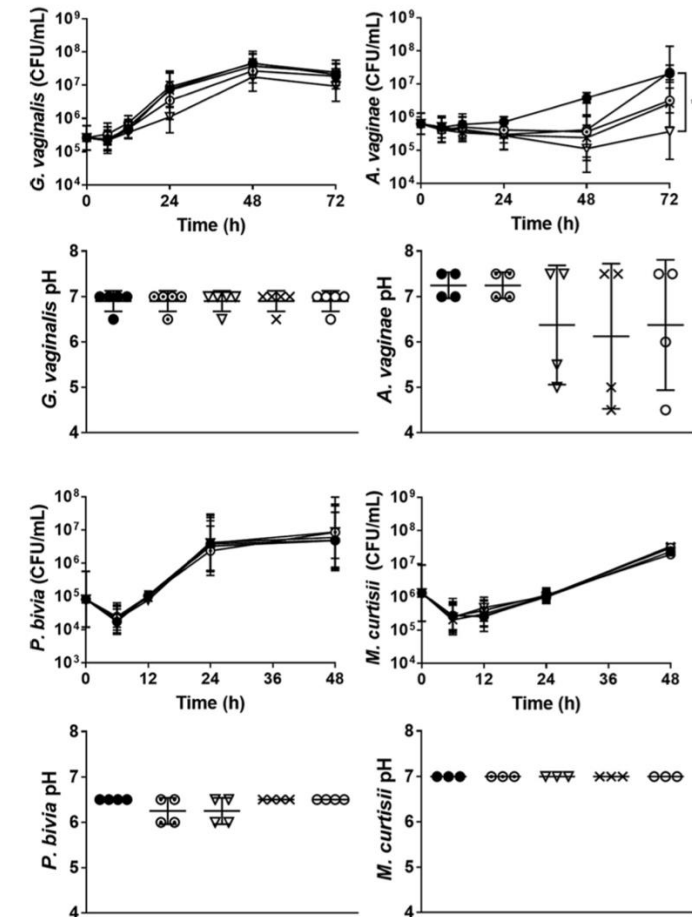


Figure 2. Growth and pH of *C. albicans* and BV organisms cultured in prebiotics

# Gut microbiota is important in the immune response to cancer treatment

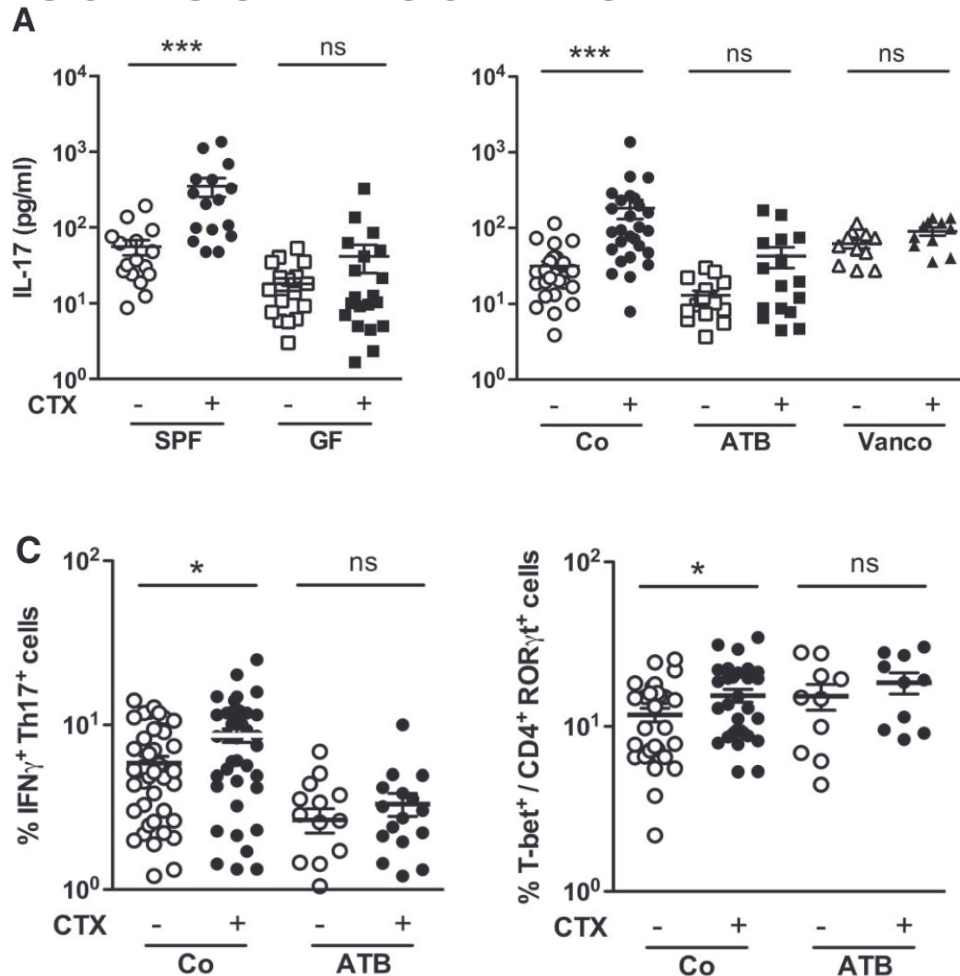


Figure 1. CTX-induced pTH17 effectors and memory TH1 responses depend on gut microbiota

