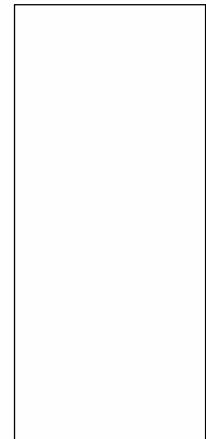


# PEDIATRIC NUTRITION & NUTRITION SUPPLEMENTS

NONPRESCRIPTION PRODUCTS & SELF-CARE, 638  
CALLEY PAULSON, DPH-4

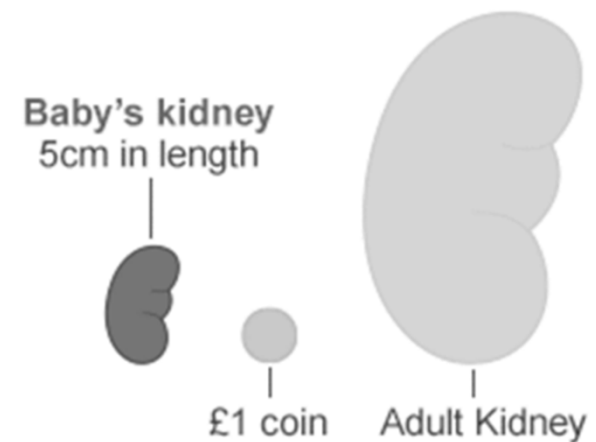


# OBJECTIVES

- By the end of this module, students will be able to:
  - Describe nutritional needs of full-term infants
  - Calculate maintenance fluid requirements for full-term infants
  - Compare and contrast different infant nutrition sources based on health benefits and infant condition
  - Summarize proper preparation and sanitization techniques for infant feeds
  - Assess use of nutritional supplements in pediatric patients
  - Evaluate and recommend when it is appropriate to refer an infant to their primary care provider

# PEDIATRIC PATIENTS DIFFER FROM ADULTS

- Body composition
  - Develops over first few years of life
  - Vast differences at each stage
- Organ Maturation
  - Liver, kidneys, gut, lungs
- Functional/Mechanical Maturation
  - Swallowing, gastric functionality, volume consumed, feeding fatigue, voiding control



# BASIC NUTRITIONAL REQUIREMENTS

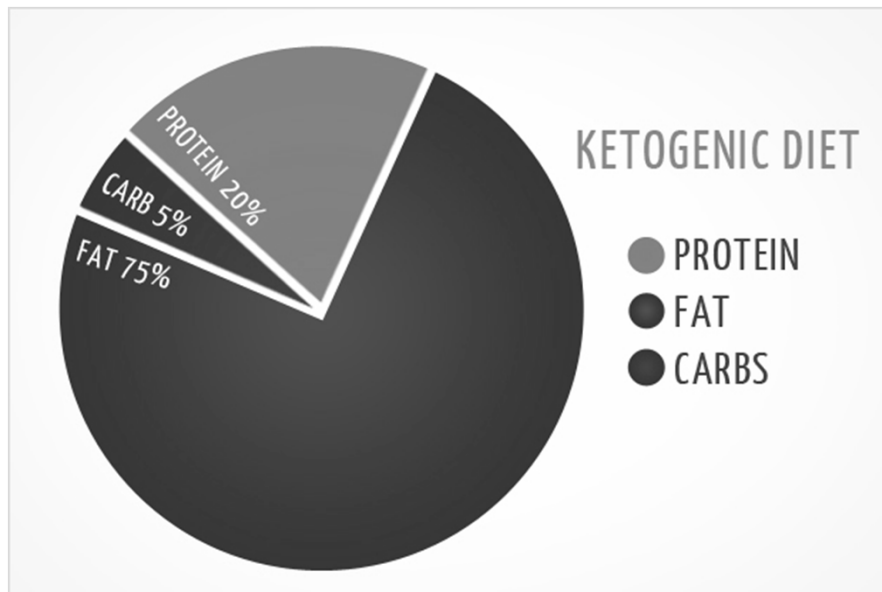
# BASIC NUTRITIONAL REQUIREMENTS

- Dietary components:
  - Carbohydrates, protein, and lipids
  - What's missing?
    - Fiber → Do not need fiber for the first 12 months of life



# BASIC NUTRITIONAL REQUIREMENTS

- **Carbohydrates**
  - 40-50% of energy needs
  - Lactose from milk
  - Exception – ketogenic diet



# BASIC NUTRITIONAL REQUIREMENTS

- **Protein**

- Contains essential amino acids (aa)
- Taurine, a cysteine a.a. derivative, is important for membrane integrity
  - Deficiency affects: sight, hearing, fat absorption
  - Present in human breast milk
  - Supplemented in infant formula



# BASIC NUTRITIONAL REQUIREMENTS

- **Lipids** (9cal/g)
  - 50% of non-protein energy from 0-12 months
    - Age 2-5 yo: Decreases to 20-30% of caloric energy intake
  - Essential Polyunsaturated Fatty Acids (PUFAs)
    - Linoleic acid → docosahexaenoic acid (DHA)
    - Linolenic acid → arachadonic acid (ARA)
    - Should always be supplemented in formula





