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5th International Whey Conference

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Whey, the gut microbiota and the influence on human health

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Whey Components

- ~ α -lactalbumin
- ~ Lactose
- ~ Galactooligosaccharides



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The Gut Microbiota

- ~ 500-1000 different species
- ~ ~95% cells within the body
- ~ Influence health and disease



Intestinal
putrefaction

Production of carcinogens

Diarrhoea, infections,
toxin production, cancer,
toxigenesis, genotoxicity.

- Ps. aeruginosa***
- Proteus sp.***
- Staphylococci**
- Clostridia**
- Veillonellae**

- Enterococci**
- E. coli***

- Sulphate Reducers**
- Lactobacilli**
- Streptococci**
- Bifidobacteria**
- Bacteroides**

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Inhibition of growth
of exogenous and
harmful bacteria

Digestion/ absorption of
food ingredients &
minerals

Stimulate
immune
function

Vitamin
synthesis

11 No./g faeces (log scale)



Influencing the Gut Microbiota

- ~ **Probiotics** - *A live microbial feed supplement which beneficially affects the host*
- ~ **Prebiotics** - *Non digestible food ingredients that selectively stimulate a limited number of bacteria in the colon, to improve host health*

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α -lactalbumin

- ~ Whey protein (25%)
- ~ Bifidogenic?
- ~ Reductions in potential pathogens?

Bruck *et al.*, (2003) J Pediatr Gastroenterol Nutr; 37:237-280



α -lactalbumin and glycomacropeptide

~ Rhesus monkey feeding study

4 feeding groups

- è Breast milk
 - è Whey-rich formula
 - è Whey-rich formula & α -lactalbumin
 - è Whey-rich formula & glycomacropeptide
-
- è At 4.5 months – EPEC



Rhesus Monkey Study....

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Feeding Group**Diarrhoea?**

Whey Formula

Acute

Glycomacropeptide

Present – sporadic

 α -lactalbumin

None

Breast fed

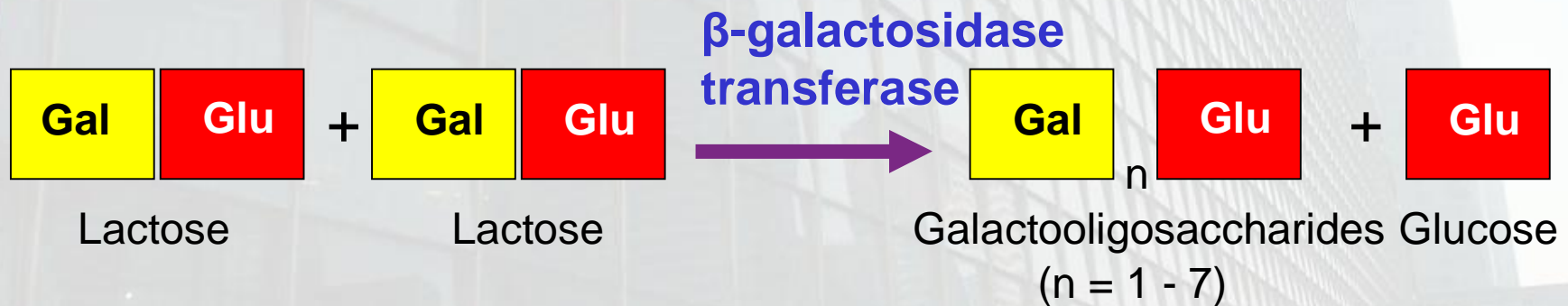
None

The faecal microbiota of breast fed and α -lactalbumin were the most similar.



Lactose and Galactooligosaccharides

- ~ Lactose is the main whey carbohydrate
- è Used to make GOS





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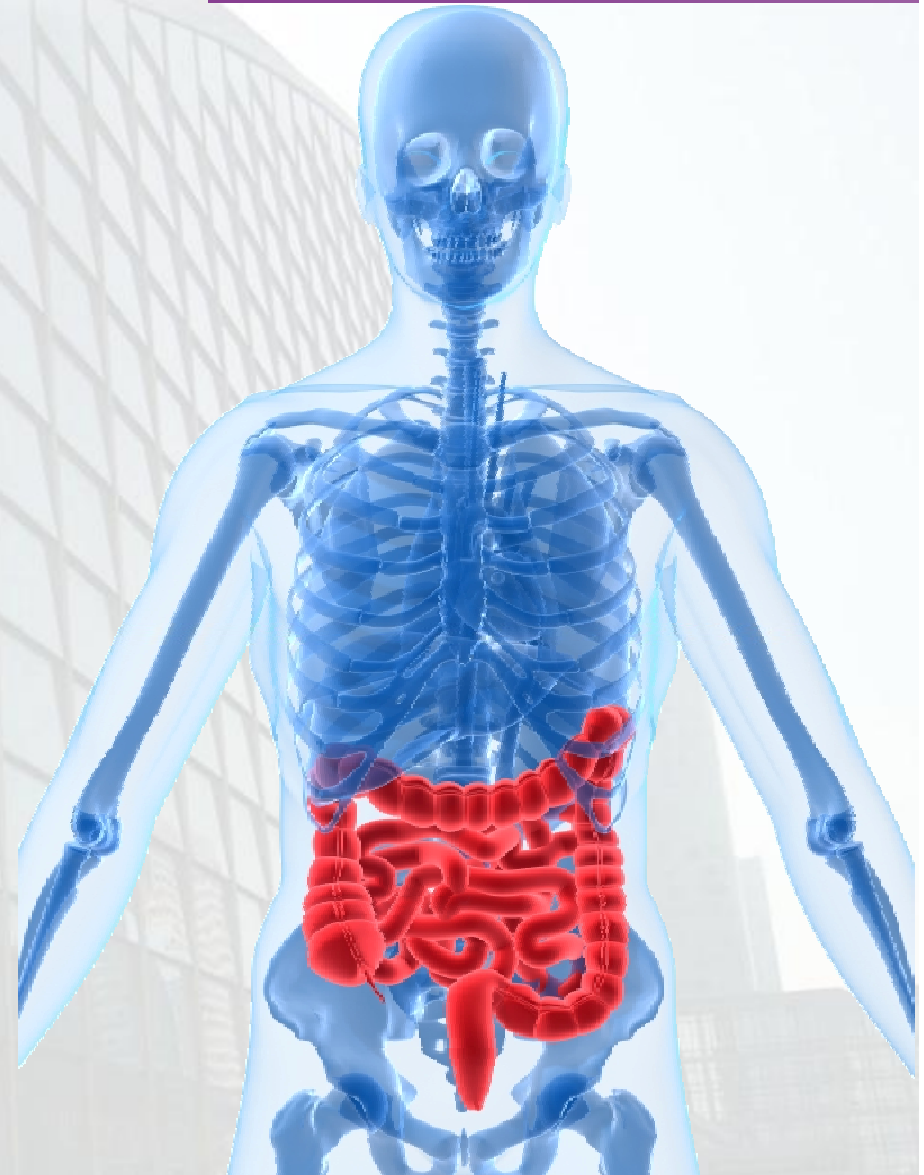
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Galactooligosaccharides and health