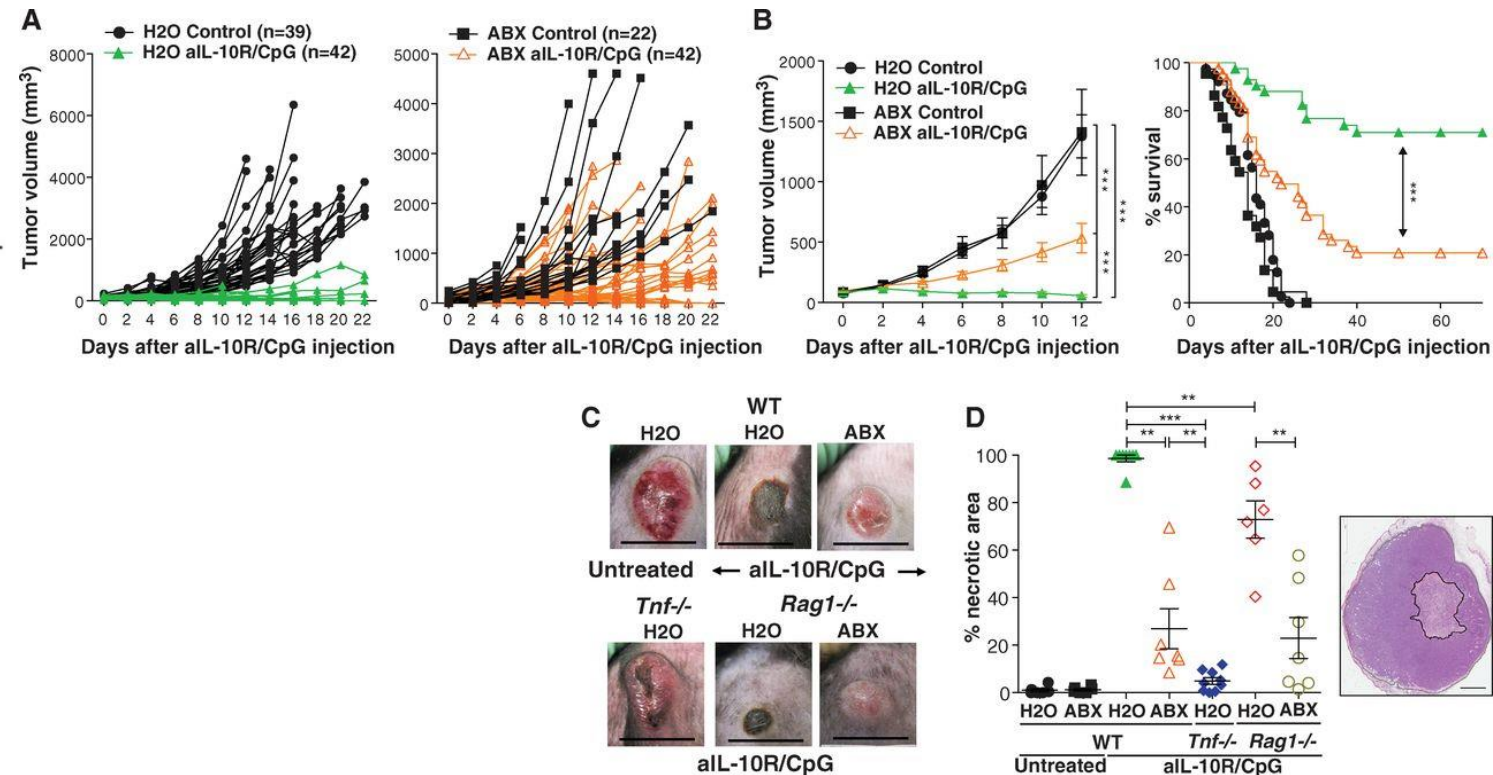


Figure 2. Oral administration of antibiotics impairs CpGODN-based immunotherapy

