

Breast Milk Benefits

- Easily-digestible protein
 - 60:40 whey-casein ratio
- Infant can self-regulate intake
- Low renal solute load
- Immune-support factors
- Protection against illness and chronic disease
 - decreased otitis media, respiratory tract infections, UTIs, bacteremia, bacterial meningitis, NEC, late-onset sepsis in preterm infants, etc.

Barbas, 2014.

Immune Support

- Secretory IgA for passive immunity
- Lactoferrin
 - Prevents Fe-dependent pathogens from binding to Fe
- Lysozyme
- *L. bifidus* as probiotic
- Leukocytes

Barbas, 2014.

Immune Support

- Xanthine oxidase in BM creates hydrogen peroxide
- Neonatal saliva vs. adult saliva
 - High levels of hypoxanthine and xanthine
 - Nucleosides and nucleobases
- BM + saliva → more hydrogen peroxide
- Effects
 - Inhibited growth of *Staphylococcus aureus*, *Salmonella* spp.
 - Promoted growth of commensal *Lactobacillus plantarum*

Al-Shehri, 2015.

Changing Composition of Breast Milk

Breastmilk: Baby's Best Nutrition



- During the feed
 - Foremilk and hindmilk
 - Hindmilk has up to 2x fat of foremilk
- During the day
 - Higher fat at night
- During the lifecycle
 - Colostrum
 - Preterm vs. term
 - Protein decrease

Barbas, 2014.



Contraindications to Breastfeeding

- HIV (in developed countries)
- Active, untreated tuberculosis
- Galactosemia in the infant
- Some medications
 - LactMed app
- Drugs of abuse



Barbas, 2014.



Breastfeeding Problems & Roadblocks

- Common problems
 - Lack of social support
 - Lack of resources
 - Pain
 - breastfeeding *should not* hurt
 - Perceived low milk supply
- Refer moms to an IBCLC for any problems
- East of the River Lactation Center – free lactation support



Donor Milk in the Outpatient Setting

- Pasteurized donor milk from HMBANA milk banks
 - Donor and her milk are screened
 - Limited availability with prescription
- Internet, community (e.g., family member)
 - Use with extreme caution
 - Non-pasteurized
 - Risks:
 - Microbial contamination
 - Diluted milk
 - Contamination with other animal milks
 - Drug/infectious disease exposure (e.g., HIV)



INFANT FORMULA ESSENTIALS



Types of Formula: Standard

- Standard Term formula
 - Enfamil Infant, Similac Advance, Gerber Good Start Gentle
 - Store brands, organic brands, etc.
 - New organic/non-GMO versions
- For healthy **term** babies
- Cow's milk based
- 19 or 20 kcal/oz




Types of Formula: Standard Preterm

- Standard Preterm Formula
 - Similac Neosure, Enfamil Enfacare
- For preterm infants >2.5 kg until ~9 months CGA
 - Includes late preterm
- ↑ Protein, Ca, Phos, folate, trace minerals, fat-soluble vitamins, etc.
- Cow's milk based
- 22 kcal/oz





Types of Formula: Specialty Standard

- Similac Sensitive, Similac for Spit-Up, Enfamil A.R. (added rice)
- For fussiness, gas, spit-up, GER
- Cow's milk based
- Lower lactose content
- Added rice starch
 - vs. adding rice cereal
- ? efficacy
 - Placebo effect/treats symptoms?
 - Treats normal infant behavior?
 - ↓ kcal? → effect on growth



Lasekan, 2014; Lightdale, 2013; Vanderhoof, 2003





Types of Formula: Soy-Based

- ProSobee, Isomil, Gerber Soy
- Vegan/vegetarian
- Not indicated for preterm infants
 - phytic acid, high aluminum, low phos
- Lactose-free
 - lactose intolerance rare in infants
- May soothe fussiness/gas – placebo?
- Not always effective in treating CMP allergy
 - 10-14% may also have soy allergy





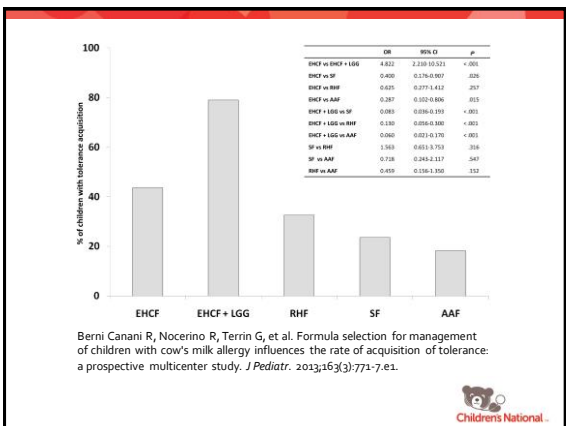

Types of Formula: Partially-Hydrolyzed Protein

- Enfamil Gentlease, Enfamil Reguline, Gerber Good Start Soothe
 - Reguline – prebiotics
 - Gerber Soothe – probiotics
- Partially broken down protein
 - Cow's milk based
- Reduce fussiness, gas, crying, spit-up
- Treat mild to moderate atopic dermatitis
- May reduce risk of CMP allergy

Types of Formula: Extensively-Hydrolyzed Protein

- Nutrigen, Pregestimil, Alimentum
 - Pregestimil & Alimentum – MCTs
 - Fat malabsorption
 - Nutrigen (powder) – *L. rhamnosus GG*
- Protein as peptides
- CMP allergy
 - Should be 1st treatment option unless symptoms are life-threatening
 - ~40-80% of infants on EHPF gain tolerance to CMP compared to ~20% of infants on amino acid based formula
 - higher rate for those on formula + LGG

