

—when MFGM added to soy infant formula

# Research Shows Milk Fat Derivative Enhances Infants' Intellects

by Pete Hardin

Nothing beats mother's milk. But a milk fat-derived material – Milk Fat Globule Membrane (MFGM) — when added to soy-based formula products, has been demonstrated to boost infants' intellectual capacity to virtually the same levels as those breast-fed.

Call it the “Gut-to-Brain Axis.” Milk fat is a vital element in the nutrition of healthy newborns. The “Gut-to-Brain Axis” utilizes milk fat from the stomach to better develop newborns' intellectual capacity. Researchers point to a newborn's first year as particularly critical for brain development. Milk fat is a vital part of the newborn's intellectual development during year one. Specifically, MFGM — the membrane surrounding milk fat globules in mammals' milk — enhances infants' intellectual growth, when added as a supplement to soy-based infant formula. Research has attributed other health benefits to MFGM supplements in soy formula, including healthier small intestine development and reduced incidence of infections requiring antibiotics and/or hospitalization.

What is MFGM? Very simply, MFGM is the thin membrane that surrounds the “milk lipid droplet” (i.e., the milk fat globule) at the time that globule is released from the mammary tissue, where the milk fat globule is produced. Improved gut bacteria health and normalized intestinal development for newborns are additional, documented benefits from MFGM supplementation of soy-based infant formula products.

On October 23-24, the American Dairy Products Institute (ADPI) sponsored a seminar on dairy ingredients in Madison, Wisconsin. Included in the array of capable speakers was Dr. Rafael Jimenez-Flores, an Ohio State University, and the Parker Endowed Chair Professor in Dairy Science. Dr. Jimenez-Flores' presentation covered more than 20 years of industry research on milk phospholipids and MFGM.

To summarize the high point of Dr. Jimenez-Flores' information: MFGM derived from cows' milk used to supplement soy-based infant formulas boosted the intellectual measures of babies, compared to those fed soy-based infant formulas lacking added MFGM. In other words, adding cow's milk-derived MFGM to soy-based infant formula products boosts brain capacity – a life-enhancing benefit for individuals and, indeed, society at large.

Product	MFGM (mg/100g)*
Cheese (25% fat)	150
Milk (skimmed, 0.5% fat)	15
Milk (whole, 3.5% fat)	35
Yogurt (1.5% fat)	15
Cream (35% fat)	200
Butter	Not available

\*Source: General estimates on the basis of research by Dewettinck et al. and Conway et al.

MFGM is naturally present in dairy products. Logically, higher fat content of a dairy product correlates with higher levels of MFGM. According to Jimenez-Flores' presentation, the following amounts of MFGMs – measured as milligrams per 100 grams — are contained in these dairy products.

MFGM, through micro-filtration technologies, may be “harvested” pre- and post-processing, from a variety of dairy products. Dr. Jimenez-Flores listed cheese whey and buttermilk as two good sources for attaining MFGM through micro-filtration. He noted the high MFGM content in buttermilk – the residual liquid from butter-making. He cited the potential value of MFGM as a health-enhancing supplement to infant formula products. He scorned the low-ball, almost throwaway values that dried buttermilk powder currently commands.

Jimenez-Flores depicted buttermilk as a dramatically undervalued product, in terms of its potential enhancement of gut health, disease prevention and nutritional value. All of these are good fundamentals for novel foods and ingredient development. If enough emphasis is given to this product, it would result in greater demand for MFGM leading to greater valorization, open markets for milk and enhances commercial marketing of dairy products.

## Health benefits for MFGM-enhanced formulas

### Enhanced cognitive skills:

Timby and Lonerdal measured cognitive skills in groups of infants receiving three separate nutrients during their first six months of life. (See accompanying Figure 1.) Here are summaries of the nutrition they received and the cognitive skills measured at one year of age:

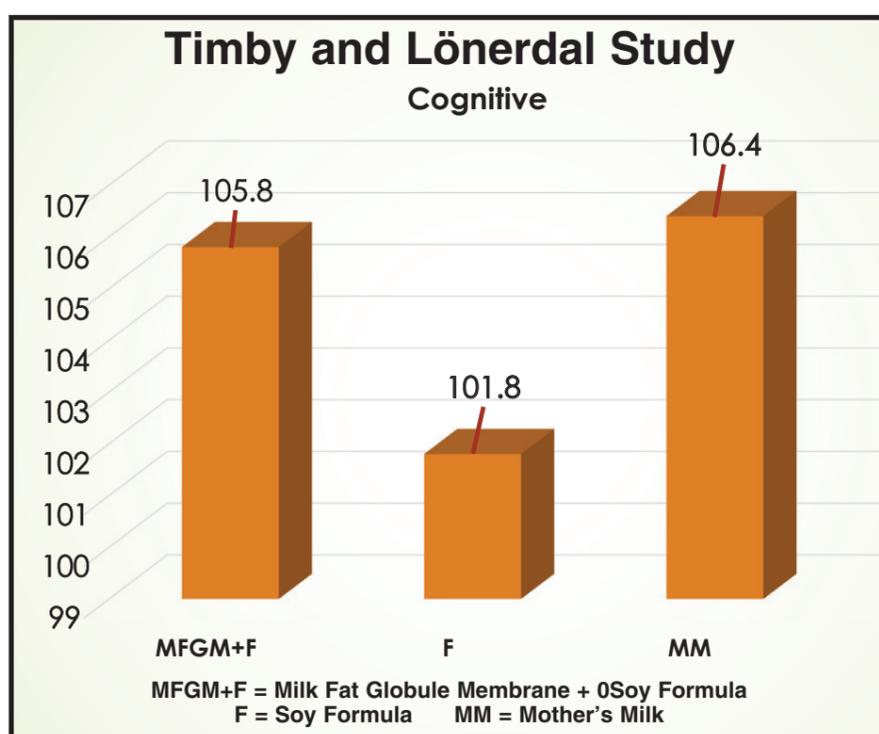
**Mother's milk:.....106.4 cognitive score**

