

### ***Handout***

## **Hold the Phone! Diet Does Matter During Breastfeeding: Implication of Diet on Fatty Acid Composition and Other Nutrients**

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For more than a decade most lactation professions have been suggesting to families that diet matters very little in terms of human milk composition. We have told parents that they can essentially eat whatever they want, it does not matter to the bottom line. However, new studies imply that in fact, diet does matter in terms of the composition of fatty acids and essential nutrients available in milk that can potentially impact life long health. Studies also show that changes in diet can lead to gene methylation which impacts gene expression, as well changing the oligosaccharide profile which shapes the microbiome. This presentation takes you on a tour of some recent research finds to better understand how prenatal/postpartum diet (potentially prenatally through lactation) DOES play a role in human milk and how a parent's diet can potentially influence a baby's health.

### **Objectives:**

Identify at least one way that maternal diet can impact fatty acid profile in human milk.

List the primary reason changes in oligosaccharide profile in human milk can have health consequences in baby.

List at least three nutrient changes in human milk that can be influenced through maternal diet.

### **Outline:**

- What are fatty acids?
  - Types of fatty acids
- How are FA's important to health and development.
- How do fatty acids access human milk.
- Does perinatal and or postpartum diet influence fatty acid profile while breast
  - Data from human studies
  - Data from animal studies
  - Potential long term meaning
- Brief description of microbiome and relationship with human milk feeding
  - Role of Human Milk Oligosaccharides and microbiome
  - How prenatal diet impacts microbiome when breastfeeding
- Postpartum diet and the epigenetic action through human milk
- Best practice for diet while lactating – what we know now

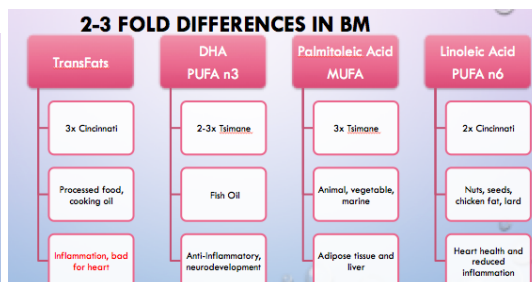
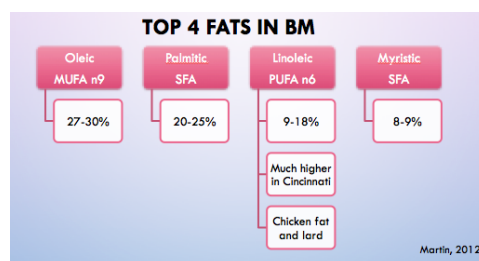
## Top Tips and Takeaways:

- Fatty acids are comprised of unsaturated and saturated fats. Within the unsaturated category, there are monounsaturated (MUFA) and polyunsaturated fats (PUFA). Polyunsaturated fats are made of two essential fatty acids, meaning that they are essential to health and can only come from the diet. These are the short chain fatty polyunsaturated fatty acids (SC-PUFA) of omega 3 (n3)  $\alpha$ -Linolenic acid or ALA and omega 6 (n6) Linoleic Acid or LA. These form the starting point for the creation of longer and more desaturated fatty acids known as the long-chain polyunsaturated fatty acids (LC-PUFA). Omega 3s are broken down into eicosapentaenoic acid or EPA and docosahexaenoic acid or DHA. Omega 6s are gamma-linolenic acid or GLA dihomogamma-linolenic acid or DGLA arachidonic acid or AA.
- ALA must be taken in through the human diet. Sources with small amounts include animal meat and some plant products, but high amounts in soy, walnuts, canola oil, flaxseeds and their oil, hempseed oil, camelina oil, and chia seed oil. EPA can be produced in body from ALA and can also be ingested. Can be found in fatty fish, a small amount in eggs and seaweed. DHA sources are mainly found in fish, and also somewhat in seaweed and eggs. It can also be converted from ALA, though not as efficiently as from dietary sources.
- Have known for many decades that dietary fats influence one another. Need well rounded sources of fatty acids in diet. Should not focus on just one fatty acid.
- Human brain develops at peak velocity during last three months of gestation and first few months of birth. The third trimester fetus and newborn particularly vulnerable to deficits if DHA is limiting. Peak formation of synapses occurs from 34 weeks gestation to 24 months after birth, creating up to 40,000 synapses, which are enriched in DHA. The accumulation of DHA in forebrain occurs through the first 24 months after birth.
- DHA - Signals membranes in photoreceptors, brain, nervous system
- Arachidonic Acid Inner Cell Membrane Liquid in heart muscle, vascular endothelium, T-Lymphocytes, adrenals, kidneys, liver, placenta
- Fat/lipids comprise 40-55% energy in human milk.
- Highly variable content.

