Stronger Together

London North West Healthcare NHS
NHS Trust

# Managing abnormal LFTs

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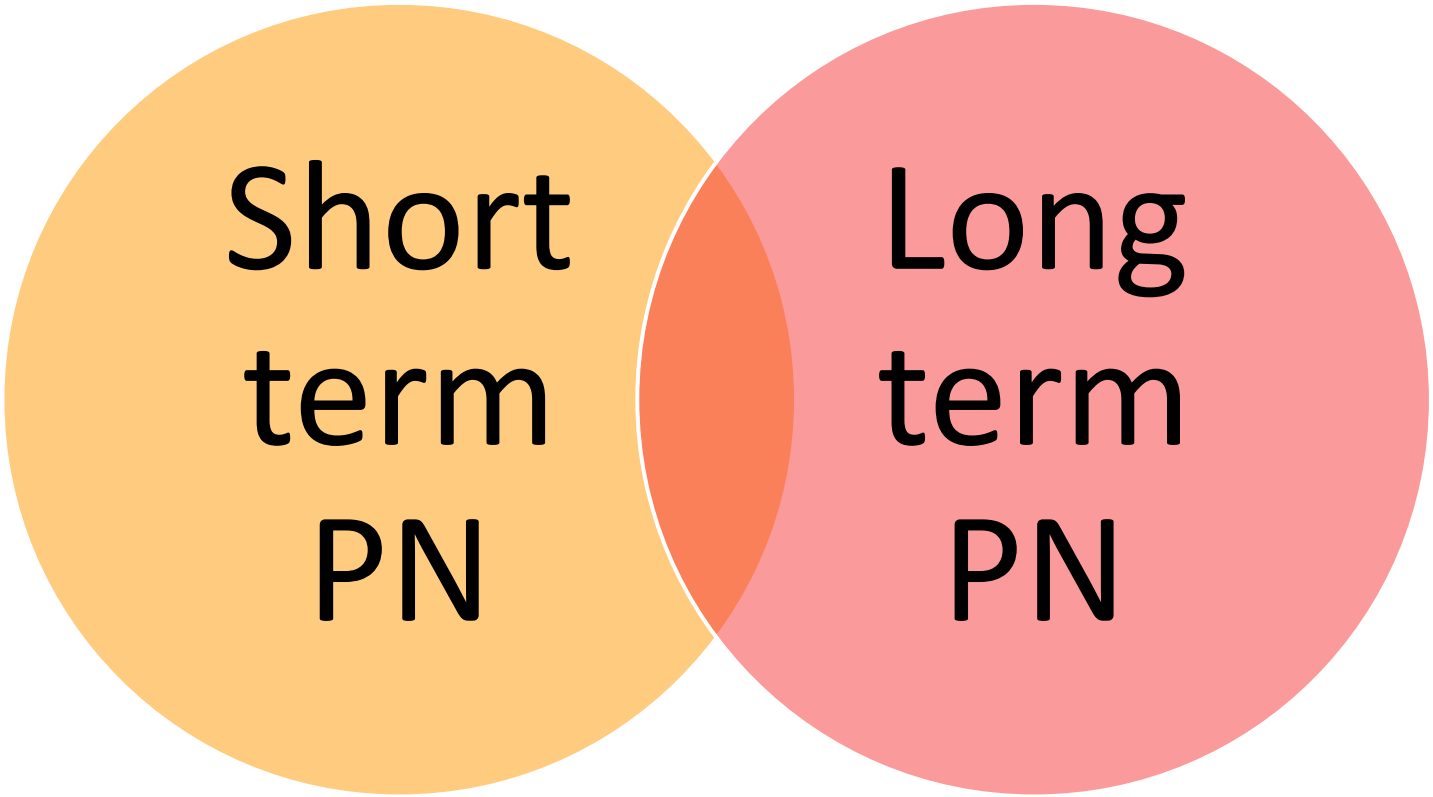
# It depends …



# Questions

How common are abnormal LFTs in patients on IVN?

Is it the parenteral nutrition?

