Fate of fructans during fermentation by infant faecal inocula

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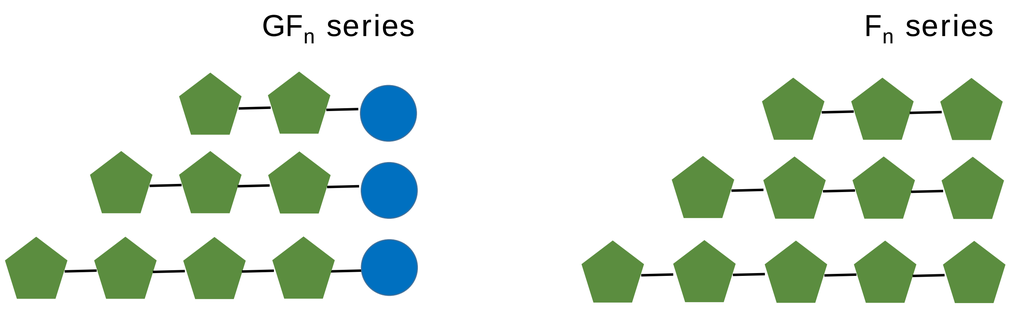
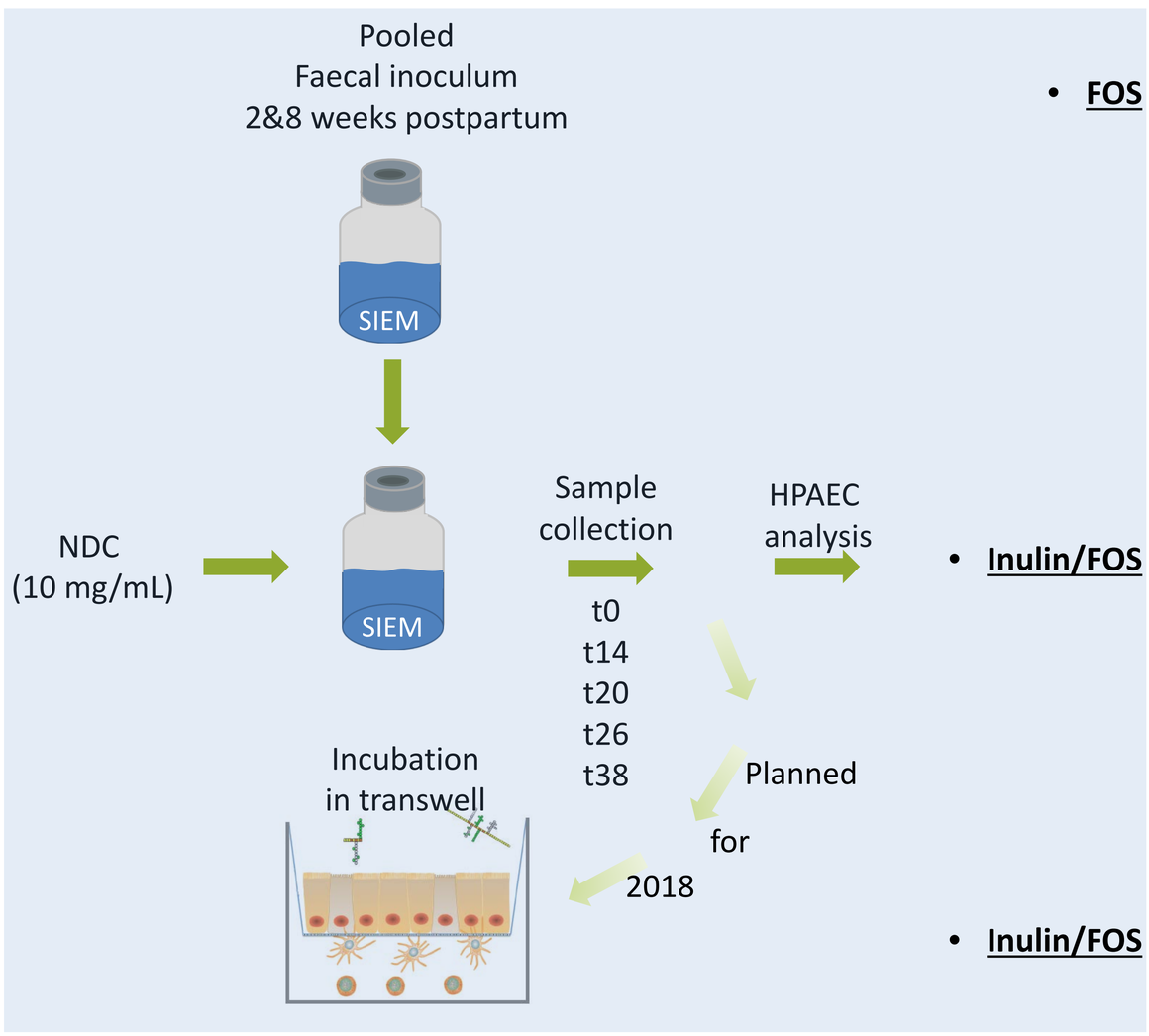
Background