Types of Formula: Amino Acid Based

- EleCare, Neocate Infant, PurAmino
- Protein is 100% amino acids
- Short bowel syndrome (SBS), EoE, severe CMP allergy, other food allergies
- SBS
 - Alleviates chronic diarrhea, improves intestinal function, weight-for-age %ile when used x3 months
 - May reduce dependence on PN



Bines, 1998; Borschel, 2014



MODIFYING CALORIC CONTENT



Formula Modulators

- Duocal
 - Fat and carbohydrate
 - Tasteless
 - 5 g = 25 kcal
- Abbott Liquid Protein Fortifier
 - Extensively-hydrolyzed casein protein
 - 1 g per 6 mL
- Beneprotein
 - Whey protein
 - 6 g protein per 7 g
 - Can add to food or formula/breast milk



Formula Modulators

- Risks
 - Inappropriate mixing (adds too many kcal)
 - Imbalanced macronutrient ratio
- Alternatives
 - Adjusting formula recipe: e.g., Enfamil 24 kcal/oz



VITAMIN AND MINERAL SUPPLEMENTS



Vitamin/Mineral Supplements

- Term babies:
 - 400 IU Vitamin D for breastfed infants and infants consuming <1 L formula
 - May omit for breastfed infants if Mom takes 6,400 IU vitamin D daily
 - Dose: 1 mL vs. 1 drop
- Preterm babies:
 - 1 ml/day Poly-vi-Sol with Iron
 - Vitamins A, C, D, B₁, B₂, B₃, B₆, iron



Duryea, 2015; Hollis, 2015; Isaacs, 2011



Vitamin/Mineral Supplements

- Strict vegetarian moms exclusively breastfeeding
 - B₁₂ - Adequate intake: 0.4 mcg/day (birth-6 months), 0.5 mcg/day (7-12 months)
- Exclusively breastfed >4 months
 - Consider iron supplementation – 1 mg/kg/day
 - 4 oz iron-fortified dry cereal per day (mixed with breast milk, water, or formula), or ½ to 1 jar of pureed meat
- >6 months
 - Fluoride: Nonfluoridated water at home, exclusive breastfeeding

Duryea, 2015; Hollis, 2015; Isaacs, 2011



INFANT STOOL PATTERNS



Ultimate Guide to Baby Poop



- PoopMD app, infographics
- Infants usually stool 5-6x/day...or more, or less
- Breastfed
 - Loose, seedy, mustard-colored
- Formula-fed
 - Tan, thicker (consistency of hummus)
- Solid foods
 - Darker brown

Cleveland Clinic, 2014.



Ultimate Guide to Baby Poop

- Other colors
 - Bright green
 - Inadequate nutrition, viruses
 - May only be receiving foremilk
 - Red
 - May indicate blood, could be 2/2 eating beets
 - White
 - Fat malabsorption
 - Black (after meconium)
 - Blood in upper GI tract

Cleveland Clinic, 2014.



STARTING SOLID FOOD & COW'S MILK



Starting Solids

- AAP/WHO: start around 6 months
 - 4-6 months may be ok if developmentally ready
- Signs of readiness
 - Showing interest in food
 - Sitting without support
 - Putting hands/toys in mouth
 - Pushing up from prone position with straight elbows
 - Extrusion reflex eliminated

Duryea, 2015; Isaacs, 2011



Risks Associated with Solid Foods

- Early introduction
 - Aspiration
 - Inadequate or excessive energy/nutrient intake
- Delayed introduction
 - Inadequate nutrient intake
 - Iron deficiency
 - Food aversion
 - Delayed oral motor function
 - Increased risk for atopic disease, type 1 diabetes

Duryea, 2015; Isaacs, 2011



First Foods

- Infant cereal
 - Iron-fortified
 - Mix with breast milk, formula, or water
 - Rice – hypoallergenic
- Fruit, vegetables
- Pureed meats
- Introduce single foods
- 3-5 days between new foods



Duryea, 2015; Isaacs, 2011



Advancing to Other Solids

- Combination foods
 - Introduce when individual ingredients are tolerated
- Thick purees, soft mashed foods
 - Introduce when sitting independently, when infant grasps at foods
 - Usually able to chew, swallow textured food (small, soft lumps, ground, etc.) by 8 months

Duryea, 2015



Advancing to Other Solids

- Finger foods
 - 8-12 months
 - Hand grasp, pincer grasp
 - Includes small pieces of soft foods, easily-dissolved foods
 - e.g. Cheerios, small banana pieces, cheese
- Family meals
 - 9-12 months
 - Can self-feed with assistance
 - Bite-size pieces of what family eats

Duryea, 2015



Food Safety

- Home-prepared food
 - Avoid spinach, beets, squash, green beans, carrots
 - High nitrate content
 - USDA website: Making Homemade Baby Food Safe
 - No added salt/sugar
- General food safety guidelines
 - Opened baby food jars should be refrigerated and leftovers discarded after 48 hours
 - Jars → not necessarily the suggested serving size
 - Serve from bowl and discard food left in bowl

Duryea, 2015; Isaacs, 2011



Inappropriate Foods

- Popcorn
- Whole grapes, raisins, hard raw fruits and vegetables
- Peanuts
- Uncut stringy meats, hot dog pieces
- Hard candy, gum/gummy candy
- Honey (risk of botulism)
- Sugar-sweetened beverages

Isaacs, 2011



