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IMPORTANT NOTICE: Breastfeeding is the best way of feeding a baby during the first 6 months of life and is preferred whenever possible. Infant formula for special medical purposes must be used under medical supervision, after full consideration of all feeding options, including breastfeeding. Continued use of an infant formula for special medical purposes should be assessed on a case-by-case basis in relation to the baby's progress, and bearing in mind any social and financial implications for the family.

Headline

Discovering bovine milk oligosaccharides (BMOs)

Danica Yau Accredited Practising Dietitian (DAA), MSc, BSc (Hons)



Bovine colostrum contains nutrients and many other biologically active constituents including growth factors, antimicrobial compounds and immune-enhancing components¹. They are important as the role of milk in the first few days of life is to provide protection for the calf against infections while the immune system is still developing¹.

Oligosaccharides, defined as carbohydrates that contain between three to ten monosaccharide units linked together by glycosidic bonds, are important bioactive components in human milk¹. **These human milk oligosaccharides (HMOs) have proposed functions including stimulation of specific beneficial bacteria in the gut, and protection against pathogens by acting as competitive inhibitors on the epithelial surfaces of the intestine^{1,2}.** While human colostrum contains 22 to 24 g/L of HMOs, bovine colostrum contains only around 1 g/L oligosaccharides and content level decreases rapidly after the first 48 hours³. Nonetheless, there is still immense interest in the structural characterization and functions of these bovine milk oligosaccharides (BMOs)³.

Both human and bovine milk contain a class of oligosaccharides called sialyloligosaccharides, especially during the early stages of lactation⁴. A study by Austin *et al.* found the **presence of 3-sialyllactose (3'-SL) in all samples of human milk from Chinese mothers (n = 466,**

from five different lactation stages, which are 5-11 days, 12-30 days, 1-2 months, 2-4 months and 4-8 months respectively), and it was the predominant form of sialyllactose in human milk from two to four months after birth⁵. Another study also found that over the course of lactation, there was a drop in the concentration of HMOs such as 2'-fucosyllactose (2'-FL), Lacto-N-neotetraose (LNnT) and 6'-sialyllactose (6'-SL), especially from one to two months, while 3'-SL remained at a relatively constant concentration from one month onwards⁶.

Correspondingly, the most abundant acidic oligosaccharide reported in bovine colostrum is 3'-SL¹. Together with 6'-SL, they make up >50% of total oligosaccharides present in bovine colostrum¹. The chemical structure of these BMOs are similar to the ones in human milk, and are believed to also carry bioactive functions that can be used in milk products¹. Preclinical data showed 3'-SL may work as an effective inhibitor of the binding of pathogen *H. pylori*¹, and some *H. pylori*-positive monkeys were cured permanently after given 3'-SL alone, showing its possible use in antiadhesive therapy to decrease *H. Pylori* colonization⁷.

How can BMOs be isolated

- While fluid bovine milk only contains trace amounts of BMOs, whey permeate can provide a concentrated source of complex BMOs that have the structural resemblance and diversity of HMOs²
- Whey permeate is a by-product from the passage of cheese whey through an ultrafiltration membrane, where whey proteins are trapped by the membrane and smaller molecules such as lactose, salts and BMOs can pass through, making up the whey permeate⁴

(Continued on P.2)

Since HMOs carry important biological functions to support immune health, commercially viable analogs of HMOs could prove to be valuable too^{2,3}. Due to the structural similarity, it is

a reasonable assumption for BMOs to carry functional attributes for human nutrition when added in food products¹.

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Info Card 2018 Issue 3

Gestational Diabetes Mellitus Fact Sheet



A summary of the latest science on gestational diabetes mellitus

Distribution of the Info Card by healthcare professionals is welcomed. Electronic copy is available on the WNSC HK website under "WNSC Publications" for download and reprint.

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Latest Science

FDA review on the physiological effects of non-digestible carbohydrates

Danica Yau Accredited Practising Dietitian (DAA), MSc, BSc (Hons)

The U.S. Food and Drug Administration (FDA) recently proposed **eight additional non-digestible carbohydrates that should be classified as dietary fibre, on the basis that these carbohydrates contribute to at least one physiological endpoint which is beneficial to our health.** Below is a summary on the review of scientific evidence carried out by FDA.

