

My Favorite Nutrition Paper

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My Favorite Paper...

- ▶ The Effect of Intradialytic Intralipid Therapy in Pediatric Hemodialysis Patients.
- ▶ Haskin O, Sutherland SM, Wong CJ.
 - Pediatric Nephrology Department, Stanford University School of Medicine.
- ▶ **Journal of Renal Nutrition**, copyright 2016 *National Kidney Foundation*, Volume 27 (2), March 2017: 132-137.

Background

- ▶ Poor growth and Protein Energy Wasting (PEW) are common in patients with CKD and ESRD.
 - Inadequate dietary intake
 - Chronic inflammation
 - Nutrient losses in the dialysate
 - Altered responses to anabolic hormones
- ▶ Anthropometrics (BMI) and serum albumin are predictors of morbidity and mortality in adults and children.

Background

- ▶ Enteral nutrition is the preferred route for nutritional support in children who have suboptimal growth.
- ▶ Non-compliance with oral supplements and/or tube feedings can be an issue, especially in older children and adolescents.
- ▶ Intradialytic parenteral nutrition (IDPN) has been used to augment nutrition in malnourished hemodialysis patients.
 - Expensive and requires substantial resources not available at many pediatric dialysis units.
- ▶ Outpatient Dialysis Unit at Lucile Packard Children's Hospital is utilizing Intradialytic Intralipid therapy (IL) as a nutritional supplement in children who have failed to show improvement in their nutritional status on enteral supplements alone.

Materials and Methods

- ▶ Retrospective chart review of all pediatric HD patients receiving IL for at least 3 months between July 2011–July 2014.
 - Patients were started on IL therapy when no improvement in nutritional status was demonstrated on oral supplements alone.
- ▶ **Data collected:**
 - Baseline renal disease, age, date of starting dialysis
 - Anthropometrics: Weight, height, BMI at the start of dialysis
 - SDS was calculated according to the CDC growth charts
 - Post-dialysis blood pressures and anti-hypertensive medications
 - Dose of IL therapy, duration of treatment, reason for discontinuation
 - Labs: Predialysis BUN, albumin, creatinine, hemoglobin, transferrin, PTH, nPCR, triglycerides, total cholesterol, HDL, LDL
 - Patients with active glomerulonephritis with predialysis BUN >100 and nPCR >1.8 were excluded.

Baseline Characteristics

- ▶ 15 patients received IL therapy (50% Male/Female)
- ▶ **Age:** Median: 12.5 years; Range: 1–20 years (range)
- ▶ 3 (20%) patients had feeding tubes
- ▶ 6 (40%) patients were on growth hormone
- ▶ Time on dialysis prior to starting IL
 - Median: 4.3 months; Range: 3.4–23.6 months
- ▶ Dose of IL (g/kg)
 - Median: 0.5g/kg; Range: 0.23–1g/kg
- ▶ Length of therapy
 - Median: 6 months; Range: 4.75–7.25 months
 - All received therapy 3 times/week during HD sessions

Baseline Characteristics

- ▶ All patients were prescribed commercially available renal appropriate oral supplements and/or protein bars for a median time of 4.3 months prior to starting therapy.
 - 6 prescribed 1 can/day liquid supplement
 - 3 prescribed 2 cans/day liquid supplement
 - 5 prescribed 1–2 protein bars per day
- ▶ Reason for Discontinuation
 - Transplant (n=5), improved nutrition (n=3), change in modality (n=2), continued therapy (n=6)

Results

Table 2. Anthropometric Measurements

Anthropometric Measurements	At Dialysis Initiation	At the Start of IL	End of IL	P Value*
Dry weight (kg) (mean, SD)	39.8 ± 19	37 ± 16.3	38.7 ± 16.2	.04
Dry weight SDS (mean, SD)	-0.16 ± 1.12	-1.17 ± 1.12	-1.22 ± 1.03	.59
HT (cm) (mean, SD)	138.9 ± 25	142.9 ± 24	145.2 ± 23.9	.03
HT SDS (mean, SD)	-0.6 ± 1.04	-0.96 ± 0.94	-1.06 ± 0.9	.5
BMI (mean, SD)	19.2 ± 4	17.2 ± 3.2	17.4 ± 3.2	.33
BMI SDS (mean, SD)	0.21 ± 1.31	-0.89 ± 1.07	-0.9 ± 1.39	.9
BMI SDS corrected for height age (mean, SD)	1.07 ± 1.31	-0.96 ± 1.34	-0.48 ± 1.31	.59