# BASIC FLUID REQUIREMENTS

# BASIC FLUID REQUIREMENTS

- Differ for premature and full-term infants
- Full-term daily maintenance

First 10 kg	100 mL/kg
Second 10 kg	50 mL/kg
Each additional kg thereafter	20 mL/kg

- Ex: Baby Seamus weighs 21.6 kg



# BASIC FLUID REQUIREMENTS EXAMPLE

First 10 kg	100 mL/kg
Second 10 kg	50 mL/kg
Each additional kg thereafter	20 mL/kg

- Ex: Baby Seamus weighs 21.6 kg

0-10 kg	1000mL
10-20 kg	500mL
21-21.6 kg	32mL
<b>Total daily fluid requirement</b>	<b>=1532mL</b>



# INFANT NUTRITION SOURCES

# NUTRITION SOURCES AT BIRTH

- Mom's breast milk!
  - Best option
- Formula
  - Wide variety
  - 2<sup>nd</sup> best option when breast milk is not an option
- Cow milk
  - Not recommended
  - Low in iron, too high in protein, variable fat content
- Goat milk
  - Not recommended
  - Low in iron, vitamin D, and folate



# BREAST MILK

- Healthy People 2020 Goals:

- 84% of infants breast-fed at birth
- 61% at 6 months old
- 34% at 12 months old
  - 2006 data: 74% at birth (including single feed); 44% at 6 months; 23% at 12 months



- American Academy of Pediatrics

- Recommends breast feeding through 12 months old

- Factors linked to not breast-feeding:

- Poor; poorly educated; unmarried

# IMPORTANCE OF BREAST FEEDING

- Best nutritional source for infants
  - Composition changes as the child grows
  - Composition even changes throughout a single feeding
- Decreases infant's risk of infections
  - Immunoglobulins passed from mother to child
  - Many other proposed benefits
- *Bonus:* Increases mother-child bonding

Andreas NJ, Kampmann B, Mehring le-doare K. Human breast milk: A review on its composition and bioactivity. *Early Hum Dev.* 2015;91(11):629-635.



# WHEN TO AVOID BREAST FEEDING

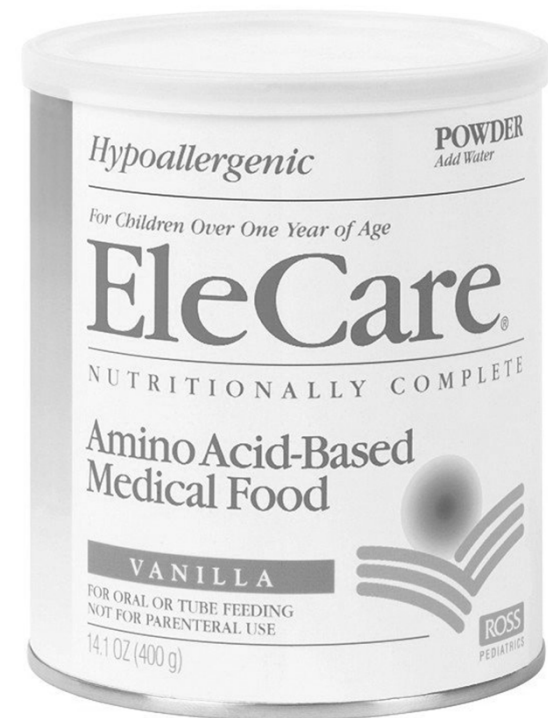
- Mother with HIV
  - Risk of transmission to nursing infant
    - However, benefit outweighs risk of HIV in underdeveloped countries
- Mother taking harmful medications
  - Many medications pass through the breast milk
  - Avoid feeds vs. dose after feeding/pumping
- Helpful resources→
  - Lactmed: <[toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov)>
  - National Breastfeeding Helpline: 800-994-9662



# INFANT FORMULAS

# INFANT FORMULAS

- Special formulations for different populations:
  - Pre-mature, newborn, infant/toddler, and specific disease states
- Various compositions:
  - Milk-based, soy protein, or casein hydrolysate-based
  - Ready-to-feed, concentrated liquid, powder
  - Therapeutic, standard, fortified



# CONDITION SPECIFIC FORMULAS

Gastric Reflux (GERD)	Enfamil A.R., Similac Sensitive
Cystic Fibrosis	EleCare, Pregestimil LIPIL, Similac Expert Care Alimentum
Lactose Intolerance	Enfamil ProSobee, Similac Sensitive, Similac Sensitive Isomil Soy
Allergy/sensitivity to cow milk or soy protein	EleCare, Neocate Infant, Nutramigen LIPIL, Nutramigin AA LIPIL, Pregestimil, Similac Expert Care Alimentum

