



<b>Clinical Guideline:</b>	<b>Parenteral Nutrition Guideline</b>
<b>Effective Date:</b>	3/13/2015; Revised 5/30/2015, 10/7/2015, 3/7/2016, 9/2/2016, 2/27/2017, 1/9/2018, 11/19/2018, 6/11/2020

### INITIATION OF PARENTERAL NUTRITION

Weight at birth	When to initiate
<1800 g	Neonatal Premix Stock PN ("Standard PN") ASAP either Central or Peripheral Access to be run at 50 mL/kg/day
≥1800 g	Clinical judgment: <50 mL/kg/day enteral feedings by 48-72 hours of life and no plan to advance per protocol
<b>Therapeutic Hypothermia (TH)</b>	Start with Standard PN, order custom PN at first AM rounds (refer to TH guidelines)
<b>New order:</b>	Through order sets > Neonatal Parenteral Nutrition
<b>Renewal:</b>	Select "Reorder" on order screen and adjust components from yesterday's order (Do NOT select "Modify")
<b>Titration:</b>	Select "Yes" or "No" if volume may be adjusted for feeding advance and/or total fluid adjustment

### MACRONUTRIENT PARENTERAL NUTRITION ADVANCES AND GOALS

	Standard PN (<1800g, TH) <i>When @ 50 mL/kg/day*, provides:</i>	Custom PN Day 1	Daily Advances	Goal
<b>Feeding Volume</b>	Refer to Enteral Nutrition Clinical Practice Guideline			
<b>IV Fat Emulsion (IVFE)</b> <i>Intralipid (IL) is BWH standard IVFE for neonates. Please refer to IVFE guideline for indications for use of SMOFlipid or Omegaven</i>	-	1 g/kg	↑ 1 g/kg	IL: 3 g/kg (15 mL/kg) SMOF: 3 g/kg (15 mL/kg) Omegaven: 1 g/kg (10 mL/kg)
<b>Glucose Infusion Rate (GIR: mg/kg/min)*</b> <i>Central Max D30%; Peripheral Max D12.5%</i>	3.47 mg/kg/min	4-6 mg/kg/min	For Glucose <120, ↑ 1-2 mg/kg/min	~12 mg/kg/min
<b>Trophamine (AA)</b>	3 g/kg/day	3**-4 g/kg	↑ 0.5**-1 g/kg	≥1800g: 3 g/kg <1800g: 3.5-4 g/kg

\*While on Standard PN, provide additional IV fluids to meet hydration needs; Avoid cumulative GIR from all IV fluids <4-5 mg/kg/min

\*\*Refeeding Risk: VLBW + IUGR/SGA/Preeclampsia

### APPROVABLE PN SOLUTIONS:

<b>Osmolarity*:</b>	Peripheral ≤ 1050 mOsm/L (Central ≤ 2000 mOsm/L)	<b>Sterile Water:</b>	Must be > 0 mL
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Dextrose and Trophamine are the most osmotic and largest volume additives in a PN solution, therefore:

- Try minor adjustments in Dextrose% or g AA/kg/day with careful attention to optimize energy, GIR and protein provision as much as possible.
  - When adjusting AA; adjust cysteine accordingly (\*40 mg/kg/day Cysteine per 1 g AA/kg/day)

\*EPIC shows mOsm/L on left hand summary screen when ordering Neonatal PN; alerts >900 mOsm/L

#### CYSTEINE<sup>◇</sup>

g/kg/day AA	Dose (mg/kg)
2.5	100
3	120
3.5	140
4	160

#### MULTIVITAMIN

Wt	Dose
<2500g	2 mL/kg
≥2500g	5 mL

#### TRACE ELEMENTS

Wt	NEOTRACE	Individual Dose
<1000g	None	Zinc: 400 mcg/kg Copper: 20 mcg/kg
1000-2500g	0.2 mL/kg	Zinc: 100 mcg/kg
>2500g	0.5 mL	None

#### HEPARIN

Central PN*:
0.5 units/mL
<i>*Add to peripheral PN if attempt for central access pending</i>

#### SELENIUM

All infants:
2 mcg/kg

#### (Levo)CARNITINE

Add on DOL 14 if on PN:
10 mg/kg

#### CALCIUM AND PHOSPHATE GUIDELINES\*

Access	mEq Calcium per 100 mL	mmol Phos per 100 mL
Peripheral	1.5	0.75
Central	3	1.5

#### MAGNESIUM

All infants*:
0.3 mEq/kg
<i>*hyper Mg: 0.1 mEq/kg</i>

### SUGGESTED LABORATORY MONITORING

<b>Electrolytes, BUN, Creatinine</b>	PRN in setting of clinical status. Note: BUN level up to 50 mg/dL reflects utilization of amino acids for energy and, in the absence of other clinical concerns, does not reflect toxicity or renal dysfunction.
<b>Glucose</b>	Daily checks until clinically stable and labs stable on goal GIR; BID when weaning PN and advancing feeds.
<b>Triglycerides</b>	<b>Check once receiving goal lipids of 3 g/kg/day.</b> Also consider checking during initial advancement if clinical concern, e.g. hyperglycemia (>180 mg/dL) or ELBW infant <1000g. For confirmed TG >250 mg/dL (i.e., not drawn off line infusing lipid): decrease lipids to 1 g/kg/day, follow daily labs and resume 1 g/kg/day advances to goal once <200 mg/dL. Avoid doses <1 g/kg/day if possible.
<b>Calcium, Magnesium, Phosphorus</b>	Once on ≥3 mEq Ca per 100 mL and ≥1.5mmol Phos per 100 mL, then weekly PRN.
<b>Total/Direct Bilirubin; Alkaline Phosphatase</b>	If on PN >2 weeks, follow every other week while on PN/lipids.

\*Guidelines represent the minimum recommended frequency of monitoring for stable infants. Frequency of laboratory monitoring should primarily be decided by overall clinical status.

### PARENTERAL NUTRITION WEANING GUIDELINES

Macronutrients				Additives				
Feeding Volume (mL/kg)	40	60	80	100	(Once feeds are fortified, *unless lab abnormalities being addressed)			
<b>Lipids (g/kg)</b>	2	1-2	1	Discontinue PN and IL	<b>Multivitamin</b>	½ starting dose	<b>Calcium*</b>	1.5-3 mEq/100 mL
<b>Dextrose %</b>	Maintain %Dextrose in setting of euglycemia; Ideally ≤ 15%				<b>Trace Elements</b>		<b>NaPhos*</b>	0.75-1.5 mmol/100 mL
<b>Trophamine (AA) (g/kg)</b>	Fortified Feeds: 1.5-2.5 Unfortified Feeds: 3-3.5				<b>Selenium</b>		<b>Magnesium*</b>	0.1-0.3 mEq/kg