## NOTES

- Can increase throughout a feed
- Human milk contains over 200 fatty acids
- Fatty acids in human milk:
  - Inactivate pathogens
  - Improve neurobehavioral development
  - Influence Microbiome
- Fat has high variability – between feeding individuals, throughout day, and between breasts
- These nutrients are particularly influenced by diet during lactation - Fatty Acids, B6, B12, Folate, Iodine, Selenium
- The diet during lactation changes percentages of types of fats in human milk but not overall amount of fat in human milk.
- Omega 3 and 6s in human milk are strongly influenced by pregnant/postpartum individual's diet. Diet during last trimester may be particularly important.
- Amount of DHA in brain continues to increase up to age 2. Important part of development of neural synapses.
- Dietary intake of DHA in many parts of the world is low and has been related to dietary fish intake. In a worldwide review in 2007 by Brenna of DHA breast milk levels, 4 of the 5 top locations reporting highest concentrations of DHA in human milk levels were coastal or island populations with diets high in marine foods, in contrast those with the lowest reported levels are inland or developed countries with low amounts of marine foods in their diets.
- In study looking at Bolivian and Cincinnati populations and fatty acids in human milk there were stark differences based on differing diets. However, the top four fatty acids in both populations were oleic, palmitic, linoleic, and myristic (Martin, 2012)

## NOTES



Vegan/Vegetarian	US, Canada, Central Europe, Australia	Denmark and Norway	China, Malaysia, Japan, Northern Canada
<0.1	0.2-0.4	0.7	≥0.8

Kent, 2006; Innis, 1992; Jensen, 1995; Innis, 2011

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- Ailhaud found that n6s in human milk the US have changed markedly in the past 60 years. Similar differences to the differences between Tismane and Cincinnati women.
- Branched chain fatty acids are also vary significantly based on human diet during lactation. Dairy consumption has strongest influenced, followed by consumption of beef. (Dingess, 2017)
- Addition of complimentary foods, timing and type, can also influence the fatty acid profile for a baby and alter long-term health outcomes.
- Choose food over supplements for best outcomes when trying to influence fatty acid profiles.
- Microbiota is also influenced by fatty acid profiles and diet during lactation. Changes in fatty acid profiles may hinder or help with gut colonization of microbiota.
- What are HMOs? Human Milk Oligosaccharides. Can't be digested by baby. There to feed our bacteria. Genetically driven. Influenced by geography. Act As - Bouncers – bacteria latch on and get a ride out of gut; Immune Tuners – Dial down immune in gut so bacteria can establish hold; Feeders –Providing unique nourishment
- Cafeteria diets in rats. CD - High fat, high sugar, low protein Resulted in lower body weight, lower lean mass, high fat accumulation, hyperleptinemia, thin outside-fat-inside body type
- CD- High fat, high sugar, low protein. Resulted in reduced anxiety, locomotor increased, alters methylation tags
- Fat Plays Important Role - Diabetes Type 1 (Niinistö, 2015); Asthma and Eczema (Elten, 2015); Influence Fetal Programming (Mennitti, 2015); TFA /SFA can impair Metabolism (Mennitti, 2015)
- What can we do? Avoid shaming; Healthy Food over Supplements unless fresh fish is not accessible; Prenatal FOCUS!; Focus on weekly goals instead of daily goals;

## NOTES

Occasional slip up okay; Looking for overall healthy dietary pattern

- What is recommended for diet? 8-12 ounces of seafood per week. Increase Omega 3's Sources are: **Flax** and Chia Seeds, Wild Caught Fatty Fish, (Salmon, Sardines, Cod Liver Oil), Nuts (Walnuts, almonds), Dark Leafy Greens (**Basil**, Spearmint). Reduce Omega 6s, especially from processed foods. Focus on Poultry/Eggs, Avocado, Nuts, Vegetable Oils (Safflower, Grapeseed, Sunflower) NOT corn, canola, and soy oil.
- For plant based diets - Algae Based DHA Supplements – 300 mg/day; Minimize Omega 6's; Add ALA to diet; Add 0.5 g of uncooked ALA to your diet daily. This would be the equivalent of: 1/5 oz English\* walnuts (3 halves), 1/4 tsp of flaxseed oil, 1 tsp of canola oil, 1 tsp ground flaxseeds
- Remember that it is still important for babies to be human milk fed. A baby who is human milk fed from a parent eating a diet deficient in fatty acids is still getting more health benefits in the long term than a baby receiving artificial milk.

## NOTES

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