

Gut Microbiota and Child Health

An overview of potential factors influencing child gut microbiota and health from gestation to childhood

POSITIVE FACTORS

NEGATIVE FACTORS

During gestation – maternal factors that impact early health programming of the offspring via maternal microbiota and *in utero* colonisation¹⁻³

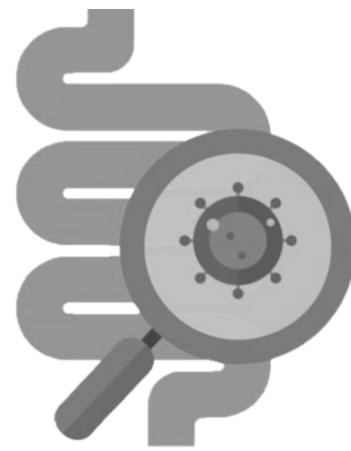
- Healthy diet (e.g. with good nutrition and lower in fat)
- Healthy maternal weight
- Appropriate weight gain



- Drugs (e.g. antibiotics)
- Stress
- Undernourished or high-fat diet
- Overweight
- Excessive pregnancy weight gain

At birth – infant is exposed to maternal microbiota^{2,3}

- Vaginal birth



- Cesarean section
- Preterm birth

After birth and up until childhood^{2,3}

- Breastfed, providing microbes and human milk oligosaccharides (HMOs)*
- Weaning to a diet with fibre, prebiotics and probiotics



- Formula-fed*
- Drugs (e.g. antibiotics)
- Stress
- Undernourished
- Unhygienic environment

*Effect is strongly associated with degree of exclusivity and duration, but not impacted by nursing or pumping feeding mode⁴

*Effect may be modulated depending on ingredients such as prebiotics present in the formulation

Dysbiotic gut microbiota in the child^{2,3}

- Such as with reduced diversity and less bifidobacteria



Associated with potential long-term health consequences in the child^{2,3}

- **Immune:** Asthma, allergy
- **Metabolic:** Obesity, diabetes, non-alcoholic fatty liver disease
- **Cognitive:** Attention-deficit-hyperactive disorder (ADHD),⁵ autism⁶



腸道菌群及兒童健康

由孕期到兒童時期對兒童腸道菌群及健康的潛在影響因素

正面因素

懷孕時期的母體因素 - 可影響媽媽自身以及胎兒在子宮內的菌群，從而影響早期胎兒健康編程 (early health programming)¹⁻³

- 健康飲食 (例如良好營養及進食較少脂肪)
- 健康體重
- 適合的孕期體重增長

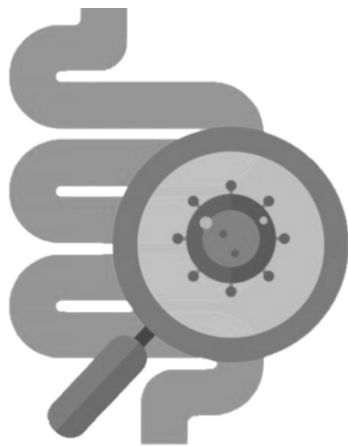


負面因素

- 藥物 (例如抗生素)
- 壓力
- 營養不良或高脂肪的飲食
- 過重
- 孕期體重增長過多

出生時 - 嬰兒會接觸到媽媽的菌群^{2,3}

- 自然分娩



- 剖腹分娩
- 早產

出生後至兒童時期^{2,3}

- 母乳餵哺, 提供微生物及母乳低聚糖 (HMOs)*
- 斷奶後的飲食包括纖維、益生元及益生菌



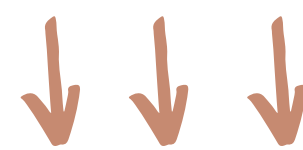
- 配方奶餵哺*
- 藥物 (例如抗生素)
- 壓力
- 營養不良
- 環境不衛生

*效果與母乳餵哺的程度及持續時間有強烈關係，但不受直接餵哺或泵奶的形式影響⁴

*效果可被配方奶中的益生元等成分影響

孩子的腸道菌群生態失調^{2,3}

- 例如低多樣性及較少的雙歧桿菌 - bifidobacteria



與孩子的長遠健康息息相關^{2,3}

- 免疫：哮喘、過敏症
- 代謝：肥胖、糖尿病、非酒精性脂肪肝
- 認知：過度活躍症、⁵ 自閉症⁶

