

# Assuring Adequate Fatty Acid Provision using an Assessment Tool for Nutrition Support

Carol Ireton-Jones, PhD, RDN, CNSC, FASPEN, FAND / Mark DeLegge MD  
 Good Nutrition for Good Living Carrollton TX / DeLegge Medical Charleston SC

## Background

Essential Fatty acid deficiency (EFAD) is a rare nutrition complication characterized by a diet or nutrition support regimen deficient in fatty acids, specifically linoleic acid (LA) and alpha-linolenic (ALA) fatty acids.

-LA and ALA requirements can be met with 2-4% of the calories in the diet come from omega-6, long-chain fatty acids (soy oil,

## ILE for Home PN

Parenteral nutrition (PN) formulations vary for very low fat formulas. Most use nutritionally complete emulsions for amino acids, components of amino acids, dextrose and intravenous lipid emulsions (ILE) along with the addition of vitamins, minerals and electrolytes to meet calorie, protein and nutrient needs.

For many years, a soybean oil-based ILE (SO-ILE) was the only available ILE in the United States (US); however, SO-ILE dosing for many HPN patients has often been limited to try to prevent the deleterious effects that may be seen in patients who receive long term high levels of omega-6 FA. To assure adequate EFA, if 4-8%

Table 1. ILE and % of total calories to meet EFA requirement

When determining the amounts of 2-oil ILE or 4-oil ILE required to prevent EFAD, a greater percentage of calories from ILE must be provided due to lower amounts of soybean oil in each. (Table 1).

ILE	Composition	%	Rec'd daily intake
SO ILE	100% Soy oil (SO)	4-8	Limit vs 1-1.5 gm/kg
4 oil ILE	30% SO, 30% MCT, 25% Olive Oil (OO) 15% Fish Oil (FO)	13	1-1.5 gm/kg
2 oil ILE	20% SO, 80% OO	16	1-1.5 gm/kg
FO ILE	100% fish oil	NA	See PI

## Methods

An ILE Assessment Tool was developed to assist clinicians in assuring that EFA needs were met (Figure 1). A Fatty acid panel (FAP) including LA and ALA is not necessary if the first part of the assessment indicates adequate ILE is being provided. If FAP is available, the assessment can include this data; however, a FAP is not necessary if the ILE is provided in adequate amounts, unless fat malabsorption is suspected.

It is important to note that the 2-oil and 4-oil ILE will generate

## Figure 1. ILE Assessment Tool

### Step 1 – Assess HPN Regimen

Patient: \_\_\_\_\_ age: \_\_\_\_\_ ht: \_\_\_\_\_ wt.: \_\_\_\_\_ M / F  
 Recommended Energy/Protein Intake: \_\_\_\_\_  
 Nutrition Support Regimen:  
 PN: Dextrose: \_\_\_\_\_ gm/d AA: \_\_\_\_\_ gm/d ILE: \_\_\_\_\_ gm/d ILE % of total calories\*: \_\_\_\_\_ %/d  
 Total Kcal/d: \_\_\_\_\_ Total fluid/d: \_\_\_\_\_  
 % of calories from PN: \_\_\_\_\_ % of calories from EN/oral: \_\_\_\_\_  
 ILE type: SO-ILE: \_\_\_\_\_ 4-oil ILE: \_\_\_\_\_ 2oil-ILE: \_\_\_\_\_ 100% Fish oil: \_\_\_\_\_  
 Recommended ILE intake+: \_\_\_\_\_ ml/day \_\_\_\_\_ ml/week

### Step 2 – Complete the EFA Assessment

**\*If patient is receiving >50% of total calories from PN, oral/enteral diet should provide adequate EFA.**

+ILE amount to meet EFA requirements:  
 100% soy oil: 4-8% of daily total calorie need.  
 4 oil ILE – ~13% of daily total calorie need.  
 2 oil ILE – ~16% of daily total calorie need.  
 100% FO = see PI – pediatric IFALD indication only

#### EFA Adequacy Assessment:

- Patient is receiving inadequate EFA based on the type and amount of ILE provided
- Patient has signs or symptoms of EFAD
- Patient does not have signs or symptoms of EFAD

### Step 3 – Evaluate Fatty Acid Profile (FAP)

Fatty Acid	Level – date	Normal level^
LA C18:6		2270-3850 nmol/mL
ALA C18:3		60-130 nmol/mL
Eicosapentanoic Acid (EPA) C20:3		14-100 nmol/mL
Docosahexaenoic Acid (DHA) C22:3		30-250 nmol/mL
Arachidonic Acid C20:6		520-1490 nmol/mL
Mead Acid (MA) C20:9		7-30 nmol/mL
Triene:tetraene		n/a

^Mayo clinic lab levels = reference standard – levels may differ from other labs

### Step 4– Complete the FAP Assessment (if available):

#### FA Profile Assessment:

- Patient has adequate EFA based on the type and amount of ILE provided with or without FAP – no change to ILE
- Patient has EFAD based on the type and amount of ILE provided with or without FAP – increase ILE
- EPA/DHA are normal/high and LA and ALA are low normal or deficient – evaluate ILE type and amount provided as FAP will be different with 2-oil and 4-oil ILE

Clinician: \_\_\_\_\_ Date: \_\_\_\_\_

## Summary and Implications for Practice

- ✓ The ILE Assessment Tool is easy to apply and has been used for patients receiving Home PN.
- ✓ Clinicians can use the ILE Assessment Tool to verify and assure that fatty acid needs are met in patients receiving PN in the hospital or home.
- ✓ Modifications to the ILE type and amount administered can be easily made without requiring additional lab testing.

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