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From dysbiosis to recovery in the infant gut microbiome: A new paradigm in infant nutrition

Statement of the Problem: Human milk has been the sole source of nutrition for infants for millions of years, and is rich in specific oligosaccharides (HMOs). The natural infant gut microbiome is dominated by a single species of bifdobacteria that is exceptionally competitive at consuming HMOs. Through the unintended consequences of formula feeding, antibiotic use, and C-section deliveries, this natural microbiome has been radically altered such that over 90% of newborn babies in the US today are dysbiosis. The purpose of this work is to develop a solution to rescue the natural microbiome from the dysbiosis through an early remodeling that returns the colonic microenvironment to its natural state.

Methodology: A randomized parallel controlled prospective clinical study (n=68) was undertaken in five sights in Davis CA, USA with healthy, term, breast-fed infants enrolled on day four of life. Half of the cohort was supplemented daily for 21 days with activated *Bifidobacteria infantis*, and half provided the routine standard of care.

Findings: All supplemented babies, regardless of mode of delivery, had a microbiome dominated to over 80% with *B. infantis* whereas the un-supplemented babies were devoid of *B. infantis* and 21 of 34 infants had no bifidobacteria at all. Differences in stool maturity, pH, microbial and chemical differences were also noted.

Conclusion & Significance: The natural hi-bif microbiome has been lost over the past 50-80 years in developed countries. The resulting dysbiosis may have a significant impact on the programmed development of the immune system and establishment of metabolic set points. We have shown that this dysbiosis can be corrected and the microenvironment reestablished by supplementation with activated *B. infantis*.

Biography

David J Kyle is the CEO of Evolve Biosystems Inc., a spin-off of the Foods for Health Institute of the University of California at Davis. He founded several companies during his career, including Martek Biosciences Corp where he led R&D and Commercial Development for over 15 years. His DHA and ARA products are now found in virtually all infant formulas around the world. In 2011, he was acquired by DSM for \$1.2B. He received his PhD in Biochemistry from University of Alberta, Canada. During his distinguished career, he published over 80 scientific articles and edited two books. He was inducted into the US Space Technology Hall of Fame in 2009 for his contributions to science and industry.

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