Previous non-digestible carbohydrates classified:

- Beta-glucan soluble fibre
- Psyllium husk
- Hydroxypropylmethylcellulose
- Guar gum
- Locust bean gum
- Pectin
- Cellulose



The additional non-digestible carbohydrates considering to be included as dietary fibre:

Type	Description	Beneficial effects
Mixed plant cell wall fibres	Mixture of components such as cellulose, hemicelluloses and pectin found in plant cell walls	Same physiological effects as individual fibres, such as improved laxation from cellulose
Arabinoxylan	Major component of cell walls of cereal grains	Improvement in blood glucose and insulin levels
Alginate	Used as food additives as the ingredient sodium alginate and sodium algin	Beneficial effect on post-prandial glucose levels
Inulin and inulin-type fructans	Mostly extracted from plants, with various common names including: inulin, fructo-oligosaccharide (FOS), oligofructose (OF)	Positive physiological effect on bone mineral density and calcium absorption
High amylose starch	Found in foods such as raw green bananas and raw potatoes, with common name as high-amylose maize (corn) starch	Beneficial effect on post-prandial insulin levels
Galacto-oligosaccharides (GOS)	A prebiotic added to foods, with functions such as bulking agent	Beneficial physiological effect on calcium absorption
Polydextrose	Added to foods with functions such as humectant and texturizer	Reduction in energy intake during subsequent meals
Resistant maltodextrin/dextrin	Used as ingredients such as soluble corn (wheat) fibre	Increase in the absorption and body retention of calcium, as well as bone formation

Reference: Food and Drug Administration, U.S. Department of Health and Human Services. Review of the scientific evidence on the physiological effects of certain non-digestible carbohydrates. 2018.

Poll Corner – Do you know?

Question: Do you know which nutrient(s) support(s) neurodevelopment including myelination?

A. Choline

B. DHA

C. Iron

D. All three of them

Interested in
knowing more?

Read the WNSC HK Bulletin 2018 Issue 1 to discover more about:

- Latest Science - The connections between myelination nutrition and cognition

Available at: <https://hongkong.wyethnutritionsc.org/en/publications/bulletin/2018-issue-1>

Scan to view more:



Answer: D

References: 1. González HF and Visentin S. Arch Argent Pediatr. 2016;114(6):570-575. 2. Georgieff MK. Am J Clin Nutr. 2007;85(suppl):614S-620S. 3. Beard JL and Connor JR. Annu Rev Nutr. 2003;23:41-58.

Monthly Health Focus

International Group B Strep Awareness Month

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Group B *Streptococcus* (GBS) has been a leading contributor to undesirable maternal and newborn outcomes worldwide¹. During the International Group B Strep Awareness month in July, GBS awareness was actively promoted².

GBS naturally lives in human bodies and 1 out of 4 pregnant women are colonized with GBS². **The Royal College of Obstetricians and Gynaecologists (RCOG) does not recommend bacteriological screening for all pregnant women, but it advises clinicians should be aware of clinical risk factors that may elevate the risk of having a baby with early onset GBS (Table 1)**³.

Association between preterm birth and maternal GBS colonization has been observed⁴. In addition, GBS-infected children exhibited poorer health outcomes including more frequent and longer hospitalization as well as higher risk of having problems with genitourinary and nervous systems whereas moderate to severe neurodevelopment impairment was reported in around 1 out of 5 GBS meningitis survivors^{5,6}.

Maternal immunization is a promising remedy against GBS infection in newborns⁷. Although researches on vaccine are still in progress⁷, intervening immune responses through vitamin D might be a potential alternative. **Higher dietary intake of vitamin D (mcg/day) was related to a reduced likelihood of testing positive for recto-vaginal GBS (OR = 0.87; 95% CI: 0.77 – 0.98) among pregnant adolescents**⁸. Vitamin D is proposed to interfere GBS colonization through its regulatory proteins like cubilin⁹.