- ~ Bifidogenic
- ~ Increased calcium absorption (osteoporosis)
- ~ Relief from constipation
- ~ Reduced CRC associated risk factors





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Irritable Bowel Syndrome

- ~ 44 volunteers
- ~ 3.5g, 7g GOS or placebo
- ~ 4 weeks

- ~ Increased bifidobacteria
- ~ Alleviated symptoms
- ~ Improved stool consistency



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Assessing CRC risk factors

- ~ The balance of the microbiota
- ~ Enzymes produced by the microbiota
- ~ End products of fermentation





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GOS – Protection from CRC?

- ~ Fischer 344 rats
 - è High GOS
 - è Low GOS
- ~ 2 & 3 weeks AOM injection
- ~ After 10months
 - è Tumour incidence



Whey fermented by bifidobacteria

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- ~ Concentrated whey - *B. breve* C50
- ~ Commercial milk - *S. thermophilus* and *B. breve* C50
- ~ Fed to healthy adults
 - è Faeces
 - è Bacterial metabolising enzymes



Fermented Whey Study.....

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	Bifidobacterium spp.	Ba. fragilis	Cl. perfringens	nitroreductase*	β -glucuronidase *
Bifidobacteria fermented whey	↑	↓	↓	28.4 ↓ 5.4	20.4 ↓ 12.8
Fermented milk	—	↓	↓	20.4 ↓ 14.5	14.1 ↓ 11.3

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Conclusions

- ~ Whey – an important dietary ingredient – many health implications
- ~ Currently it is estimated 5% whey used effectively
 - è more dietary incorporation could be beneficial to gut and overall health

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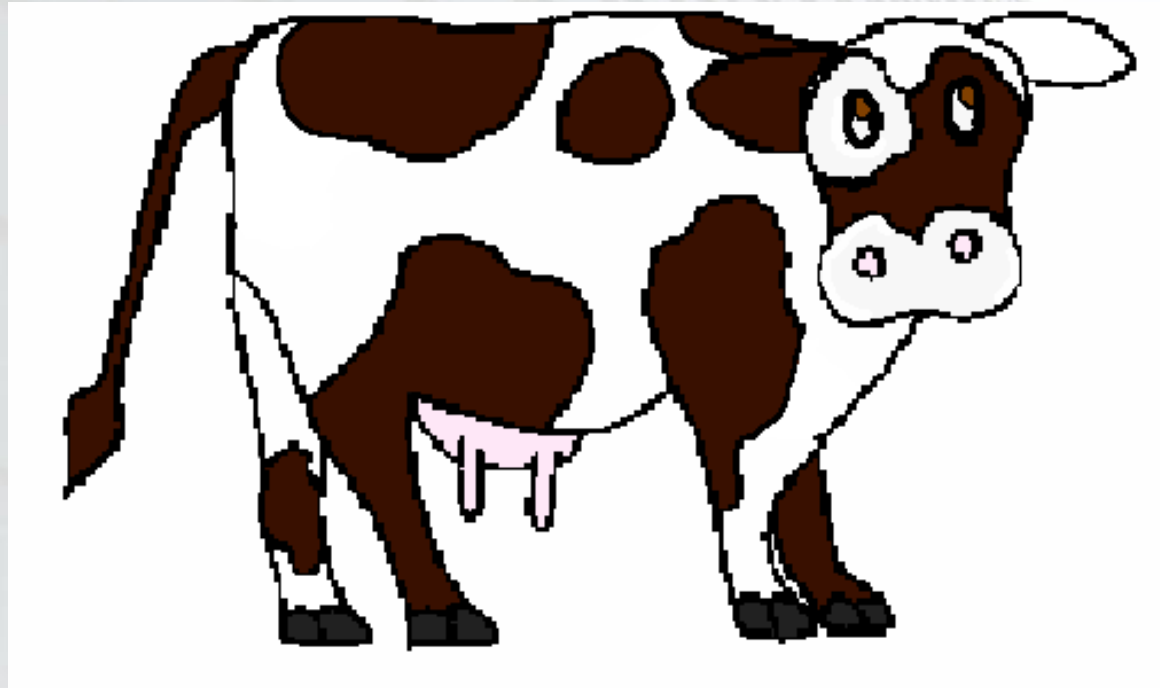
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The whey forward?



Thank you!

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