# *B.infantis* attenuate CRC chemotherapy mucositis

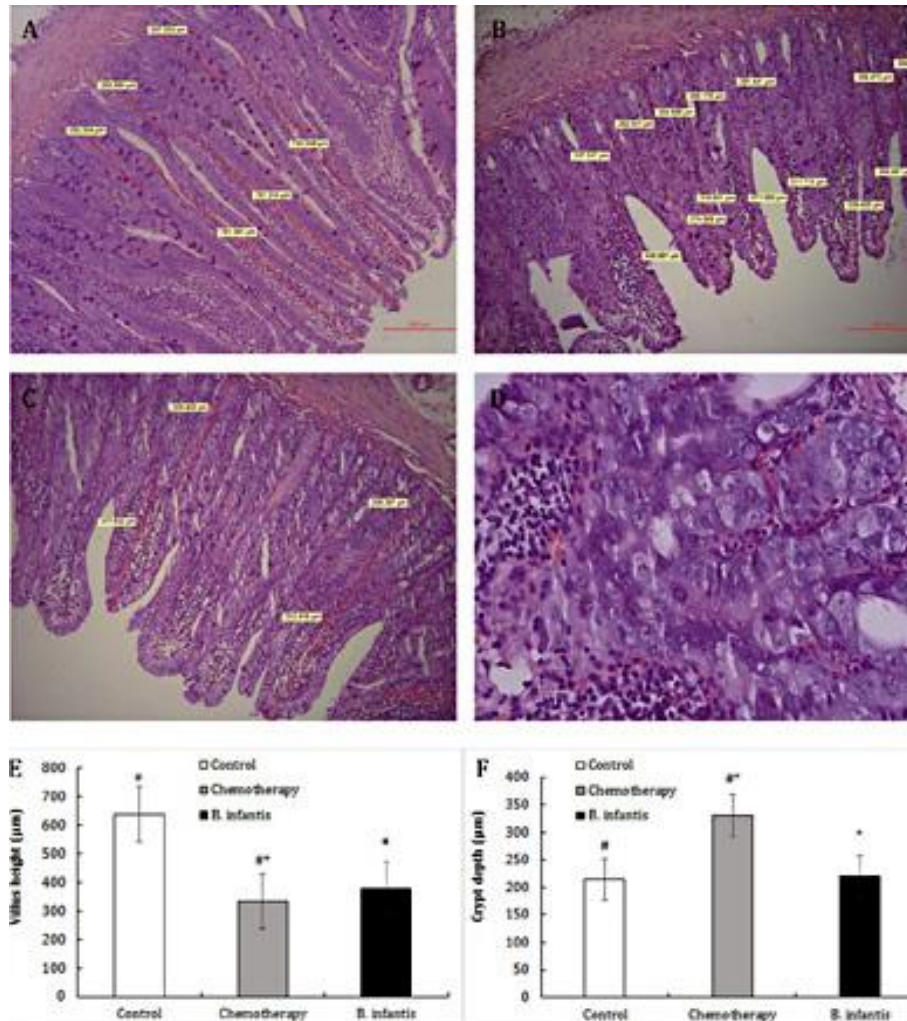


Figure 1. The microscope specimen of intestinal tissue that were collected from the rats

