**ECMO Neonatal Nutrition Guidelines**

*L.Lusk 12.2022*

*Neonates on ECMO are hypermetabolic and markedly catabolic. They are at high risk of remaining catabolic for weeks and often have malnutrition and poor growth long after separating from ECMO. Because of this, we should begin providing aggressive nutrition immediately via parenteral nutrition and initiation of enteral feeds, when appropriate.*

Parenteral Nutrition- Hyperalimentation:

*ECMO should NOT be considered “metabolic rest” and normal neonatal calorie goals should be used. Protein should be initiated early to avoid a negative nitrogen balance.*

1. Goal 100-120kcal/kg/day.
2. If patient is DOL 1-3, begin starter TPN upon admission.
3. If patient is > DOL 3, begin infant on D10 with electrolytes as needed upon admission.
4. TPN should be started as soon as possible with goal of 3g/kg/day protein.
5. Minimum GIR 4-6, consider insulin if GIR limited by hyperglycemia.

Parenteral Nutrition- Lipids:

*There is a theoretical risk of increasing pulmonary vascular resistance and potentiating pulmonary hypertension. This is based on older animal studies and with use of bolus IL at higher rates than currently used. There are no current evidence-based recommendations on the use of IL in neonates with PH. Use of lipids should be catered to the individual patient.*

1. All patients should be started at 1g/kg of Intralipids.
2. Infants with pulmonary hypertension:
	1. Advance to 2g/kg/day by day 3-4.
	2. Hold at max of 2g/kg/day Intralipids for 7 days, then advance per normal protocol.
3. Infants without pulmonary hypertension can be started at 1g/kg/day and advanced per standard protocol as tolerated.
4. In all infants, consider transition to SMOF lipids if direct bili ≥ 0.5. Start at 1g/kg/day.
5. Caution: do not limit SMOF lipids <2.5g/kg/day as this can cause essential fatty acid deficiency.

Enteral Feedings:

*There is some data that feeding enterally in the neonatal population is safe, though it remains limited. Enteral nutrition in the pediatric and adult population is safe and has been associated with improved mortality and decreased risk of sepsis. Neonates are unique in their risk of necrotizing enterocolitis and are known to have poor gastric emptying on EMCO so caution should be used.*

1. Consider starting enteral feeds when patient stabilized on ECMO (stable hemodynamics on a stable ECMO flow).
2. Enteral feeds can be started on either VV or VA ECMO.
3. Initiate feeds of either EBM or DBM at 5ml Q3 hours (~10ml/kg/day).
4. Provide trophic feed for minimum of 2-3 days, then advance by 20ml/kg/day as tolerated if bowel sounds are present and there is no abdominal distention. Max feeds of 100ml/kg/day.
5. Both bolus and continuous feeds are acceptable.
6. Both NG and NJ feeds are acceptable. *Do not place a new feeding tube in a heparinized patient.*
7. Do not initiate promotility agents in neonates.
8. Consider holding feeds for emesis, abdominal distention, or worsening of clinical status
9. Contraindications to enteral feeds:
	1. Septic shock
	2. Increasing vasoactive support
	3. Rising lactate
	4. Requirement of >1 pressor (not including hydrocortisone)
	5. Severe ileus
	6. Unrepaired congenital diaphragmatic hernia
	7. Other abdominal pathology

Routine Nutrition Labs:

*Infants on ECMO are at risk for electrolyte abnormalities, particularly with magnesium and calcium. They should also be followed closely for hyperlipidemia as this can interfere with other tests including anti-Xa and PTT.*

1. Daily basic metabolic panel
2. Daily magnesium
3. Daily ionized calcium
4. Daily phosphorus, until stable
5. Check triglycerides per standard TPN lab protocol