

# NUTRITION

## ENTERAL REQUIREMENTS

**Refer to dietitian for nutritional advice and composition of supplements and formulas**

### Introduction

- To maintain optimal growth, it is essential to meet nutritional requirements of preterm infants
- Neonatal nutrition team will monitor, audit, educate, and advise to ensure vulnerable infants maintain appropriate growth

### Daily recommendations

Daily recommendation (growing phase)	Preterm ELBW <1.0 kg	Preterm VLBW <1.5 kg	Term 0-3 month
Fluids mL/kg	160-220	135-190	150
Energy kcal/kg	130-150	110-130	115-100
Protein g/kg	3.8-4.2 4.4*	3.4-3.6 4.2*	2.1
Protein:energy ratio	3.3 g/100 kcal	2.8 g/100 kcal	
Sodium mmol/kg	3.0-5.0		2-3
Iron mg/kg	2.0-4.0 (not before 2 weeks )		1.7 mg/day
Calcium mmol/kg	2.5-5.5		13.1 mmol/day
Phosphorus mmol/kg	1.9-4.5		13.1 mmol/day
Vitamin A IU/ kg	700-1500 2000-3000/kg in chronic lung disease		1155/day
Vitamin D IU/ kg	150-400 400/day		340/day

\* protein for catch-up growth (based on Tsang guidelines 2005)

## MEETING DAILY REQUIREMENTS FOR PRE-TERM INFANTS

- Offer breast milk. If unavailable, use pre-term formula
- See **Vitamin and mineral preparations** for appropriate supplements and dosage for use with individual feeds

### Pre-term formula

- Feed at 150-165 mL/kg/day
- average nutritional contents per 100 mL = 80 kcal/2.4 g protein

### Breast milk

- Unfortified expressed breast milk (EBM) feed at >200 mL/kg/day
- EBM + Nutriprem breast milk fortifier (BMF) feed at 150-180 mL/kg/day
- fortifier can be added on day 14. Protein content of preterm breast milk falls from 1.8 g/100 mL to 1.3 g/100 mL by second week
- average nutritional contents of EBM (mature) per 100 mL = 70 kcal/1.3 g protein
- average nutritional content of fortified EBM (mature) per 100 mL = 86 kcal/2.1 g protein

### When babies reach 1.8–2.0 kg and on discharge

#### Breast milk

- Encourage babies to breast feed
- Stop fortifier unless growth poor – refer to dietitian for assessment
- Continue with vitamins and iron

#### Formula milk

- Offer Nutriprem 2 (available on prescription ACBS) as feed of choice for preterm infants, and stop vitamins and iron

- Continue Nutriprem 2 until 6 months after expected date of delivery, then use formula milk until 12-18 months old
- If term milk given, continue vitamins and iron - see **Vitamin and mineral preparation** sections for dosage
- average nutritional content of Nutriprem 2 per 100 mL = 75 kcal/2.0 g protein
- average content of term formula per 100 mL = 67 kcal/1.4 g protein

### **Vitamin and mineral preparations**

#### **Multivitamins**

##### ***Preterm infants on preterm formula or EBM plus Nutriprem BMF***

- Abidec 0.3 mL orally daily
  - start when oral feeds established 150 mL/kg
  - stop when Nutriprem 2 given >150 mL/kg **but continue if term formula given**
- or
- Healthy start vitamins – 5 drops orally daily

##### ***Preterm infants on breast milk only***

- Abidec 0.6 mL orally daily
  - start when oral feeds established 150 mL/kg
  - reduce to 0.3 mL on discharge
- or
- Healthy start vitamins – 10 drops orally daily - reduce to 5 drops on discharge

#### **Vitamin K**

- **Indications**
- all babies
- **Administration**
- see **Vitamin K** guideline

#### **Folic acid**

- **Indications**
- babies fed breast milk only
- Give 50 micrograms orally once daily
- start when oral feeding established – 150 mL/kg
- stop on discharge or when breast milk fortifier added

#### **Phosphate**

- Use phosphate supplements with unfortified EBM and Peptijunior/Pregestimil
- When on full feeds, give Joulies phosphate 0.5 mL 12 hrly, increasing to 0.7 or 1.0 mL 12 hrly to maintain serum phosphate >1.5 mmol/L (Joulies phosphate contains PO<sub>4</sub> 1.35 mmol/mL and Na 0.87 mmol/mL)
- unless osteopenia of prematurity present, phosphate supplements are normally stopped at discharge or at 37 weeks
- Exclusively breastfed infants may require serum PO<sub>4</sub> check at 6 weeks post-term and may need phosphate supplements up to 3 months old if <1.49 mmol/L

#### **Iron**

##### **Indications**

- Birth weight <2 kg

##### **Preparation**

- Sodium ferredetate (Sytron) liquid – containing elemental iron 5.5 mg/mL

##### **Administration**

- Sodium ferredetate 1 mL daily to all infants <2 kg
- start at 6 weeks or when transfusions cease, whichever is later
- stop when Nutriprem 2 is started
- give 5.5 mg (1 mL) at discharge to all breastfed infants or those fed term formula

## **MONITORING GROWTH**

- Critical in assessing nutritional needs of infant
- if not monitored **regularly**, optimum growth may not be achieved
- where monitoring not appropriate (e.g. very sick infant), ensure basic levels of nutrition – 120 kcal/kg and protein 3.4-3.8 g/kg/day

