

## Feeding Guidelines

Birthweight	Initiation of Feeds		Feeding Increase	
<500g	1mL q6h x 48h 1mL q4h x 48h 1mL q2h x 48h		1mL q24h	
500-650g	1mL q6h x 24h 1mL q4h x 24h 1mL q2h x 24h		1mL q24h	
651-750g	1mL q4h x 24h 1mL q2h x 24h 1mL q2h x 24h		1mL q24h	
751-1000g	1mL q2h x 24h		1.5mL q24h	
1000-1250g	2mL q2h x 24h		If 1000g-1050g: 1.5mL q24h If 1051g-1250g: 2mL q24h	
1251-1500g	4mL q2h x 24h		If 1251g-1350g: 2mL q24h If 1351g-1500g: 2.5mL q24h	
	No Respiratory Distress	Stable with Respiratory Distress	No Respiratory Distress	Stable with Respiratory Distress
1501-2000g	80mL/kg/d Feed q2h x 24h	40mL/kg/d Feed q2h x 24h	Increase feeds with TFI increase	80mL/kg/day Feed q2h x 24h
>2000g and <35 weeks	60-80mL/kg/d Feed q2h x 24h	40mL/kg/d Feed q2h x 24h	Increase feeds with TFI increase	Increase feeds with TFI increase
>2000g and ≥35 weeks	Ad lib oral feeds or if ng feeding: 60-80mL/kg/d Feed q3h x 24h	Delay initiation for 24h to wait for EBM if BF If formula feeding, 60-80 mL/kg/d Q3h	Ad lib oral feeds	Increase feeds with TFI increase Feed q3h

Nutrients per 100 ml	Expressed Breast Milk (EBM)				Standard Formulas					Special Formulas	
	Mature EBM (Donor EBM)	Fortified EBM:			Similac Special Care (Preterm Formula)	Similac Neosure (Post-Discharge Formula)	Similac Advance (Term Formula)	Total Comfort (Whey)	Neocate (Free AA)/ Alimientum (Hydrolyzed Casein)		
		EBM +HMF CL (Human Milk Fortifier)	EBM 24 + Neosure								
Concentration kcal/oz	20	22 (1pk HMF CL: 50mL EBM)	24 (1pk HMF CL: 25mL EBM)	27 (1 pk HMF CL: 25 mL + Neosure)	20	24/HP	22	20	24	20	20
Energy kcal/100 mL	68	75	80	90	68	81	74	68	81	68	68
Protein g/100 mL	1.2	2	2.7	3	2.0	2.4/2.67	2.1	1.4	1.7	1.6	2.1/1.9
Fat g/100 mL	3.9	3.9	4.0	4.6	3.65	4.3	4.1	3.7	4.3	3.65	3.0/3.8
Carbohydrate g/100 mL	7.2	7.9	8.5	9.6	7.0	8.4/8.1	7.5	7.3	8.8	7.1	7.8/7.0
Sodium mmol/100 mL	0.78	1.1	1.4	1.6	1.26	1.5	1.1	0.78	9.5	1.3	1.07/1.38
Potassium mmol/100 mL	1.35	2.2	2.9	3.3	2.42	2.9/3.03	2.72	2.06	2.2	2.29	2.64/2.05
Calcium mmol/100 mL	0.7	2.0	3.1	3.4	3.0	3.65	1.95	1.33	1.58	1.78	2.06/1.78
Phosphorus mmol/100 mL	0.45	1.4	2.2	2.4	2.2	2.6	1.5	0.9	1.13	1.65	1.99/1.65
Iron mg/100 mL	0.04	0.2	0.4	0.6	1.2	1.5	1.3	1.2	1.46	1.0	1.2
Vitamin D IU/100 mL	2.0	65	118	126	102	122	52	40.5	49	40.5	39.8/30

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## Mt. Sinai NICU Nutrition Guidelines

