FACTSHEET

THE DEVELOPING ROLE OF PROBIOTICS IN INFANT HEALTH

DURING PREGNANCY AND AFTER BIRTH

THE GUT MICROFLORA

The trillions of microorganisms in the gut play an essential role in supporting strong immune and digestive systems. Having the optimum balance is important for everyone but especially important during pregnancy, birth and breastfeeding to give the infant the best possible start in life.

THE GUT FLORA AND IMMUNITY

Particularly in early life, the composition of the gut flora profoundly influences the development of the gut mucosal lining[1] and the corresponding immune system[2,3]. Up to 70% of immune cells are located within the gut[4]. It appears that the infant's immune system is activated by the gut flora and it is thought that it is the wide mixture of bacterial species, opposed to one individual strain that influences its development[5]. Probiotics have been shown to positively influence the infants gut flora balance and developing immune system[6], showing promising results in the prevention and treatment of infectious diarrhoea and allergy in particular in infants[7]. Probiotics taken during pregnancy and given to infants from birth seem to increase resistance to common coughs and colds and reduce the need for antibiotic use[8].

THE GUT FLORA AND ATOPIC DISEASES

Over the last 50 years there has been a substantial increase in the incidence of allergic diseases, such as eczema, asthma and hay fever. Allergy is a malfunction of the immune system[5], so it is not surprising that an imbalance in gut flora has been observed in atopic infants[13]. The 'hygiene hypothesis' suggests that with the relative sterilisation of the modern world, which although has positively reduced infectious disease and infant mortality, has led to a decreased exposure to microbes, depriving the infant of necessary immune stimulus and development[6,9]. As it is not practical to completely eliminate public hygiene, probiotics are increasingly being considered an alternative approach to improving the mixture of species within the gut flora[5].

Studies are showing positive results of mothers taking probiotics during pregnancy and breastfeeding[15,16], with more benefit being seen in prevention opposed to treatment of allergies[14]. One study halved the risk of infants developing eczema during the first two years of life[17]. There is also growing evidence of an association between antibiotic use and an increase in allergic disease[10,11,12], in relation to antibiotics interrupting the process of infants establishing a normal gut flora.

THE GUT FLORA AND DIGESTION

A healthy gut flora is necessary to assist in digestion, regular healthy bowel movements and the integrity of the gut lining (where food absorption takes place). Any imbalance could lead to digestive symptoms such as constipation, diarrhoea, bloating, flatulence and cramping. It is important that the digestive system works effectively so that the infant is able to gain adequate nutrients to function and grow optimally. The gut flora appears to be imbalanced in infants suffering colic[18]. They often have fewer levels of beneficial *Lactobacillus* that produce much less gas than potential pathogens. Promising probiotic studies are emerging regarding prevention or management, with one study using a *Lactobacillus reuteri* to significantly improve symptoms[18].

GUT AND VAGINAL FLORA AND NATURAL BIRTH

It is currently understood that during birth, infants born vaginally are exposed mainly to microbes that originate from the mother[6]. Although skin to skin contact ensures some transmission of microbes from mother to child[6], infants delivered by caesarean section acquire intestinal flora mainly from the environment[19,28]. Hygienic conditions and antimicrobial procedures at this time are also said to strongly influence colonization[19]. It is also reasonable to assume that the transmission of a healthy microbial flora to the infant is only as effective as the quality of the mother's gut and vaginal flora. Some women like to insert probiotic capsules into the vagina during the last trimester of pregnancy to ensure a healthy vaginal flora balance before birth.

ARE BABIES BORN STERILE?

It has traditionally been thought that babies are born completely sterile but observations are suggesting that the foetus may possibly be influenced by the mothers gut flora in the womb via the placenta[1,21-24]. This new information highlights the importance of a healthy gut flora in women before and during pregnancy.

DOES BREAST-MILK INFLUENCE THE INFANT GUT FLORA COMPOSITION?

An obvious difference between breast-fed and formula-fed infants is the development of the intestinal flora[34]. Breast milk provides a continuous supply of a wide range of microbes[3] including potentially beneficial bacteria such as bifidobacteria and lactobacilli[24] and components that specifically stimulate the growth of bifidobacteria in the infant gut[29]. Studies have indicated that the specific gut flora of breast fed infants closely reflects that of their mother's breast milk[27]. Bifidobacteria is the predominant species in a breast fed infant's gut flora[24,34], whereas in formula-fed infants other potentially harmful bacteria predominate[28,29,34]. Individuals are said to harbour a different mix of microbes within their gut and it is probable that a wide mix of microbes is of greater benefit than the presence of one individual strain. Orally supplemented probiotics to the mother have been isolated at varying levels in colostrum[30], breast milk[31] and infant stool samples[6] indicating effectiveness of consumption. However, the benefit may not necessarily be to purely transfer one specific probiotic strain from mother to infant, but also to assist in the prevalence of a protective overall gut flora in the mother that will hopefully be transferred to the infant.

ARE PROBIOTICS SAFE TO TAKE DURING PREGNANCY AND IN INFANCY?

A review[32] of *Lactobacillus* and *Bifidobacterium* probiotics consumed by pregnant women during varying stages of pregnancy highlighted no reported adverse effects, such as increased rate of caesarean-section, low birth weight babies, miscarriages or malformations. At the time no studies were available for *Saccharomyces* spp. use during pregnancy so its safety is unknown. Another review[33] looked at studies giving probiotics directly to infants from the first day of birth, again no serious adverse events were reported.

Other areas of possible benefit of probiotic use in the pregnant mother

- Mastitis[3,31]
- Bacterial vaginosis[35]
- Urinary tract infections[36]
- Constipation[37]
- *Candida*[20]

A healthy gut microflora is considered extremely important in pregnant women, for the health of her and her infant. A multi-strain probiotic could be considered to provide a wider range of benefits to a broader range of women and their infants.

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