Gut microbiota guide the development of a balanced immune system and support maturation of the gut barrier in infants. Mother-milk has been considered the golden standard for steering the colonization of the infant gut. Human milk oligosaccharides responsible for this effect can be replaced by non-digestible carbohydrates (NDCs) in cow-milk derived formulas. Potential NDCs which will be illustrated here are fructo-oligosaccharides (FOS) and inulin. Both consist of β(2-1) linked fructosyl moieties with (GF) or without (F) terminal glucose unit. The DP of FOS ranges between 3-9 while inulin reaches up to DP 60.



Schematic overview of FOS; GF$_n$ and F$_n$ serie with glucose (●) and fructose (⬟)

Schematic overview experimental set-up

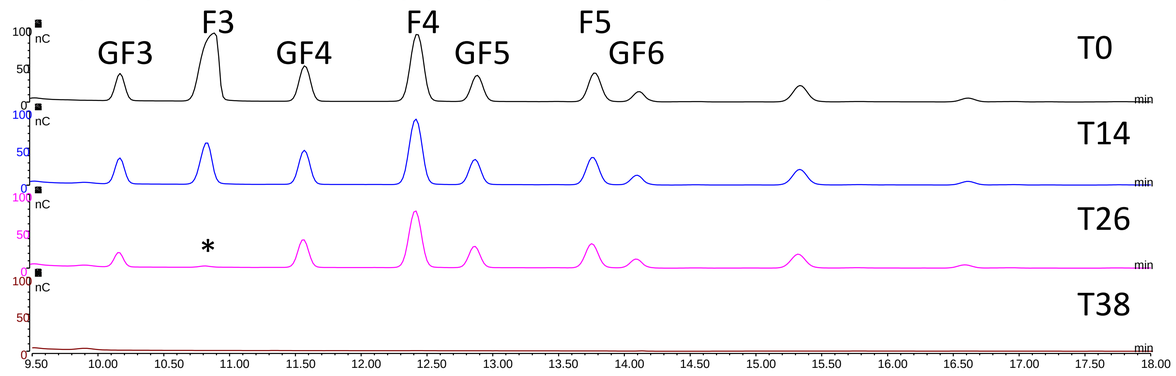


Objective and approach

Structural characterization of NDCs and their (glycosyl) fermentation products and determining their impact on barrier function and T-cell polarization will reveal NDC structure-dependent immune effects.
Batch fermentation of FOS and inulin was performed using pooled infant faecal inoculum of 2 and 8 weeks old infants. Samples were taken at different time points and analysed by HPAEC to study their fate during fermentation. In a later stadium of this project the fermentation digesta will be applied on an *in vitro* model of the infant intestine.

