



Clinical Guideline:	Parenteral Nutrition Guideline
Effective Date:	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, 3/26/2021

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
Therapeutic Hypothermia (TH)	Start with Standard PN, order custom PN at first AM rounds (refer to TH guidelines)
New order:	Through order sets > Neonatal Parenteral Nutrition
Renewal:	Select "Reorder" on order screen and adjust components from yesterday's order (Do NOT select "Modify")
Titration:	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
Feeding Volume	Refer to Enteral Nutrition Clinical Practice Guideline			
IV Fat Emulsion (IVFE) <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)
Glucose Infusion Rate (GIR: mg/kg/min)* <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
Trophamine (AA)	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 ([Neonatal Refeeding-like Syndrome Clinical Summary](#))

APPROVABLE PN SOLUTIONS:

Osmolarity*:	Peripheral ≤ 1050 mOsm/L (Central ≤2000 mOsm/L)	Sterile Water:	Must be > 0 mL
---------------------	---	-----------------------	----------------

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[◇]

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
<2500g	None	Zinc: 400 mcg/kg Copper: 20 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

STANDARD CALCIUM AND PHOSPHATE RATIOS

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

Electrolytes, BUN, Creatinine	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.
Glucose	Daily checks until clinically stable and labs stable on goal GIR; BID when weaning PN and advancing feeds.
Triglycerides	Check once receiving goal lipids of 3 g/kg/day. 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.
Calcium, Magnesium, Phosphorus	Once on ≥3 mEq Ca per 100 mL and ≥1.5mmol Phos per 100 mL, then weekly PRN.
Total/Direct Bilirubin; Alkaline Phosphatase	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)				
Lipids (g/kg)	2-3	1-2	1	Discontinue PN and IL	Multivitamin	½ starting dose	Calcium*	1.5-3 mEq/100 mL	
Dextrose %	Maintain %Dextrose in setting of euglycemia; Ideally ≤ 15%						Trace Elements	NaPhos*	0.75-1.5 mmol/100 mL
Trophamine (AA) (g/kg)	Fortified Feeds: 1.5-2.5 Unfortified Feeds: 3-4						Selenium	Magnesium*	0.1-0.3 mEq/kg