**Soy formula: .....101.8 cognitive score**

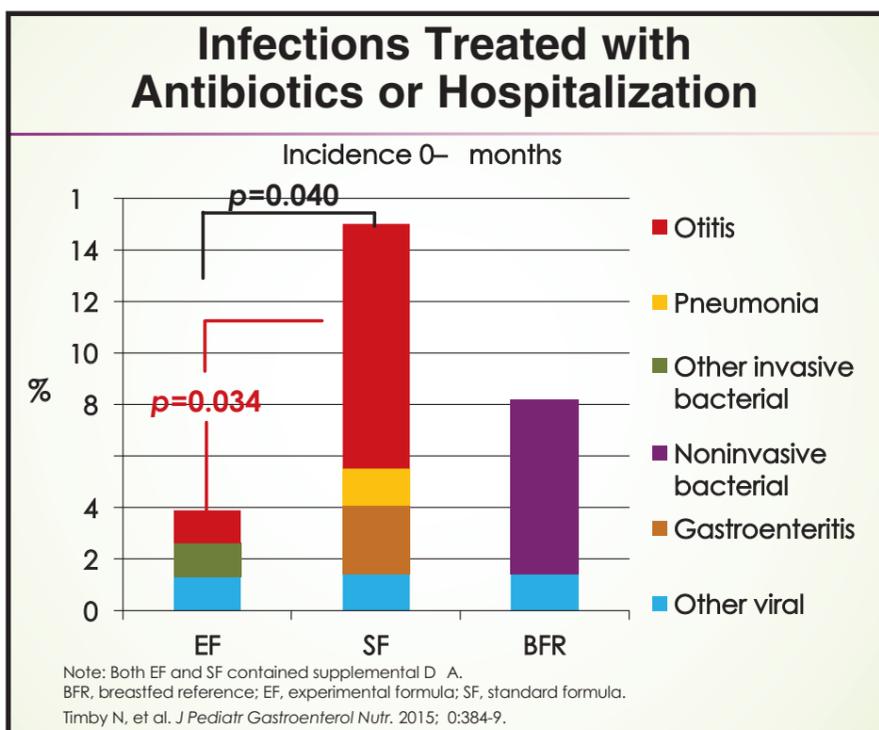
**Soy formula with MFGM supplement .....105.8 cognitive score**

### Reduced infections treated with Antibiotics or Hospitalization:

Timby et al. (2014) determined that infants receiving soy-based formula products had far higher incidents of infections that required treatment with antibiotics or hospitalization during their first six months of life. About 15% of infants fed soy-only formula registered infections requiring treatments with antibiotics and/or hospitalizations. A hair more than 8% of infants consuming only mother's milk registered infections. Surprisingly, the newborns fed MFGM-supplemented



#1 Timby et al. (2014) reported the following cognitive scores for three groups of newborns. These feeding regimens spanned the first six months of the infants' lives. The cognitive testing was conducted after 12 months. From left to right, the group receiving soy-formula supplemented with MFGM scored 105.8. The second group – which received soy-formula, scored 101.8. And the third group – fed mother's milk – scored 106.4. Thus, the MFGM-supplemented soy-formula group scored nearly identically to the group fed mother's milk.



#2 Timby et al. (2015) measured three groups of newborns for the percent in each group experiencing infections during the first six months of life requiring antibiotic treatment and/or hospitalization. This research detailed the types of infections. Results: Slightly less than 4% of infants fed soy-based formula enhanced with MFGM had infections requiring treatment. Just a hair more than 8% of infants fed mother's milk had infections requiring treatment. But about 15% of infants fed only soy-based formula had infections need antibiotics and/or hospitalization.

infant formula scored the lowest level of such infections – a hair less than 4%. (See Figure #2 accompanying this article for those different groups' levels of infections and a breakdown of the specific types of those infections.)

Dr. Jimenez-Flores' presentation at the ADPI seminar in late October exhibited a passion for MFGM and summarized decades of research on the subject by numerous investigators. He pointed to a very recent (October 2018) study by Danone that outlines possible mechanisms behind this gut-brain axis in infants. He projected ahead, noting: “The mechanisms behind the gut-brain axis in infants should be further explored and better understood, so possible nutritional interventions can be explored to support healthy brain development.”

## Conclusions ...

Dr. Jimenez-Flores offered the following conclusions at the end of his presentation:

“Dairy ingredients for now will have to satisfy consumer demands (... faster horses)

“Dairy ingredients with real health impact will be complex, highly functional and dependent on the food matrix that delivers them (*Nutrition is science, NOT opinion*)

“Novel means of measuring their functionality will have to go beyond the physical and chemical analyses and will involve biotechnological methodology.

“Innovation in dairy ingredients will be tied to real psychological response in human health.

“Make what can be sold, rather than sell what you make.”

The future? As Dr. Jimenez-Flores opined in his concluding remarks at the ADPI seminar in late October, greater investment in research is needed to explore the miracles of fat and other elements in cow's milk.