INFANTMET: Infant Nutrition for Programming the Gut Microbiota in Neonates

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Key external stakeholders:

Food manufacturers, dairy industry, pharmaceutical companies, research communities; public health agencies and health professionals; policymakers.

Practical implications for stakeholders:

- Establishment of the intestinal microbiota commences at birth and the microbiota has a major role in protection against pathogens, maturation of the immune system and metabolic welfare of the host.
- In terms of infant health, it is imperative to understand how early infant nutrition influences the development of a healthy gut microbiota.
- Breast Milk is the Gold Standard feeding regime for newborn infants and represents a baseline for the functional performance of infant formulae.
- In this prospective study, we compared the gut microbiota of initially breastfed infants born at Cork University Maternity Hospital, who were born under different birth modes (standard vaginally delivered and Caesarean section) and different gestational ages (full-term and pre term). We investigated the effect of both of these factors on the establishment of the nascent gut microbiota of breast fed infants.
- Delivery mode and gestation age have significant effects on early neonatal microbiota composition.

Main results:

- Standard Vaginally delivered Full-Term infants' microbiota remained stable at both phylum and genus levels during the first 24 week period.
- Caesarean section delivered Full-Term infants' displayed a different microbiota composition compared to Standard Vaginally delivered infants, with an increased faecal abundance of Firmicutes and decreased Actinobacteria abundance one week after birth.
- The microbiota of Caesarean section delivered infants displayed a greater flux than that seen in Standard Vaginally delivered infants over the first 24 weeks of life, and gradually progressed to a microbiota closely resembling Standard Vaginally delivered Full-Term infants over that period.
- The gut microbiota of preterm infants displayed a significantly greater abundance of Proteobacteria compared to full-term infants ($p < 0.001$) at week 1.
- The data uniquely show the longitudinal effect of preterm birth after the infant leaves the hospital environment.
- A bank of infant intestinal strains (mainly *Bifidobacterium* and *Lactobacillus*) has been generated as future potential probiotics for the infant nutrition and health markets.

Opportunity / Benefit:

The INFANTMET data provide new opportunities for optimisation of infant milk formula composition, with appropriate new bioactive ingredients such as milk fractions, probiotics and prebiotics to effectively programme the early infant gut microbiota in a manner closer to mothers milk.

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Collaborating Institutions:

APC Microbiome Institute: University College Cork & Cork University Maternity Hospital,

Project team: Prof. Catherine Stanton, Prof. Paul O' Toole, Prof. Tony Ryan, Prof. Gene Dempsey, Prof. Paul Ross, Carol-Anne O' Shea, Kiera Murphy, Cian Hill, Claire Watkins.

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PUBLICATIONS

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