## Plot weight/length/head circumference weekly on centile charts

### **Weight**

- May reflect fluid balance rather than fat/lean body mass
- measure every 3 days and plot weekly on centile chart to assess growth
- An increase of 15-20 g/kg/day implies adequate weight gain **only** if reflected on centile charts

### **Length**

- Essential in reflecting skeletal and organ growth
- In under-nutrition, length is spared over weight gain
- Some babies experience altered growth with stunting
- Early assessment of longitudinal growth can provide better indication of long term growth
- Aim to monitor all babies, especially those who are ELBW/IUGR/CLD/fed EBM
- Measure weekly and plot on centile chart

### **Head circumference**

- Gives valuable information on cerebral growth in respect of cerebral injury and nutritional adequacy
- in moderate under-nutrition, head growth is spared in relation to length and weight
- Measure weekly and plot on centile chart

### **Monitor serum/urine concentrations weekly**

- Phosphate (1.0-2.3 mmol/L)
- urinary TRP
- Sodium (135-145 mmol/L)
- Urea (1.9-6.2 mmol/L)
- Alkaline phosphatase
- FBC
- Hb
- reticulocytes

## **POOR GROWTH**

### **Factors suggesting inadequate growth**

- Failure to achieve optimum growth according to head/length/weight measurements plotted on centile charts
- Weight gain <15 g/kg/day
- Weight  $\pm$  length falling across centile over 1-2 weeks

### **Review**

- Before addition of supplements, check and correct/modify:
  - fluid restriction
  - inadequate human milk fortification
  - sodium depletion
  - anaemia
  - sepsis
  - corticosteroid treatment (can delay growth)
  - respiratory/cardiac condition (resulting in increased energy requirement)
  - use of diuretics
  - malabsorption
- If volume cannot be increased, consider supplements

### **What to do after above factors checked**

- Action will depend on which milk infant receiving
- Make changes **sequentially**, one at a time

### **If infant having low birth weight formula milk**

- Increase fluid intake by 5 mL/kg increments to 180 mL/kg/day (provided medical condition allows)
- Once growth assessment checked, add Duocal in increments of 1 scoop (2.5 mL/6 kcal scoop)/100 mL /24 hr (maximum 3 scoops/100 mL)
- Review weight gain weekly before each increment increase
- Always consider increased volume before introducing supplements

### ***If infant having breast milk***

- Aim to **increase volume by 5 mL/kg increments to max 200 mL/kg** as tolerated (unfortified >220 mL/kg)
- Add Nutriprem BMF when taking full feeds 150 mL/kg but **not before day 14**
- full strength – 1 sachet (2.1 g)/50 mL
- if gastrointestinal symptoms present, use half strength – half sachet (1.1 g)/50 mL for 24 hr. If tolerating, increase to full strength

### **Documentation**

- To ensure all staff aware, record all dietary modification in medical notes, including:
- number of 2.5 mL scoops and what is added – not just additives
- kcal/protein g/kg **or** per 100 mL after modification

***If growth poor, refer to breast feeding specialist***

## **MANAGING SPECIFIC CONDITIONS**

### **Problems with initiating feeds**

- Use EBM
- If EBM not available, prefer preterm formula
- if absorption poor, use Prenan – partially hydrolyzed whey protein or term formula
- if Prenan not tolerated, use Peptijunior or Pregestimil – hypoallergenic feeds made from extensively hydrolyzed whey/casein

### **Malabsorption ± post GI surgery**

- Use Peptijunior or Pregestimil – both are hypoallergenic feeds made from extensively hydrolyzed whey/casein with MCT

### **Cholestasis**

- Use Prenan, Peptijunior or Pregestimil – all have MCT, and Prenan meets nutritional needs of preterm infant

### **Galactosaemia**

- If suspected, use infant soya formula milk

### **Cow's milk protein intolerance**

- Use Peptijunior or Pregestimil – neither contains lactose or cow's milk protein

### **Note:**

- Peptijunior and Pregestimil have low folic acid content and are formulated for term infants. If 200 mL/kg cannot be achieved, concentrate feed:
- normal dilution – 13% 1 scoop to 30 mL boiled water
- concentrated – 15% 1 scoop to 25 mL boiled water

### **Low albumin/low urea**

- Contact dietitian for supervision
- Low albumin is a consequence of prematurity but a falling value may indicate inadequate protein
- Low urea <1.0 mmol/L – may indicate inadequate protein
- If <4 wk old, low urea may indicate liver unable to make urea, with consequent hyperaminoacidaemia/hyperammonia, especially in preterm infants with IUGR
- If infant stable and growing, low urea may reflect protein economy in rapidly growing infants
- plot length, weight and head circumference
- if falling away from centile or static, extra protein needed – contact dietitian

### **High blood glucose**

- Contact dietitian to discuss replacing carbohydrate within feeds with fat
- Calogen is an emulsion of long chain fats 50:50 fat/water which can be added to feeds in 1 mL increments up to 2 mL/100 mL of milk (1 mL = 4.5 kcal)

### **Dexamethasone**

- Can cause high blood glucose and high serum urea
- if infant poorly nourished, consider reducing blood glucose using medical means rather than by reducing nutrition

### **Indometacin**

- May cause restriction of blood flow to GI tract
- avoid use of supplements while on this treatment