Adapted with permission from SickKids NICU Guidelines

Measure your babies every **Monday**

	Preterm	Term (First 3 months)
<b>Initial Weight Loss</b>	7-20%	≤10%
	Maximum weight loss is expected to occur by ~4-6 days of life	
<b>Weight Gain</b>	Birth weight usually regained by 10-14 d	
	15-20 g/kg/d	20-30 g/d
<b>Length</b>	0.8-1.1 cm/wk	0.69-0.75 cm/wk
<b>Head Circumference</b>	0.5-1 cm/wk	

**Monitor Growth:** using above and appropriate growth chart:

- Fenton (preterm infants)
- WHO (term infants; preterm infants > 50 wks PMA)

### Enteral Nutrient Requirements

Nutrient	Preterm Infants		Term Infants
	<1 kg	>1 kg	
<b>Fluid</b> (ml/kg/d)	135-200		120-180
<b>Energy</b> (kcal/kg/d)	110-135		90-120
<b>Protein</b> (g/kg/d)	4-4.5	3.5-4	1.5-2.5
<b>Vitamin D</b> (IU/d)	400-1000		400-800
<b>Calcium</b> (mmol/kg/d)	3-5		
<b>Phosphate</b> (mmol/kg/d)	1.9-4.5		
<b>Iron</b> (mg/kg/d)	3-4	2-3	
<b>Sodium</b> (mmol/kg/d)	3-5		
<b>Potassium</b> (mmol/kg/d)	1.7-3.4		

### Human Milk Fortification Guidelines

Birth Weight	When?	What?
< 2kg < 34 wks	Enteral 100 mL/kg/d	SHMF CL 22 kcal/oz
≥34 weeks	Enteral 140 mL/kg/d	SHMF CL 24 kcal/oz
		See RD

Urea nitrogen level	Adjustable Fortification
< 3.6 mmol/L	Increase fortification one level
3.6-7 mmol/L	No change to fortification
>7 mmol/L	Decrease fortification by one level but not below standard fortification
<b>Level 1 fortification</b>	0.5g (3mL) liquid protein/100 mL
<b>Level 2 fortification</b>	1.0g (6mL) liquid protein/100 mL

## Elemental Iron and Vitamin Supplementation

<b>Initiation &amp; Duration</b>	Start 72 hours after full fortification (24 kcal) and once full feeds reached Continue until 12 mo. corrected age
<b>Elemental Iron</b>	See online <b>NICU medication manual</b> for weight adjusted dosages
<b>Tri Vitamin mixture</b>	0.5 mL = 200 IU Vitamin D, 375 IU Vitamin A, 15 mg Vitamin C until 12 mo. Corrected age

\*doses of iron and multivitamins should be given at different times

### PolyCal

Used orally for hypoglycemia management  
Carbohydrate (CHO) module – corn maltodextrin

Approximate CHO content when added to EBM or formula at the following final caloric concentrations:

Approximate Concentration	20kcal+ 1/2/3 g Polycal	22kcal+ 1/2/3 g Polycal	24kcal+ 1/2/3 g Polycal
<b>CHO</b> (g/100ml)	8.1/9/9.9	8.8/9.7/10.6	9.4/10.3/11.6

## OSTEOPENIA SURVEILLANCE

**Day 21 bloodwork:** iCa, PO4, ALP, 25(OH) D

If PO4 < 1.5mmol/L and ALP >600 mmol/L consider Ca Carbonate supplements at 75 mg/kg/d (despite normal iCa) and PO4 supplements at 0.5 mmol/kg/d concurrently Repeat blood work after 1-2 weeks

### DONOR EBM

**\*Consent and Documentation Required\***

**Eligibility Criteria** (any one of):

- Birth weight ≤ 2000g
- Gestational age at birth ≤ 35 wks
- Cardiac or GI surgery within first 4 wks of life
- Post NEC

**Discontinuation:**

- 36-37 wks

Wean off donor EBM over 48 hours by alternating donor EBM feeds with appropriate formula

