Introduction: Bringing Science to Early Life Nutrition\textsuperscript{1,2}

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The symposium entitled “Bringing Science to Early Life Nutrition” was held to honor the contribution of Guenter Boehm to the field of early nutrition during his active career. Boehm has enhanced the development of this important area of research from 2 different viewpoints: first as an independent clinician-scientist and later as research director of a world-leading formula industry. This combination allowed him to bring together both worlds with one clear focus: the improvement of early nutrition for sustainable health in later life. In 2006 he was appointed as a professor in Pediatrics–Pediatric Nutrition at the Sophia Children’s Hospital, Erasmus University, Rotterdam, Netherlands, where he could continue his work as an independent scientist.

His major achievements to the field of infant nutrition include designing and executing a large series of studies of the safety and efficacy of oligosaccharides in neonates and toddlers. He was involved in many basic studies that elucidated the role of these substances on the immune system and innate immunity, both directly and indirectly via modulation of the microbiome (1–3). After and parallel to these proofs-of-principle studies, he coordinated many clinical studies in term and preterm infants and in older children (4, 5). His research interests were not restricted to oligosaccharides alone and also included research areas such as amino acid requirements (6) and lipids (7).

Boehm received several prestigious prizes including the Virchow Prize in 1989 (national prize of East Germany for his contribution to the field of nutrition and metabolism of low-birthweight infants), the Prize of the European Society for Perinatal Medicine in 1986, and in 2011 the Medal of the Utrecht University for his contribution to translational medicine.

The symposium, held in the Netherlands in October 2011, encompassed most of the areas of Boehm’s interest and presented his own work or studies by others that were facilitated in some way by him. These studies have been assembled in the present supplement; most of them aimed to improve infant formula by approaching the functional composition of human milk. That an infant’s own mother’s milk is the optimal infant nutrition is evident, but mother’s milk is not available for every child. Modern technologies can be helpful in bringing the composition of infant formula closer to that of human milk. However, human milk is not a standard product in that it changes composition during lactation (8). Colostrum is very different from mature milk and hind milk differs from foremilk. And maternal diet, for example, has a distinct influence on the PUFA status of human milk. Different maternal Lewis blood types are associated with specific patterns of oligosaccharides in human milk. Consequently, referring to human milk as the gold standard is certainly justifiable, but this poses the question of what exactly is the composition of human milk?

Nutrition in early life has distinct effects on the immune and metabolic system. These effects can be attributed to a direct effect by the different components of the milk, but several ingredients can also indirectly affect those systems, for example by modulating the microbiome. In this supplement issue, Nauta et al (9) discuss the key role of environmental microbial components on the immune system and their effects on metabolic processes. Specific added oligosaccharides to infant formula can have such an indirect role by modulating the intestinal microbiome (10). Dietary intervention with these dietary oligosaccharides in early life could lead to the prevention of atopic dermatitis, food allergy, and/or allergic asthma. These effects could be a result of the change in numbers and diversity of the intestinal bacteria. Via this route, oligosaccharides have the potential to reduce the risk of infection episodes and the development of allergic symptoms (11). However, direct interaction on immune cells in a microbiota-independent manner could also be considered (12). Not only human milk oligosaccharides are important; glycolipids and various glycoproteins can interact with specific cell-signaling properties (13). As much as oligosaccharides may influence later health and disease, directly or indirectly, there is little evidence that n–3 long-chain PUFAs exert an antiobesity effect (14). However, long-chain PUFAs are associated with effects on later neurocognitive development as is indicated by Willatts et al (15) in this supplement issue. Other fatty acids, such as trans isomeric fatty acids, may interfere with the potential beneficial effects of PUFAs (16).

Preterm infants comprise a different category. Their growth is faster when compared with term infants and they have higher resting metabolic rates because they are frequently ill. These factors contribute to a different requirement that cannot be met solely by their mother’s milk. Slow growth is associated with impaired neurocognitive outcome. Therefore, fortifiers are needed to improve the intake, but these need to be further developed to meet the specific requirements (17). On the other hand, and similar to term infants, too-rapid growth results in...

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insulin insensitivity and a higher risk of metabolic syndrome (18). Again, own mother’s milk is the preferable choice for each infant, including prematurely born infants, but each infant requires an individual approach to meet his or her requirements.

The collaboration of the academic nutrition world and the formula industry is pivotal in our aim to improve the health of infants, not only for their direct well-being but also to improve the health status of all communities around the world.

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REFERENCES