# Probiotic use in Pediatrics

**Probiotics:**
**Live** microorganisms that when consumed in **adequate** amounts, alter the host microflora and confer a health **benefit**.

## Probiotic Properties

- Able to resist processing and **survive** in the digestive tract
- Are **non-pathogenic** in a normal host
- Different strains have **unique** properties

## Intestinal Microflora

- Colonization of the gut begins **immediately** after birth
- Microflora composition is **influenced by**:
  - Gestational age
  - Delivery type (vaginal, c-section)
  - Antibiotic use
  - Environment
  - Diet (breast milk, formula)
- Addition of **solid** foods to diet causes the infant gut to resemble that of the **adult**

## Role of Gut Microflora

- **Intestinal** microflora support the intestinal mucosa **barrier function** by:
  - Increasing **mucin** secretion
  - Decreasing gut **permeability**
  - Modulating gut **immune** function
  - **Competing** with pathogenic bacteria for adhesion receptors and nutrients
- **Colonic** microflora **metabolize** malabsorbed carbohydrates into **short chain fatty acids:**
  - These are the enterocyte's **preferred** fuel
  - Also **acidifies** colon contents and increases water **reabsorption**

**Probiotics support these gut microflora functions!**

## Adverse Effects

- Probiotics have the potential to cause local or invasive **infection** in **any** patient
- Use with **caution** in those with a higher risk of infection: born **preterm**, immunocompromised

Probiotics effects on conditions are dependent on the **specific strain** and ensuring an **adequate dose**!

| Indication | Strains with the most evidence | Recommendations, definitions, and mechanisms | Evidence of Benefit |
|---|---|---|---|
| **Prevention of AAD** | LGG<br>S boulardii | AAD (Antibiotic associated diarrhea): ≥3 loose stools/day for ≥2 days, occurring up to 2 weeks after antibiotic initiation | Yes |
| **Treatment of Acute Viral Diarrhea** | LGG<br>Strain and dose dependent | Most benefit if started **within 48 hours** of illness<br>**Reduces duration** of diarrhea by 17-30 hours<br>**Rotavirus** is more responsive<br>**No** effect on **bacterial** diarrhea | Yes |
| **Prevention of NEC** | Bifidobacterium infantis, B bifidus, S thermophilus | NEC (necrotizing enterocolitis) pathology related to altered gut **permeability and microflora**<br>Promote the use of probiotics with **breastfeeding** in **preterm** infants **>1 kg** who are **at risk of NEC** | Yes |
| **Preventing infectious diarrhea** | Strain dependent | More effect in **non**-breastfed infants<br>Consider use in those who: live in **long term care** facilities or attend **daycare** and have **recurrent** infections | Modest |
| **IBS** | LGG, Escherichia coli, VSL#3 | IBS (irritable bowel syndrome) **symptom improvement**: abdominal distension, gassiness and IBS scores | Possible |
| **Infantile Colic** | L reuteri | Colicky infant guts have reduced levels of lactobacilli<br>May reduce **symptoms** of colic | Possible |
| **C difficile infection** | S boulardii | Possible role in **preventing** recurrent infections<br>**No** evidence in primary prevention | Possible |

**More evidence** needed **before** these potential indications can be recommended: Reduction of **respiratory infections**, **antibiotic use** and absences from daycare due to illness; treatment of **allergic colitis**; prevention of **traveler's diarrhea**; use in **preterm babies weighing <1 kg**; prevention and treatment of **atopic and allergic** disease.

**Reference: Canadian Paediatric Society (2019). *Using Probiotics in the Paediatric Population.* Retrieved from https://cps.ca/en/documents/position/probiotics-in-the-paediatric-population**

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Eileen Tu (Medical Student, C2023, University of Alberta), Dr. Karen Forbes (Pediatrician, University of Alberta), for www.pedscases.com