Want to create GBS awareness? Please visit:

https://www.groupbstreptinternational.org/july_gbs_awareness_month.html

Table 1. List of risk factors associated with increased risk of early onset GBS

- Having a previous baby with GBS disease
- Identification of maternal GBS carriage through bacteriological investigation during pregnancy (e.g. a urine infection or a swab taken to investigate a vaginal discharge)
- Preterm birth
- Prolonged rupture of membranes
- Suspected maternal intrapartum infection (e.g. suspected chorioamnionitis)

GBS in Hong Kong

- GBS colonization in pregnant women¹⁰ - 14.6%
- Incidence of early onset GBS¹¹ - Approximately 1.0 per 1,000 births

GBS is the commonest cause of severe early onset infection in newborns with high rate of illness and death - 5 to 10%¹¹



References: 1. Seale AC et al. Clin Infect Dis. 2017;65(suppl 2):S200-S219. 2. Group B Strep International. International Group B Strep Disease Awareness Month. Available at: https://www.groupbstreptinternational.org/july_gbs_awareness_month.html. Accessed on 25Jul2018. 3. RCOG. Green-top guideline No. 36. 2017. 4. Bianchi-Jassir F et al. Clin Infect Dis. 2017;65(suppl 2):S133-S142. 5. Yeo KT et al. Arch Dis Child. 2018. pii: archdischild-2017-314642. 6. Kohli-Lynch M et al. Clin Infect Dis. 2017;65(suppl 2):S190-S199. 7. Song JY et al. Hum Vaccin Immunother. 2018;1-13. 8. Akoh CC et al. J Pediatr Adolesc Gynecol. 2017;30(1):71-75. 9. Akoh CC et al. J Reprod Immunol. 2017;121:42-48. 10. Chung JKO et al. J HKIMLS Ltd. 2011-2012;13:No 1 & 2. 11. HK DoH. Prevention of neonatal Group B Streptococcus infection. 2013.

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Wyeth Nutrition Science Center HK



Featured News

Hong Kong – City with the highest life expectancy in the world

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Since 2015, Hong Kong has overtaken Japan to become the population with the highest life expectancy in the world for women^{1,2}. Having steadily increased over the past 47 years, **Hong Kong's life expectancy at birth for both men and women has since climbed to global top spots in recent years leading with 81.7 years for male and 87.7 years for female in 2017³**. While reports from the United Nations projected that Hong Kong will continue this reign for the next several decades, the Hong Kong government has also echoed this postulation, projecting that in the year 2066, the average life expectancy for men and women will continue to inch upwards to a historic high of 87.1 and 93.1 years respectively^{4,5}.

With an ageing demographic in Hong Kong coupled to longer life expectancies, the impact of chronic diseases and dependencies thus becomes a greater burden than ever for individuals and societies alike^{6,7}. More importantly then, **the focus on ageing should not simply be fixated on the number of years, but also on the quality of life of these year⁷**. Centenarians (those ageing over 100) and supercentenarians (over 105) are often regarded as model cases for 'successful aging' as they generally have better retention of their independence, cognition, and functional capability for extended period compared to the general population⁷. To provide a snapshot, the 2001 population census estimated that there were 697 Centenarians in Hong Kong⁸.



In a recent effort to determine what are some of the most important drivers of successful aging at extreme old age, Japanese researchers conducted a longitudinal

study of an unprecedentedly large group of semi-supercentenarians comprising of 1,554 individuals from three community-based prospective cohorts: Tokyo Oldest Old Survey on Total Health (TOOTH), Tokyo Centenarians Study (TCS), and Japanese Semi-Supercentenarians Study (JSS). **The study concluded that for successful aging up to extreme old age, a key malleable determining factor is inflammation – a better predictor of capability and cognition than even gender or age⁷**.

Inflammation is often associated with an increased risk of a range of chronic diseases – a factor undermining longevity and optimized health^{6,9}. Evidences suggest that a diet high in fruit and vegetables may provide protection against inflammation, as they are rich sources of beneficial nutrients with antioxidants and anti-inflammatory properties⁹. **As a recommendation for preventing chronic diseases, WHO suggests a daily intake of 400 grams or 5 servings of fruit and vegetable¹⁰**.

Geographically, Hong Kong benefits from having both a land and marine access to China and neighboring Asia markets allowing for an abundance of choice for fresh fruits and vegetables¹¹. Yet, a survey in 2016 showed that 79.2% of HK residents aged 18-64 years are consuming less than the recommended 5 servings of fruits and/or vegetable per day¹⁰. Hence, **encouraging adequate intake of fruit and vegetable should be an essential part of healthy eating**.

In sum, living in a city with the highest life expectancy in the world, adopting a healthy diet, as well as making other healthy lifestyle choices, are amongst just some of things that we can do every day to help promote good health and optimizing quality of life as we continue on our quest for graceful aging.

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