## Parenteral Nutrition (PN)

Day of Life	BW <1000g	
	Protein	Lipid**
<b>Birth</b>	D10W PN with 5 g protein/100 mL, 2 mmol each Ca and Acetate per 100 mL to max TFI of <b>50 mL/kg/d</b> (2.5 g protein/kg/d)	1 g/kg/d
<b>After 24 hours</b>	Switch to PN containing all electrolytes and minerals to maximum of 4 g/kg/d protein	Increase by 1 g/kg/d  Maximum 3 g/kg/d

Day of Life	BW 1000-2000g	
	Protein	Lipid**
<b>&lt;4 hours of age</b>	D10 P3 standard PN Maximum of 3.5-4 g/kg/day	1 g/kg/d
<b>After 24 hours</b>	Maximum of 3.5-4 g/kg/d	Increase by 1 g/kg/day Maximum 3 g/kg/d

\*\* Maximum Rate calculation:  $4 \text{ g} \times \frac{\text{wt (in kilograms)}}{24 \text{ hours}}$  protein concentration in PN bag

\*\* SMOFlipid® rate (mL/hr) =  $[1 \text{ g/kg/day} \times \text{wt (kg)}] / 24 \text{ hours} / 0.2 \text{ g/mL}$

Lipid level after increase to 1 and 3 g/kg/d:

- Normal lipid level < 1.25 g/L
- Lipid level > 1.25 g/L, d/c for 24 hours and repeat level before restarting

### Standard PN solutions/100mL

<b>Na</b>	2.8 mmol	<b>Ca</b>	1.5 mmol
<b>K</b>	2 mmol	<b>P</b>	1.5 mmol
<b>Cl</b>	+/- mmol	<b>Mg</b>	0.4 mmol
<b>Acetate</b>	0.8 mmol		

\*\*Available in D7.5W, D10W and D12.5W

## Electrolyte and Mineral Intake

Nutrient	Initial Dose (mmol/kg/d)	Maintenance Requirements (mmol/kg/d)		
		Intermediate Phase	Stable/Growing Phase	
			Preterm Infants	Term Infants
<b>Sodium</b>	0-3	2-5	3-5	2-3
<b>Potassium</b>	0-2	1-3	2-5	1.5-3
<b>Chloride</b>	As needed to maintain acid-base balance			
<b>Calcium</b>	0.5-1	Same as stable/growing phase	1-2	0.25-2
<b>Phosphorus</b>	0-1		1-2	0.5-2
<b>Magnesium</b>	0-0.25		0.15-0.25	0.15-0.25
<b>Acetate</b>	<ul style="list-style-type: none"> <li>• As needed to maintain acid-base balance</li> <li>• Sodium acetate/potassium acetate may be substituted for chloride to provide a source of bicarbonate for infants with metabolic acidosis (acetate is metabolized by the liver to produce bicarbonate in a 1:1 molar ratio)</li> <li>• No acetate in PN = ↑ chloride ions in PN; High acetate in PN = ↓ chloride ions in PN</li> <li>• <b>Maintenance 1-2 mmol/kg/d; Treatment: 2-4 mmol/kg/d; do not exceed 6 mmol/kg/d</b></li> </ul>			
<b>Iron</b>	• Not routinely added to PN			
<b>Trace Elements</b>	• Micro +6 Pediatric trace element mixture is added daily. Contains Zn, Cu, Mn, Cr, Se, I			
<b>PN Multivitamin</b>	• Multi-12/K1 Pediatric is added daily but not to stock bags on unit			

\*Small preterm infants may require greater intakes of both minerals and electrolytes

### PN for SGA infants

**Birthweight <10<sup>th</sup> percentile for weight and <32 weeks at birth**  
These infants are at greater risk of 'refeeding like syndrome' with low serum PO<sub>4</sub> and low/normal K at 24 hours of age

