

HOW 2'-FUCOSYLLACTOSE & 6'-SIALYLLACTOSE RELATE TO INFANT NEURODEVELOPMENT, MATERNAL BMI & DIABETES STATUS

Featuring:

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TRANSCRIPT

Maura Bowen: It's likely you've likely heard a lot by now about human milk oligosaccharides, because here at Abbott Nutrition Health Institute, we're really fascinated with their benefits, and we talk about them a lot. To level-set, human milk oligosaccharides—HMOs—interact with babies' brains, guts and other organs to help give them a stronger chance of growing and developing normally and healthfully.

Maura Bowen: What nutrition scientists are still trying to determine, however, is whether and how certain maternal factors influence HMO concentrations. Today's expert—Dr Elena Oliveros—is here with me to discuss that point exactly. She and a team of her colleagues recently published an article in the *Journal of Nutrition Food Science*, titled, "Human Milk Levels of 2'-Fucosyllactose and 6'-Sialyllactose are Positively Associated with Infant Neurodevelopment and are Not Impacted by Maternal BMI or Diabetic Status." You can tell by that title that Dr Oliveros and team's research takes us one giant step closer to understanding the correlations between a mother's health and behaviors and how they play a part in the health of her child.

Maura Bowen: Feeling the pressure yet, mamas? But what else is new, right? Dr Oliveros, thanks for joining us.

Dr Oliveros: Hello everyone and Thanks so much for inviting me today and for giving me the chance of sharing with the audience the latest scientific findings about this topic.

Maura Bowen: First, I should note that since we're still in the middle of a pandemic, Dr Oliveros and I are both dialing in from the comfort of our offices rather than recording together in the studio.

Maura Bowen: Secondly, Dr Oliveros, here's my chance to properly introduce you. Would you mind telling us a little bit about yourself, like your current role, background, and how you came to focus your career on nutrition?

Dr Oliveros: I am currently a Senior Scientist working at the R&D Department of Abbott Nutrition I obtained a degree in Pharmacy in 2003 and a degree in Food Technology in 2004 at the University of Granada in Spain and lastly, I earned a doctorate degree in Pharmacy at the same University in 2019.

As for my career in nutrition, I joined Abbott around 15 years ago at the R&D Department working in different scientific positions, so I initially did some laboratory work related to the stability products program. Afterwards I was involved in different research preclinical projects related for example to the metabolic fate of long-chain polyunsaturated fatty acids and to the influence of HMOs on cognitive performance which in fact, became the topic of my PhD.

Maura Bowen: Let's start by talking about the body of science on how maternal factors influence HMO concentrations. Before your study, what was the general scientific consensus on this topic?

Dr Oliveros: It is already well-known the association between HMOs concentration and some factors such as lactation stage, parity, ethnicity, city of residence, season or even exclusive human milk feeding.

However, only a few studies had assessed the effect of maternal overweight, obesity or diabetic status on the distribution of carbohydrates in human milk, and specifically on HMO profiles. In addition to that, there were controversial results in this sense, so additional studies were needed to try to clarify this point.

Maura Bowen: And what about HMOs concentration and neurodevelopment? Was there any previous scientific evidence?

Dr Oliveros: As most of you probably know, HMOs have been widely linked to multiple biological functions such as effects on immune system, anti-infective and bifidogenic activity, modulation of inflammation or even to gut motility.

In the case of the effect of HMOs on the cognitive function, it was mostly demonstrated in some preclinical models in the last decade, but clinical data were still quite limited with just a couple of association studies.

Maura Bowen: Can you tell us a little bit about how this study come about? What prompted you and your colleagues to take on this discovery?

Dr Oliveros: I have to say that our research on HMOs and neurodevelopment started some years ago using preclinical models. In fact, our team has several publications on this field. We were able to get very positive results when testing the effects of these 2 HMOs, 2'-FL and 6'-SL, on cognitive outcomes in rodent models.

So I would say that those findings led us to try to confirm those data in the clinical side and then to get more information about a possible influence of maternal factors such as weight in the HMO profile of breast milk.

Maura Bowen: What did you expect your study to prove or uncover?

Dr Oliveros: Our main expectation when conducting this study was to be able to translate the findings we got in our preclinical experiments to the clinical setting.

The supportive data initially obtained with animal models with these 2 HMOs made us to be quite confident about the potential results of the present study, so we hopefully expected to evidence the benefits of receiving HMOs at the early stages of the life on cognitive functions in infants.

Maura Bowen: Can you tell us a little bit about your study's approach?

Dr Oliveros: This study was aimed to determine if maternal BMI or diabetic status during pregnancy were linked to HMO profiles, specifically 2'-FL and 6'-SL concentrations, and whether those HMOs impacted neurodevelopment in the offspring.

