**HUMAN MILK OLIGOSACCHARIDES**
UNDERSTANDING
THE POTENTIAL

**GUT-BRAIN-IMMUNE AXIS**

70% of the immune system is in the gut and there are millions of neurons.  

- **GUT**: HMOs interact with the microbiota and cells in the wall of the gut.
- **BRAIN**: HMOs modulate markers associated with synaptic function.
- **IMMUNE SYSTEM**: HMOs directly modulate the immune response.

**SYSTEM-WIDE EFFECTS OF 2'-FL HMO**

Human milk oligosaccharides (HMOs) have many postulated benefits.

- In a clinical study, compared to a control formula, 2'-FL HMO was shown to:
  - **lower plasma inflammatory cytokine levels** to more closely resemble those of breastfed infants.
  - **associate with lower incidence of eczema**.
  - **associate with fewer respiratory infections**.
  - **improves memory and learning**.
  - **changes molecular markers associated with synaptic function**.
  - **positively affects long-term potentiation (synaptic strength)**.

**IMPORTANT OUTCOMES OF 2'-FL HMO**

Clinical and preclinical research is revealing potential benefits of supplementation with 2'-fucosyllactose (2'-FL), which is the most abundant HMO in 75–85% of mothers breast milk.

- **GUT HEALTH**
  - Supports growth of populations of *Bifidobacterium* and *Bacteroides*.
  - Intestinal adaptation after surgery.
  - Incidence of infectious diarrhea.
  - Severity of experimental necrotizing enterocolitis.
  - Intensity of colonic motor contractions.

- **IMMUNE SYSTEM**
  - In a clinical study, compared to a control formula, 2'-FL HMO was shown to:
    - lower plasma inflammatory cytokine levels to more closely resemble those of breastfed infants.
    - associate with lower incidence of eczema.
    - associate with fewer respiratory infections.
    - Food-allergy symptoms.

- **BRAIN HEALTH**
  - Improves memory and learning.
  - Changes molecular markers associated with synaptic function.
  - Positively affects long-term potentiation (synaptic strength).

*Preclinical results only.
†In comparison to control formula without HMOs, based on parent-reported adverse events from a posthoc analysis of a clinical study.


8. Goehring KC, Marriage BJ, Oliver JS, et al. Similar to those who are breastfed, infants fed a formula containing 2′-fucosyllactose have lower inflammatory cytokines in a randomized controlled trial. *J Nutr.* 2016;146(12):2559-66.