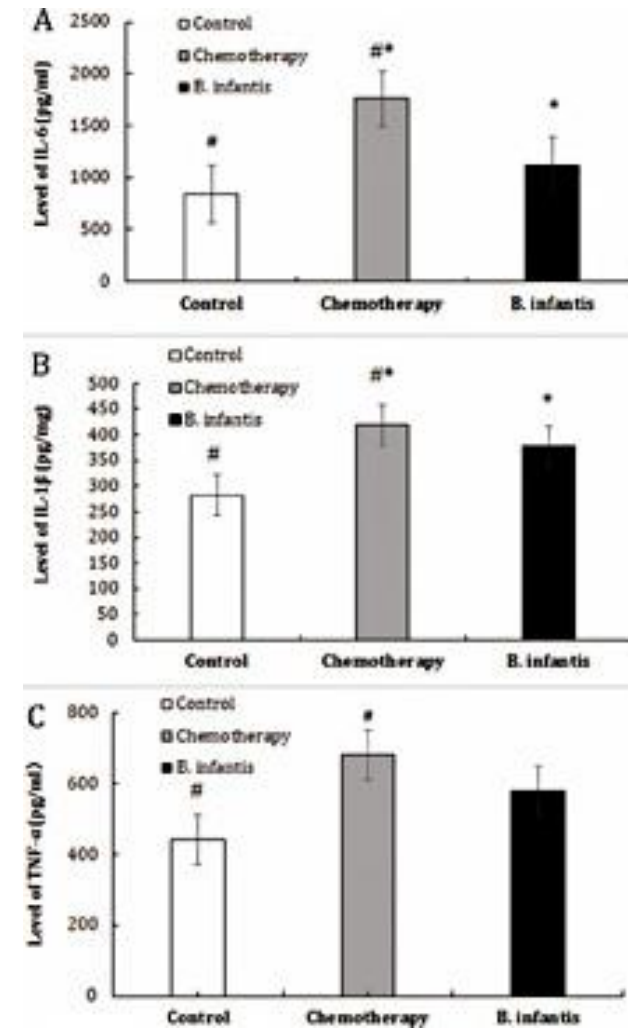


Figure 2. The level of IL-6, IL-1 $\beta$  and TNF- $\alpha$  determined by ELISA