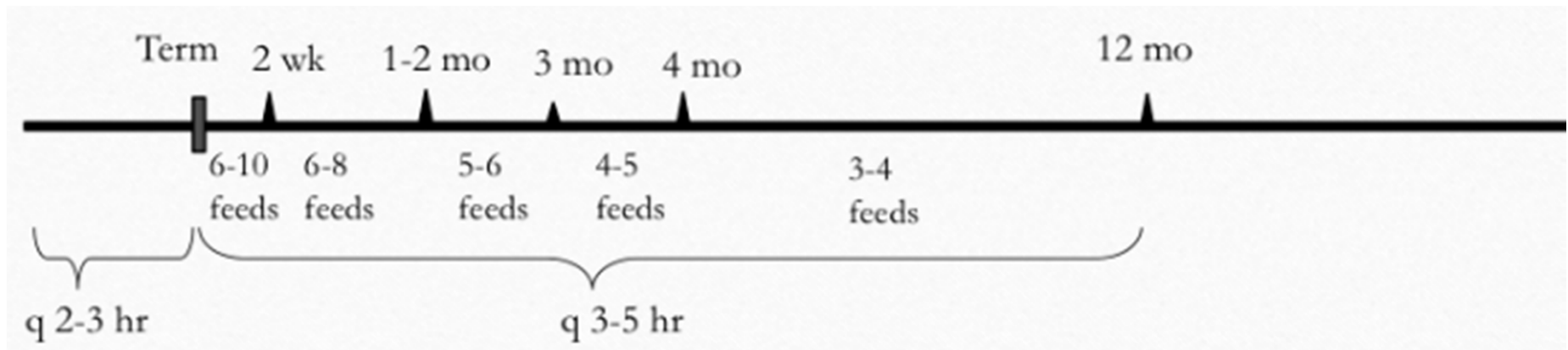
# FORMULA CONSIDERATIONS

- Manufactured to be sterile
  - Reminder: still requires sterile preparation by caregiver
- Standard caloric density: 20 kcal/ounce
  - 1.5mL of water for each kcal
- Formulas can be fortified to be more concentrated!



# FEED SCHEDULE

- Dependent on size, age, food source, and baby
  - Smaller babies feed more often, but a smaller volume
- Important to avoid over and under-feeding



- There are no hard numbers for recommendations!

# FORMULA PREPARATION

# FORMULA PREPARATION PEARLS

- Wash hands before handling feeding materials
- To sterilize feeding materials:
  - Start with cold tap water
  - Place materials into water, bring to a rolling boil, hold for 5 minutes
  - Remove materials from water and allow to dry



# FORMULA PREPARATION PEARLS

- Sterilize water for formula mixture
  - Bring to a rolling boil for 1-2 minutes then allow to cool
- Formulas
  - Wash the container with hot water and soap, then rinse
  - Shake formula (unnecessary for powder forms)
  - Mix appropriate amounts of sterilized water and formula
- Prepare feed and give to baby
  - Test temperature!





# BEYOND USE DATE

## Liquid Formula

- Liquid concentrate
  - Refrigerated
    - 48 hrs
- Ready-to-use
  - Refrigerated
    - 48 hrs

## Powdered Formula

- Unused, reconstituted liquid
  - Refrigerated
    - 48 hrs
- Unused powder
  - Non-refrigerated
    - 1 month

# MICROWAVES FOR PREPARATION

- *Not recommended*
- Safe utilization:
  - Remove lid prior to microwaving
  - 4 oz of milk per cycle –
    - Never frozen milk → water-bath prior
  - 4 or 8 oz of formula
- Duration:
  - 4 oz = 30 sec
  - 8 oz = 45 sec
- Invert 10 times after each heating
- Test temperature!



# PEDIATRIC NUTRITIONAL SUPPLEMENTS

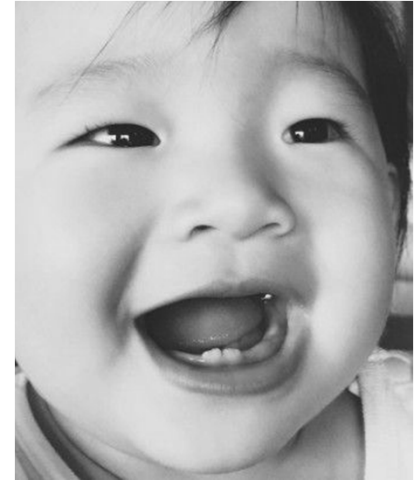
# VITAMIN & MINERAL SUPPLEMENTATION

- Multivitamin and mineral supplementation is generally unnecessary for full-term infants
- Some infants at risk for deficiencies requiring supplementation of:
  - Vitamin D
  - Iron
- Supplementation should always be discussed with the physician first!



# VITAMIN & MINERAL SUPPLEMENTATION

- Fluoride
  - Reduces dental decay
- Supplementation not recommended:
  - birth to 6 months
- Supplementation may be recommended:
  - 6 months to 6 years of age when drinking water is inadequately fluorinated and lack fluoride from other sources
- PCP may recommend supplementation when fluoride intake is inadequate



# WHEN TO REFER

INFANTS NOT APPROPRIATE FOR SELF-CARE

# WHEN TO REFER

- **Vomiting/Diarrhea**

- Green
- Projectile
- Day 3

- **Bloody stool**

- **Dehydration**

- S/sx: limp, lethargic, lacking tears
- Fewer wet diapers, dark urine





## QUESTIONS?

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