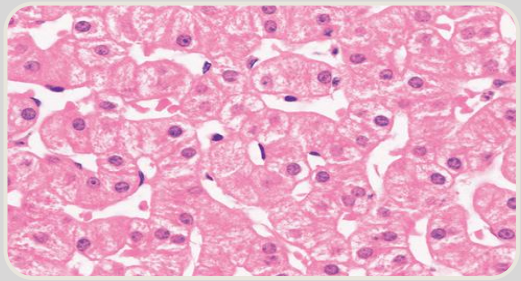
Short term PN

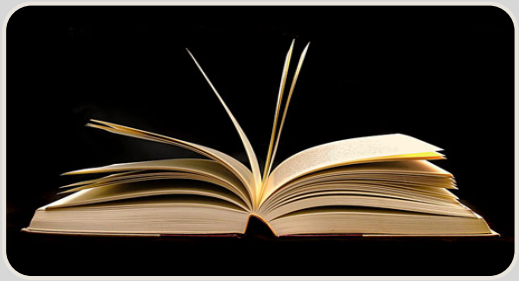
# Abnormal LFTs

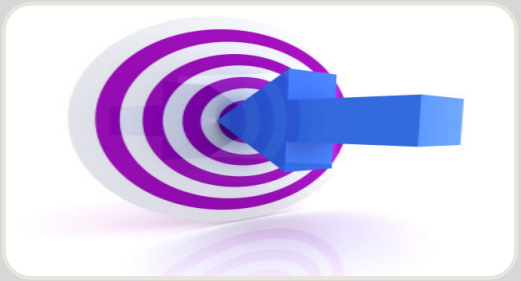
| Author | Study | % Elevated | | |
|---|---|---|---|---|
| | | AST | Alk Phos | Bil |
| Lindor et al. 1979 | 2 weeks PN (high glucose & no lipid) | 68% | 54% | 21% |
| Clarke et al. 1991 | 4 weeks PN (more balanced PN) | 27% | 32% | 31% |

Short term PN

# Is it the parenteral nutrition?







## Liver biopsies
- 93 patients on TPN
- 35 matched controls

## Assessment
- 19 histological grades
- 27 clinical variables

## Results: abnormal hepatic histology correlated with
- Pre-existing liver disease
- Abdominal sepsis
- Renal failure
- Blood transfusion

Histology DID NOT correlate with TPN administration

Wolfe *et al*, Arch Surg 1998;123:1084-1090

# Abnormal LFTs & short term PN

- 58 patients receiving PN (M:F 36:22)
- 48 (83%) fistula, obstruction, ileus, failed EN

**Abn LFTs before PN started (34% patients)**

- 60% LFTs worsened on PN
- 30% LFTs resolved on PN

**Abn LFTs while on PN (9% patients)**

- 46% sepsis
- 24% underlying liver disease

Baker & Nightingale, Clin Nutr 2004;23:864

Long term PN

# Abnormal LFTs & long term PN

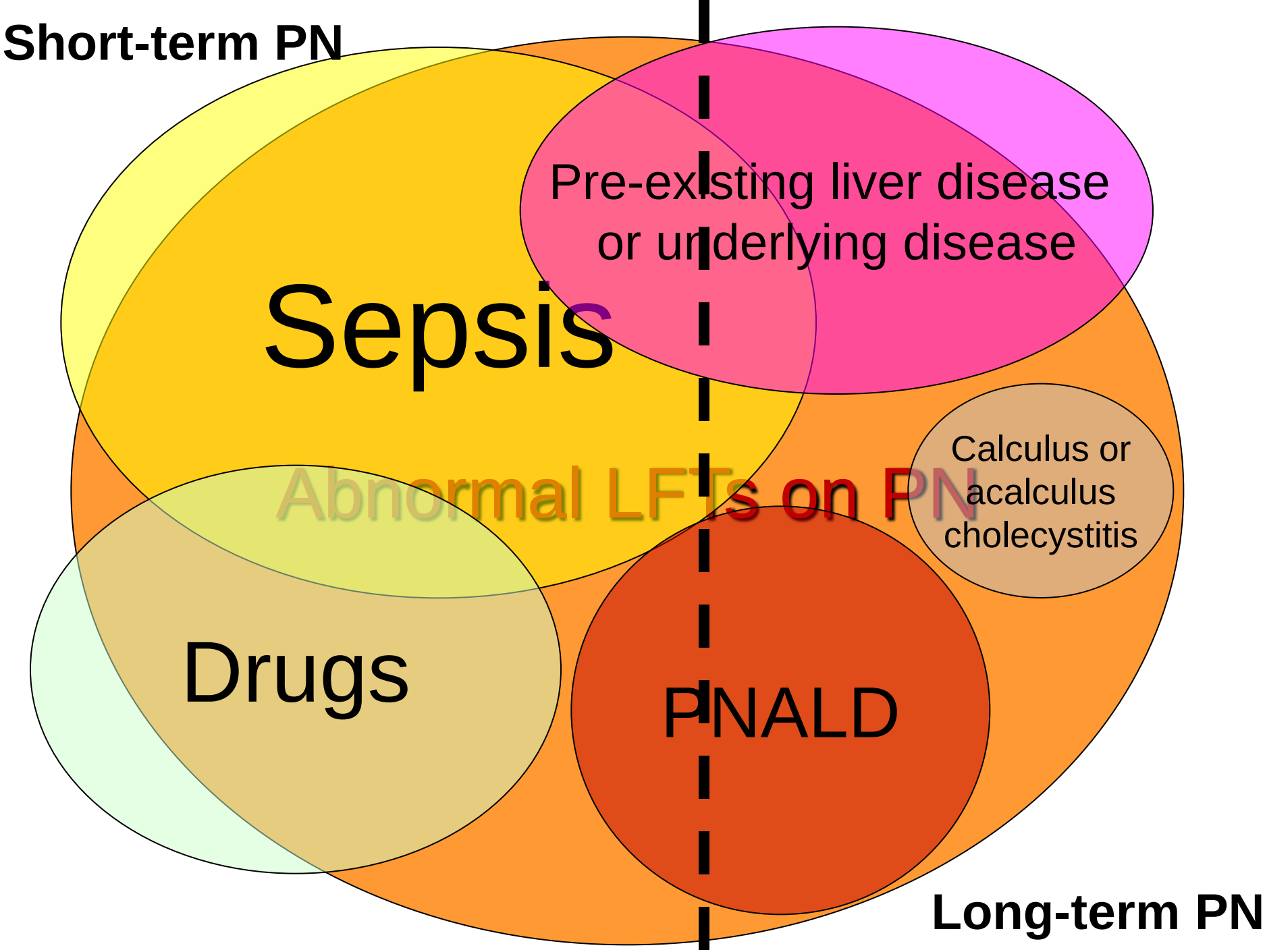
| Author | No. HPN patients | Abn LFTs | Severe liver disease |
|---|---|---|---|
| Luman et al, 2002 | 107 | 48% | 0% |
| Salvino et al, 2006 | 162 | 95% | 4% |
| Lloyd et al, 2008 | 113 | 24% CC | |
| Cavicci et al, 2000 | 90 | 65% CC | 26% at 2 years<br>50% at 5 years |
| Chan et al, 1999 | 42 | | 14% |
| Ito & Shills, 1991 | 16 | | 19% |