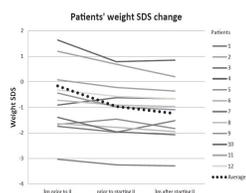
BMI, body mass index; IL, intralipid; SD, standard deviation; SDS, standard deviation score.

*P value: comparing at the start of IL therapy versus at the end of IL therapy.

- ▶ 5% average weight gain during IL therapy
- ▶ 6 patients had improved SDS for weight
- ▶ 8 patients had improved SDS for BMI

Results

- ▶ Dry weight parameters on 12 patients 3 months prior to starting therapy
- ▶ 8/12 showed favorable change in weight SDS decline
 - Mean weight SDS change 3 months prior to therapy 0.28 +/- 0.3
 - Mean weight SDS change 3 months after 0.093 +/- 0.2.
 - Not statistically significant



Results

- ▶ Significant improvement in albumin, predialysis BUN and nPCR levels.
- ▶ One patient had IL therapy held for 1 month after TG levels doubled. TG levels returned to baseline and IL therapy was resumed.
- ▶ TG and cholesterol levels were lower prior to IL- not significant.
- ▶ No adverse events recorded.
- ▶ Electrolyte and CO2 levels were stable during treatment.

Table 3. Nutritional Parameters (Mean ± SD)

Nutritional Parameters	Prior to IL	End of IL	P Value
Albumin (g/dL)	3.2 ± 0.5	3.6 ± 0.4	.02
Predialysis BUN* (mg/dL)	53 ± 11	66 ± 19	.03
nPCR (g/kg/d)	0.98 ± 0.2	1.2 ± 0.3	.03
KTV	1.59 ± 0.23	1.64 ± 0.32	.64
Transferrin (mg/dL)	181 ± 58	205 ± 37	.18
Triglyceride (mg/dL)	140 ± 85	134 ± 74	.40
Total cholesterol (mg/dL)	155 ± 82	133 ± 31	.17

BUN, blood urea nitrogen; IL, intralipid; nPCR, normalized protein catabolic rate; SD, standard deviation.
*Excluding two catabolic patients.

Results

- ▶ No difference in systolic or diastolic blood pressures prior to and at the end of therapy.
- ▶ Average number of anti-hypertensive meds decreased from 2.1 to 1.6.
- ▶ Average cost significantly cheaper than IDPN
 - IL \$30 per treatment
 - IDPN \$170 per treatment

Limitations

- ▶ Small sample size
- ▶ Variable length of treatment
- ▶ Inadequate documentation of oral intake
- ▶ Larger prospective multi-center studies needed to better evaluate the effects of IL therapy on growth and nutritional status

Discussion

- ▶ IL therapy had positive effect on protein balance—possible theories...
 - Increased fatty acid availability spares protein degradation
 - Improved oral intake
 - IL administration may decrease circulating levels of peptide YY, a hormone that suppresses appetite.

- ▶ Changes in Weight and BMI SDS were not significant—
 - Reduction in anti-hypertensive medications may indicate patients were not at dry weight prior to initiation of IL therapy, so actual gain of LBM may have been higher.

Practical Application

- ▶ IL therapy during hemodialysis can be used as an adjunct therapy to dietary counseling and oral supplements to improve nutritional status in patients.

- ▶ Minimal side effects, is relatively inexpensive, requires fewer resources than IDPN, and can overcome non-compliance barriers associated with enteral nutrition.

- ▶ Given the ongoing struggles with PEW and malnutrition in pediatric dialysis patients, it's important to continue to look for new effective strategies to optimize nutritional status to support growth and development.