# *L. Gallinarum* boost anti-PD1 efficacy in CRC

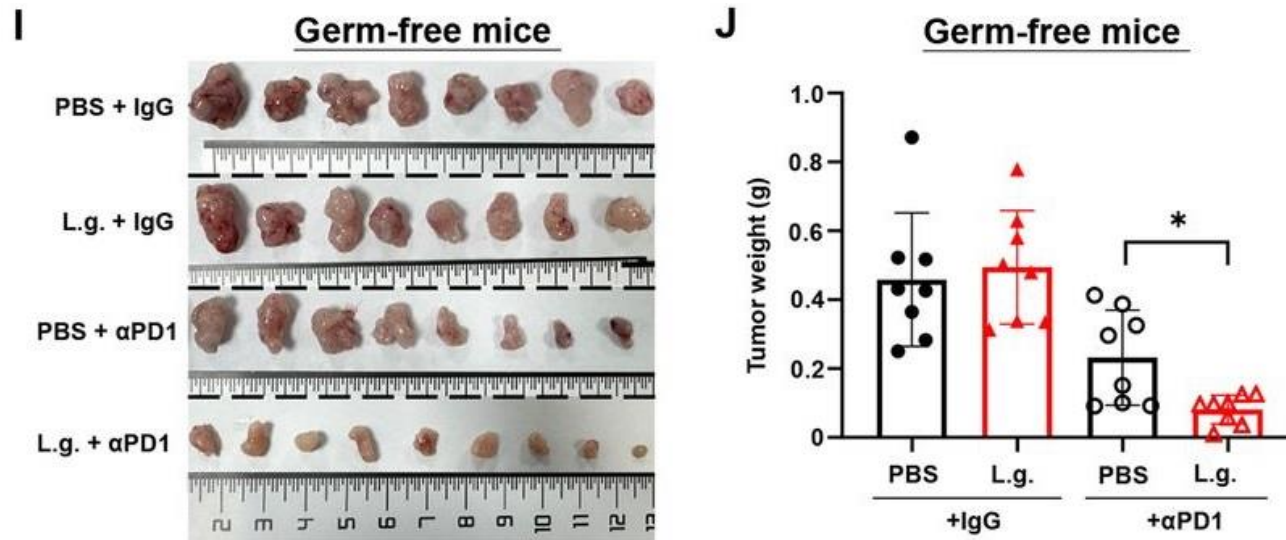


Figure 1. *Lactobacillus gallinarum* improved anti-PD1 efficacy in CRC mouse models

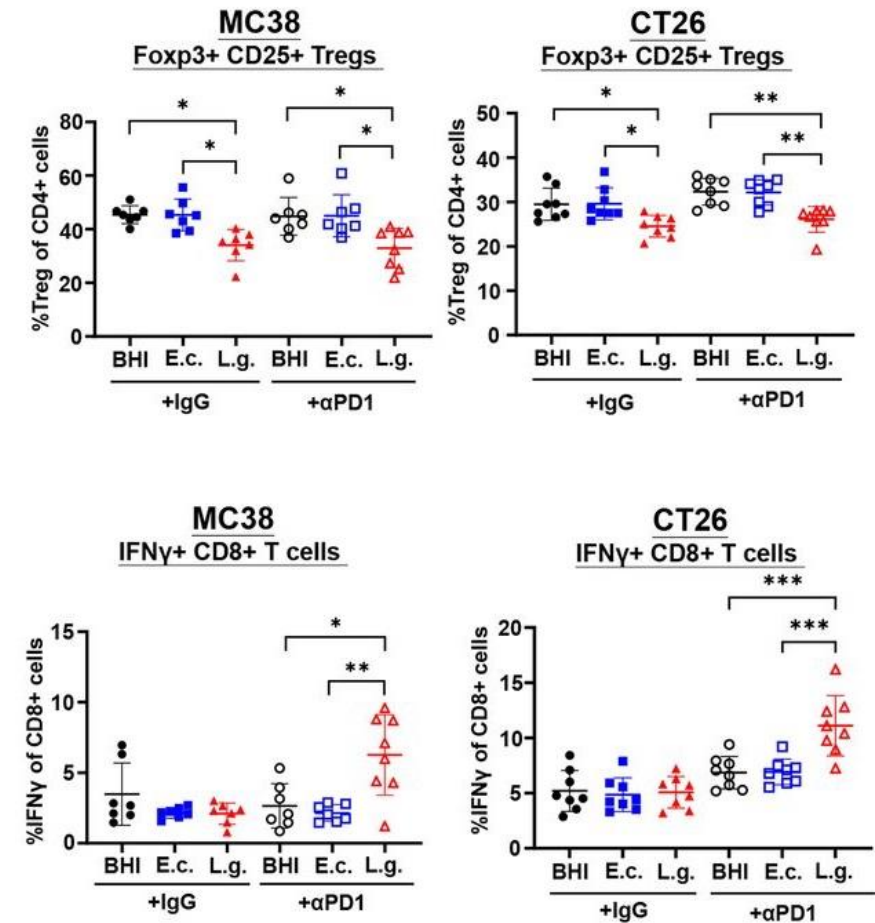
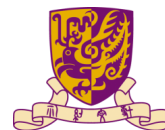


