Reference 2

Lactating Mothers and Breastfed Infants: Meeting Their Dietary Needs with Bioactive Sustainable Nutrition for Health and Wellness

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Chronic malnutrition negatively impacts nearly 165 million infants and children under five years of age globally, posing a lifetime of compromised physical, cognitive and metabolic capacity if not mitigated within the first 24 months of life. This global loss of human socioeconomic and economic value is estimated by The Foreign Agriculture Organization to cost globally impacted countries approximately 5 % of GDP ($3.5 trillion annually), and ever-increasing welfare costs, not to mention the lifetime of diminished opportunity for the child.

The good news is that there is a new era of nutrition poised to make a difference in the lives of infants born from mothers in a nutritionally deficit environment conducive to chronic malnutrition. Scientifically documented and FDA-DSHEA compliant nutraceutical nutrition is proving to be the solution for mitigating the negative impacts of infant chronic malnutrition. For example, NutraLac™, is an all-natural clinically documented and patented plant-based extract from the bran and germ layers of rice and characterized by high bioavailability in the human digestive system. NutraLac™ has been shown to significantly mitigate, and in most cases remediate, the negative physical and cognitive effects of chronic malnutrition in infants when breastfed from lactating mothers who consumed the NutraLac™ formulations during the exclusive breastfeeding period (Table 1).

Table 1. Initial and final 'Z' scores and percentile results for five growth indicators of exclusively breast-fed infants ranging from 1.5 to 6 months of age. Their mothers took a 40 g daily ration of a Rice Bran-Based Food Supplement for a 4.5 months post-puerperium period.

Anthropometric indicator	INITIAL Z[2] score (1.5 months old)			FINAL Z score (6 months old)			p-value[1]
	N	mean	percentile	N	mean	percentile	
weight-for-height (WHZ)	153	0.17 ± 1.3	56.75	129	0.53 ± 1.0	70.19	0.00890
length-for-age (HAZ)	153	-1.9 ± 1.21	2.87	129	-1.78 ± 1.0	3.75	0.34730
weight-for-age (WAZ)	153	-1.6 ± 1.3	5.48	129	-0.79 ± 1.0	21.48	<0.0001
cephalic perimeter-for-age (HCZ)	153	-1.3 ± 1.14	9.68	129	-1.03 ± 0.9	15.15	0.03140
body mass index-for-age (BAZ)	153	-0.82 ± 1.33	20.61	129	0.31 ± 1.3	62.17	<0.0001

[1] Student t test for independent samples, INFOSTAT, version 2013. [2] 'Z' scores of anthropometric indicators, allow for comparison of results with the international child growth reference indicators from the World Health Organization (WHO), as determined by WHO-ANTHRO, version 3.2.2

This table shows the significant improvement of breastfed infants whose mothers consumed NutraLac™ for a 4.5-month post-puerperium period, and until the breastfed infants were six months of age. In this short period, infant growth indicators across all five World Health Organization metrics increased following the 135-day testing period. These are significant results. Three key WHO infant growth and wellness indicators exhibited statistically significant improvements (weight for height/length; weight for age; body mass index for age). Cephalic perimeter for age, a crucial indicator of brain growth and cognitive development during this period, also showed significant improvement. These studies are on- going, and the NutraLac™ nutritional period will be carried through six and nine months of lactation and breast feeding to further quantify cognitive development, breast milk quantity and nutritional enhancement.

The Benefits of Bioactive Nutraceuticals

The nutritional difference between standard nutrient intake by lactating mothers, and the intake of a hydrolyzed bioavailable nutraceutical extracted from plant-based materials like NutraLac™, is the nutraceutical capacity for increased bioactivity and absorption (efficacy) in the lactating mothers' umbilical vein for transfer of nutrient-rich blood to the nutritional wellbeing of the fetus, and enrichment of the mother's breast milk during lactation.

The NutraLac™ patented all natural enzymatic hydrolyzation technology cleaves complex proteins into simple proteins (peptides and amino acids) for greater digestibility and absorption into the blood stream. By the same process, complex fat and oils are broken-down to yield a regime of antioxidants and phytonutrients with pharmacological characteristics that provide catalytic value for enhanced nutritional efficacy. Likewise, complex carbohydrates are hydrolyzed into highly digestible polysaccharides for greater absorption and bioactive nutrition. This process is scientifically documented and patented as USPTO Patent No. 8,945,642 B2.

While all cereal grains can be hydrolyzed using the aforementioned NutraLac™ process, the bran and germ layers of rice are particularly high in phytonutrients which embody isolates possessing pharmacological values.

These highly beneficial phytonutrients are not readily digested in the human gastrointestinal system in their natural state, and subsequently pass through the body with little nutritional value. The NutraLac™ all-natural enzymatic hydrolyzation process is the key to achieving the bioavailability of these important nutraceutical nutritional isolates, and subsequently the bioactive efficacy to achieve positive health and wellness results.

In Summary, plant-derived nutraceuticals that have been extracted, hydrolyzed and scientifically documented, present a significant opportunity to increase the nutritional value in formulations targeting the health and wellness in lactating mothers and their breastfed infants, thereby playing a significant role in mitigating chronic malnutrition on a global basis. NutraLac™ formulations for achieving both commercial and humanitarian goals are well established for bringing nutritionally potent ingredients and formulations to the infant nutrition marketplace.

In awarding the Patent for Humanity Award to NutraLac™, the United States Department of Commerce and U.S. Patent Office cited the pioneering benefits resulting from the NutraLac™ bran extraction and hydrolyzation technology to capture the potent nutritional embodiment of a globally available by-product of the rice milling process for mitigating chronic malnutrition in infants. To this end, we have established a collaboration with Sustainable Nutrition International to further these humanitarian initiatives that have worldwide potential for helping solve chronic malnutrition in infants.

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