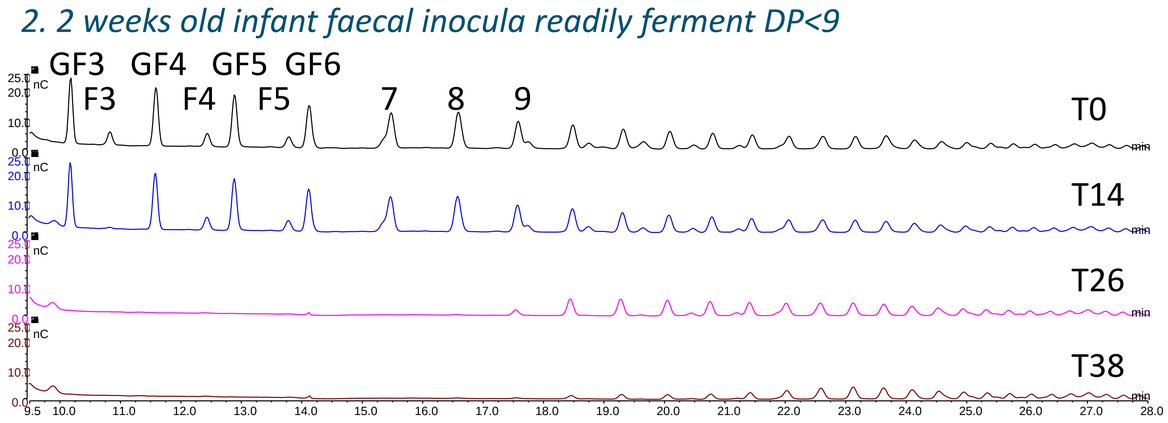
Results & Discussion

1. Infant faecal inocula prefer to ferment FOS DP3 having a terminal fructose



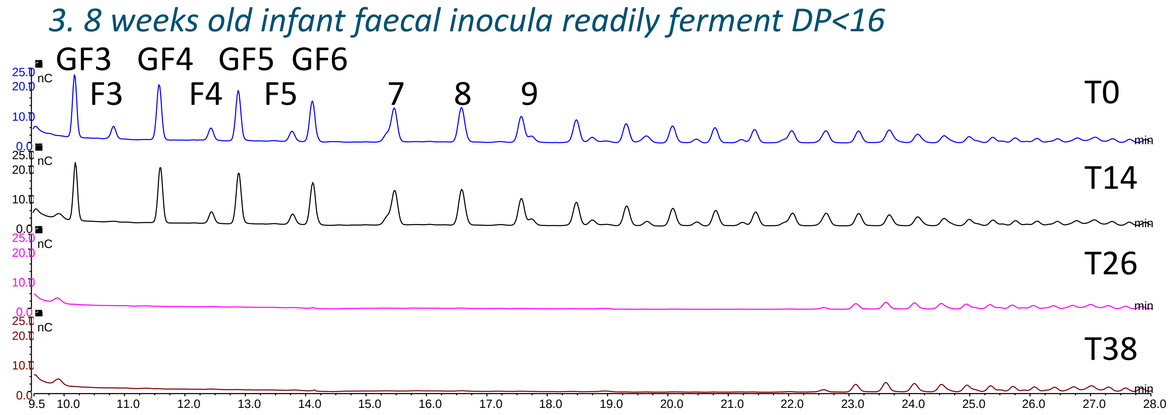
Fate of FOS during in vitro fermentation using faecal inoculum of 2 weeks old infants
Similar pattern found for faecal inoculum of 8 weeks old infants (not shown)

2. 2 weeks old infant faecal inocula readily ferment DP<9



Fate of FOS/inulin during in vitro fermentation using faecal inoculum of 2 weeks old infants

3. 8 weeks old infant faecal inocula readily ferment DP<16



Fate of FOS/inulin during in vitro fermentation using faecal inoculum of 8 weeks old infants

Conclusion

- Preference for FOS DP 3 having a terminal fructose over other FOS for both 2 and 8 weeks old infant faecal inoculum
- 8 weeks old infant faecal inoculum is capable of degrading higher DP inulin than 2 weeks old infant faecal inoculum

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