

Clinical experience with a lipid-free, ready-made parenteral nutrition solution in dogs:

70 cases

Gajanayake et al, JVECC 2013

- 1. Demonstrated a similar risk of septic complications to other studies pertaining to lipid-containing solutions**
 - **7% is similar to the 8% seen in other vet reports that used lipid-containing solutions (and this number would likely be higher if all tips cultured!)**
 - **Recent human studies also support no increased risk of septic complications for lipid containing emulsions**
- 2. This solution is a viable alternative if compounding or expertise are not available, if lipid is not desirable, or to institute PN earlier and able to meet a goal of 40-70% of RER**

DOSING:

- 5.9% amino acid solution with 100g/L glucose + electrolytes
 - 650kcal/L
 - pH 5.2, osmolality 1350
- Administered either via dedicated peripheral catheter (66%) or dedicated port of multi-lumen jugular catheter
- Standard calculations used for RER to current body weight, no illness factors used
- Dosed according to protein allocation
 - Standard protein needs = 4g/100kcal
 - Increased = 6g/100kcal
 - Decreased = 2-3g/100kcal
- Rate of glucose infusion maintained below 4mg/kg/min, rate decreased by 50% if hyperglycaemia developed
- Administered at 50% of calculated rate then increased after 24hrs to total rate
- **57% of dogs also received supplemental enteral nutrition of varying percentages of RER**

Complications:

- **Metabolic**
 - Occurred in 43/67, all independent of amount of calories delivered
 - Hyperglycemia occurred in 24 (119-450, median of 135mg/dL), rate of infusion no different in these patients
 - Hyperkalemia 16/67, no significant relationship between additional potassium supplementation and developing this complication
 - Azotemia in 6/67, independent of protein rates
- **Mechanical**
 - Catheter dislodgement, leaking of fluid from site, damaged catheter/administration set
 - 28/67, all but one of which occurred with peripheral catheters
 - Just one of these was thrombosis
 - Higher rate of mechanical complications than previous studies (40% compared to 26%), but also higher use of peripheral vs central catheters

- Higher rate could also be secondary to high osmolality and acidity of solution compared to lip containing ones
- **Septic**
 - 24/67 dogs suspected (based on CBC, fever), confirmed in 5 (7%) based on catheter tip culture
 - NO association with catheter type, duration of PN or amount of calories
 - 7% is similar to the 8% seen in other vet reports that used lipid-containing solutions (and this number would likely be higher if all tips cultured!)
 - Recent human studies also support no increased risk of septic complications for lipid containing emulsions

Outcome:

- 46% discharged, 11 died, 27 euthanised
- Median duration of PN - 2.2d (0.5-9.5)
- Median duration of hospitalisation 7d (2-31)
- Development of PN related complications not associated with duration of hospitalisation
- Development of hyperglycemia and azotemia not associated with survival
 - Hyperglycaemia in cats on PN has been associated with poorer prognosis
 - Study may have been underpowered to detect an association
- Development of hyperkalemia **was associated with poor outcome**
 - Median of 4.9
 - Supplementation also associated with poor outcome
 - Unable to determine if it was an independent risk factor or not
- Provision of supplemental EN was not associated with outcome
- Higher complication rates (0.49 complications per day of PN) than previous studies of compounded PPN, but different methods of evaluating complications so cannot compare directly
- The solution administered has very low non-protein calorie:nitrogen ratio (36:1, while in people aims for critically ill patients 100-120:1, higher in those with minimal metabolic stress). The optimal ratio has not been studied in dogs

QUESTIONS:

For a ready-made parenteral nutrition solution with 5.9% amino acids and 100g/L glucose, with a total of 650kcal/mL:

- 1) What rate should the solution be administered to meet a protein requirement of 5g/100kcal for a 15kg dog?
- 2) What percentage of the patient's RER will be obtained at this rate?
- 3) Describe some circumstances under which you would consider using this solution?

ANSWER:

1) $RER = 15 \times 30 + 70 = 520$.

Protein requirement = $5 \times 5.2 = 26\text{g/day}$

59g protein per L

Daily requirement = $26/59 = 0.44\text{L} = 18\text{mL/hr}$

2) $18\text{mL/hr} = 440\text{mL/day} = 286\text{kcal/day}$

$RER = 520\text{kcal/day}$

$286/520 = 55\% \text{ RER}$

3) When compounding is not available. When lipids are not desirable (hypertriglyceridemia, renal/liver disease). When a central catheter cannot be placed for a more calorically dense solution. With significant cost concerns. To supplement enteral nutrition.