So to that end, what we did was to evaluate 2'-FL and 6'-SL levels in 1-month human milk samples in a secondary analysis of an existing cohort that was a clinical trial called PREOBE Study which gathered 4 study groups: overweight, obese, normal weight and diabetic pregnant women and their offspring.

Subsequently, in order to assess the role of 2'-FL and 6'-SL on infant neurodevelopment, the concentrations of these 2 HMOs were compared with results from neurodevelopment assessments using the Bayley scales of infants born to mothers from the PREOBE study at different ages.

Maura Bowen: Did you encounter any challenges throughout the course of your study? And were there aspects of the study that went more smoothly than you expected?

Dr Oliveros: A clinical trial is always really challenging and, in this case, one of the limitations was the low number of mother-infant pairs evaluated due to the reduced number of human milk samples available.

On the contrary, we counted with great experts not only in the human milk samples analysis by UHPLCMS/MS but also in the neurodevelopment assessment using the Bayley scales, so the results were obtained in a quick and very easy way.

Maura Bowen: What were your team's findings?

Dr Oliveros: In terms of maternal factors such as weight or diabetic status we were not able to see significant differences in 2'-FL or 6'-SL levels among study groups.

On the opposite side, in the neurodevelopment evaluation, we found a positive association between 6'-SL human milk concentration and cognitive and motor scores in infants at 18 months of age and also an association between 2'-FL concentration and motor score at 6 months of age although this last results was not significant when separating low and high 2'-FL groups.

Maura Bowen: Did anything surprise you about the data?

Dr Oliveros: In the preclinical work we did, we were mainly focused on the cognitive side and thereby, most of the tasks evaluated were related to learning and memory.

However, In the present study we had also the chance of assessing motor skills in infants and toddlers obtaining a positive association between 2'-FL and 6'-SL levels and motor scores in the Bayley test. So Maybe this result surprised me the most since it would involve even more benefits of HMOs intake than the ones already known.

Another point of interest would be the different results obtained when we considered the High 2'-FL and low 2fl groups together or separately.

Maura Bowen: What conclusions have you drawn from your results?

Dr Oliveros: In summary I would say that in this preliminary study, 6'-SL and 2'-FL levels seem not to be impacted by maternal weight or the development of diabetes mellitus but on the other side, the levels of these two HMOs were positively associated with infant neurodevelopment.

Maura Bowen: With all of this in mind, in what ways do you think clinicians can take this information and apply it to practice?

Dr Oliveros: As you may know, human milk is considered the "gold standard" in infant nutrition by providing optimal nutrients for normal growth and development. Thereby, infant formula attempts to mimic the nutritional composition and the performance of breast milk and, to that end, different nutrients have been added to the IF to close the gap with HM over the years. So, bearing in mind that maternal breastfeeding is associated with an improved cognitive performance in children, these results are supporting that IF with HMO would close the gap even more with human milk performance.

Maura Bowen: Last question: What sorts of studies would you like to see conducted to complement and advance the understanding of maternal factors, HMOs in breast milk, and infant outcomes?

Dr Oliveros: Well, further research and full-scale clinical studies with a higher number of subjects are needed to elucidate the effects of HMOs in pediatric neurodevelopment.

Moreover, the mechanism of action by which HMOs exert their cognitive effects remains still unclear. Several hypotheses have been proposed pointing out to their prebiotic effect or their action on the Gut-Brain Axis (GBA) through the vagus nerve but more research is still needed to clarify this point.

In addition to that I would dig more deeply into the differences between High and low 2-FL populations.

Maura Bowen: Dr Oliveros, thank you for your time today, and for helping us to build awareness for this important topic. We're really grateful you were able to share your insights with us today.

Dr Oliveros: You are welcome, and I really want to thank the ANHI team for inviting me today.

Maura Bowen: Absolutely. For our listeners. If you're looking for more podcasts, we have dozens and dozens across a variety of different nutrition science topics, and you can find them on ANHI.org by clicking RESOURCES at the top of the page, then PODCASTS & VIDEOS.

And as I said in the introduction to this recording, HMOs are a favorite topic among the ANHI team, and we have a host of other HMO resources on our site. In fact, we've even carved out a KNOWLEDGE HUB on our site that consolidates all of our HMO content in one quick and easy location. Simply visit anhi.org, click RESOURCES at the top of the page, click KNOWLEDGE HUB, and scroll down to find our hubs on NEONATAL HEALTH & THE MICROBIOME, as well as on HUMAN MILK OLIGOSACCHARIDES.

Thanks for listening today. Stay healthy and safe.