- Obtain PO<sub>4</sub> and K at either 12 or 24 hour bloodwork
- If PO<sub>4</sub> < 0.9 mmol/L, begin a potassium phosphate intravenous correction at 0.5 mmol/kg over 6 hours. See online NICU medication manual
- Repeat serum PO<sub>4</sub> at 1 and 6 hours after correction and repeat if necessary

### Na and Acetate Correction Equations

#### Sodium

**Serum Na correction** (mmol/d) = (desired serum Na - present serum Na) x 0.6 X wt (kg)

**Urinary Na losses** (mmol/d) = urinary Na (mmol/L) x L urine/day

**Total Na requirements** (mmol/kg/d) = serum Na correction + urinary Na losses + Maintenance (3-4mmol/kg/d)

#### Acetate

**½ correction (mmol acetate/day)** = wt (kg) x 0.3 x base deficit

## PN Calculations

**STEP 1 – Calculate hourly fluid rate (mL/hr)\*:**

=  $\text{TFI (mL/kg/d)} \times \text{wt (kg)} \div 24 \text{ (hr/d)}$

\*This is the total fluid including lines running; heparin, continuous IV meds, drips, PN, lipid, feeds

**STEP 2 – Calculate hourly lipid volume (mL/hr):**

=  $\text{desired intake (g/kg/d)} \times \text{wt (kg)} \div \text{lipid concentration* (g/mL)} \div 24 \text{ (hr/d)}$

\*20% SMOFlipid = 0.2 g/mL

To calculate **lipid intake (g/kg/d):**

=  $\text{hourly rate (mL/hr)} \times 24 \text{ (hr/d)} \times \text{lipid concentration (g/mL)} \div \text{wt (kg)}$

**STEP 3a – Determine hourly PN volume (mL/hr):**

=  $\text{hourly fluid rate (mL/hr)} - \text{hourly lipid rate, heparin rates, other infusions, feeds, etc.}$

**STEP 3b – Determine daily PN volume (mL/d):**

=  $\text{hourly PN volume (mL/hr)} \times 24 \text{ (hr/d)}$

**STEP 4 – Calculate Nutrient Intakes:**

**GIR (mg/kg/min): For continuous infusions only**

=  $\text{rate (mL/hr)} \times \text{dextrose (g/L*)} \div 60 \text{ (min/hr)} \div \text{wt (kg)}$

\*g/L is same as mg/mL → 100 g/L = 100 mg/mL dextrose

**Protein (g/kg/d):**

=  $\text{daily PN volume (mL/d)} \times \text{concentration of AA (g/mL)} \div \text{wt (kg)}$

**Other Nutrients (mmol/kg/d):**

=  $\text{daily PN volume (mL/d)} \times \text{concentration of nutrient (mmol/mL)} \div \text{wt (kg)}$

To calculate desired concentration to put in PN solution (g/L AA or mmol/L other nutrients):

=  $\text{desired intake (g OR mmol/kg/d)} \times \text{wt (kg)} \times 100 \text{ mL} \div \text{daily PN volume (mL/d)}$

### COMMON CONVERSIONS

#### Amino Acids (AA)

5g/100 mL = 0.05 g/mL

#### Lipids Emulsion

20% SMOFlipid = 20 g/100 mL = 0.2 g/mL

#### IV Fluids

0.45% NS: 77 mmol/L Na = 0.077 mmol/mL Na

0.9% NS: 154 mmol/L Na = 0.154 mmol/mL Na

D5W = 50 g dextrose/L D10W = 100 g dextrose/L

D125W = 125 g dextrose/L

### TIPS AND TRICKS

- Changes to bloodwork are only reflected after a new PN solution has been hung for a minimum of 6 hours
- Suggested net changes in intake (PN + other infusions) needed to make a significant difference on serum levels:
  - Na ↑/↓ 1.5 mmol/kg/d
  - K ↑/↓ 0.7 mmol/kg/d
  - GIR ↑/↓ 1-2 mg/kg/min