Figure 2. *L. gallinarum* reduced Foxp3+CD25+ Treg infiltration and increased IFNγ+CD8+ T cells in the tumour microenvironment



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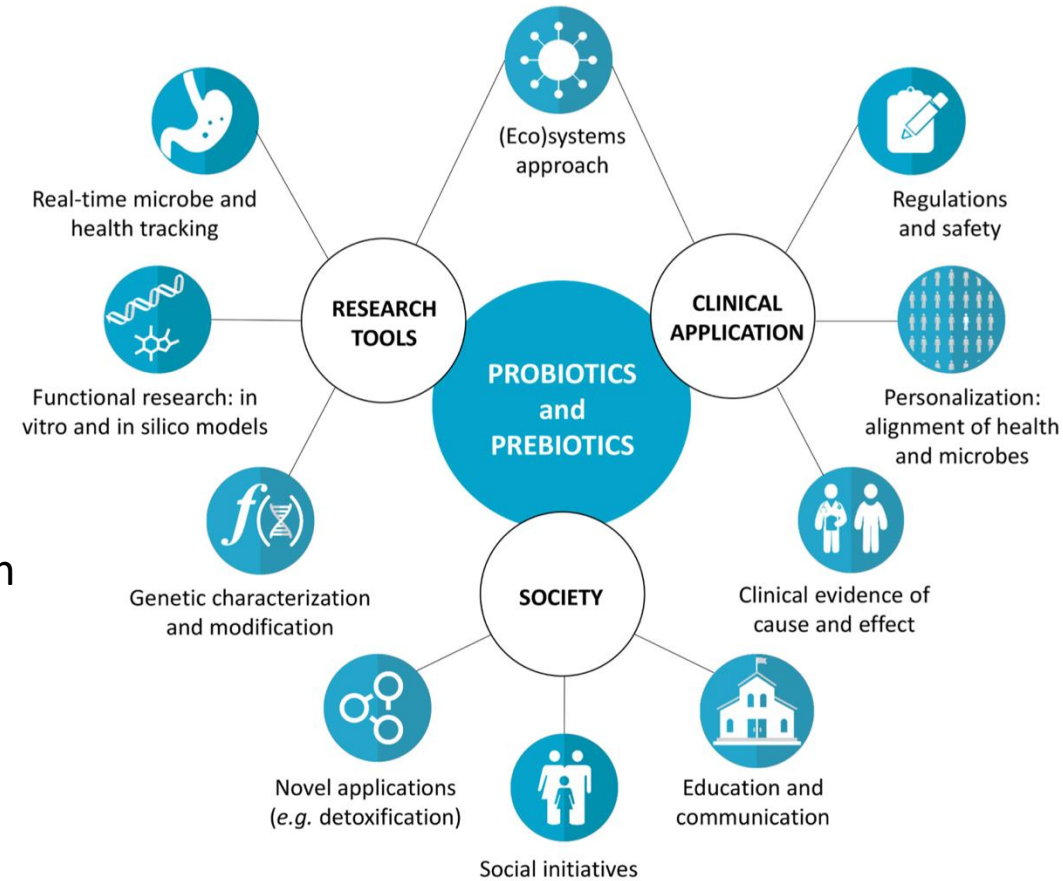


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# Future Perspective

# Future perspective

- Regulatory hurdles
- Strain-specific efficacy
- Large-scale clinical validation

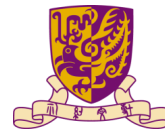


- The real-time interactions with the host
- The microbial functionality
- The individual factors
- The regulation and safety aspects
- The environmental and social needs

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**Thank you**