CC = chronic cholestasis

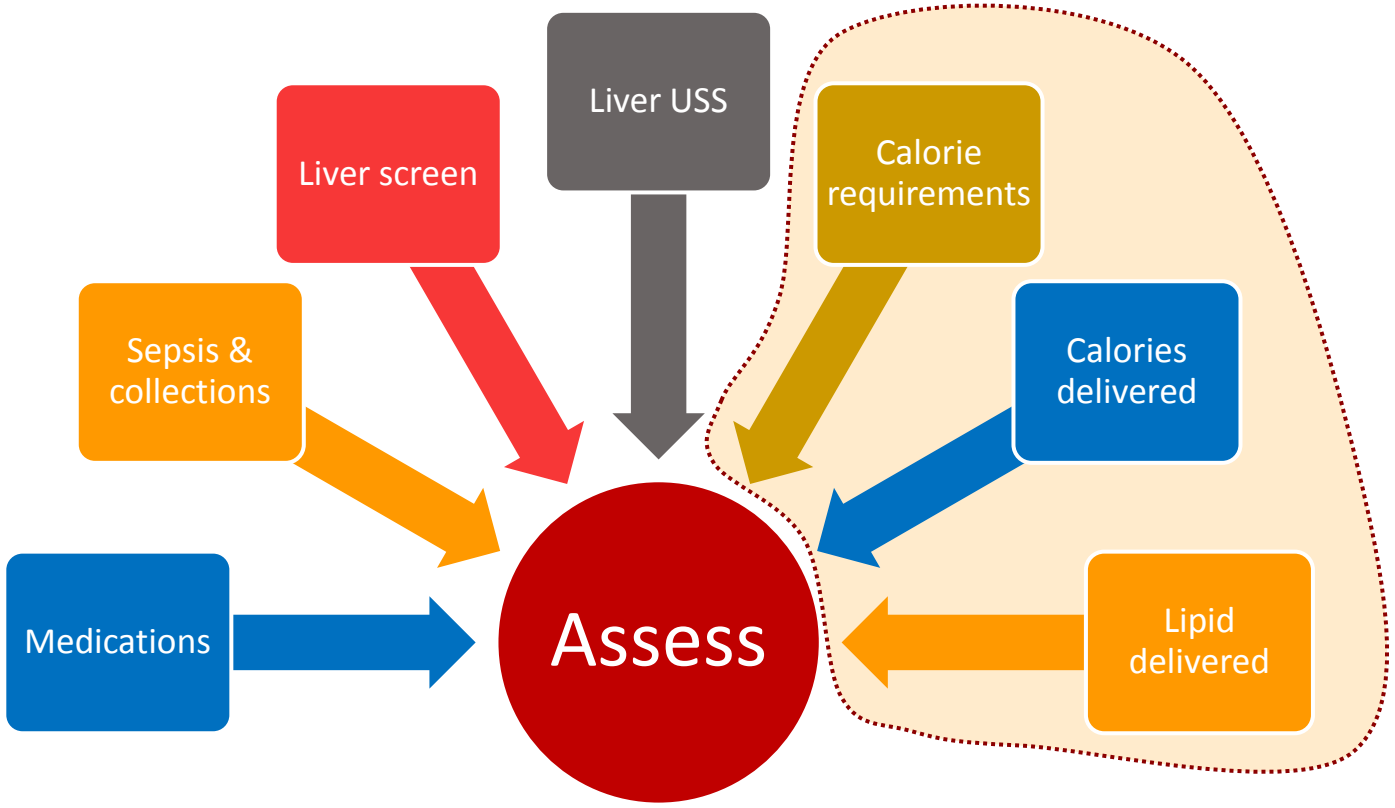
# Questions

What are the causes of abnormal liver function?

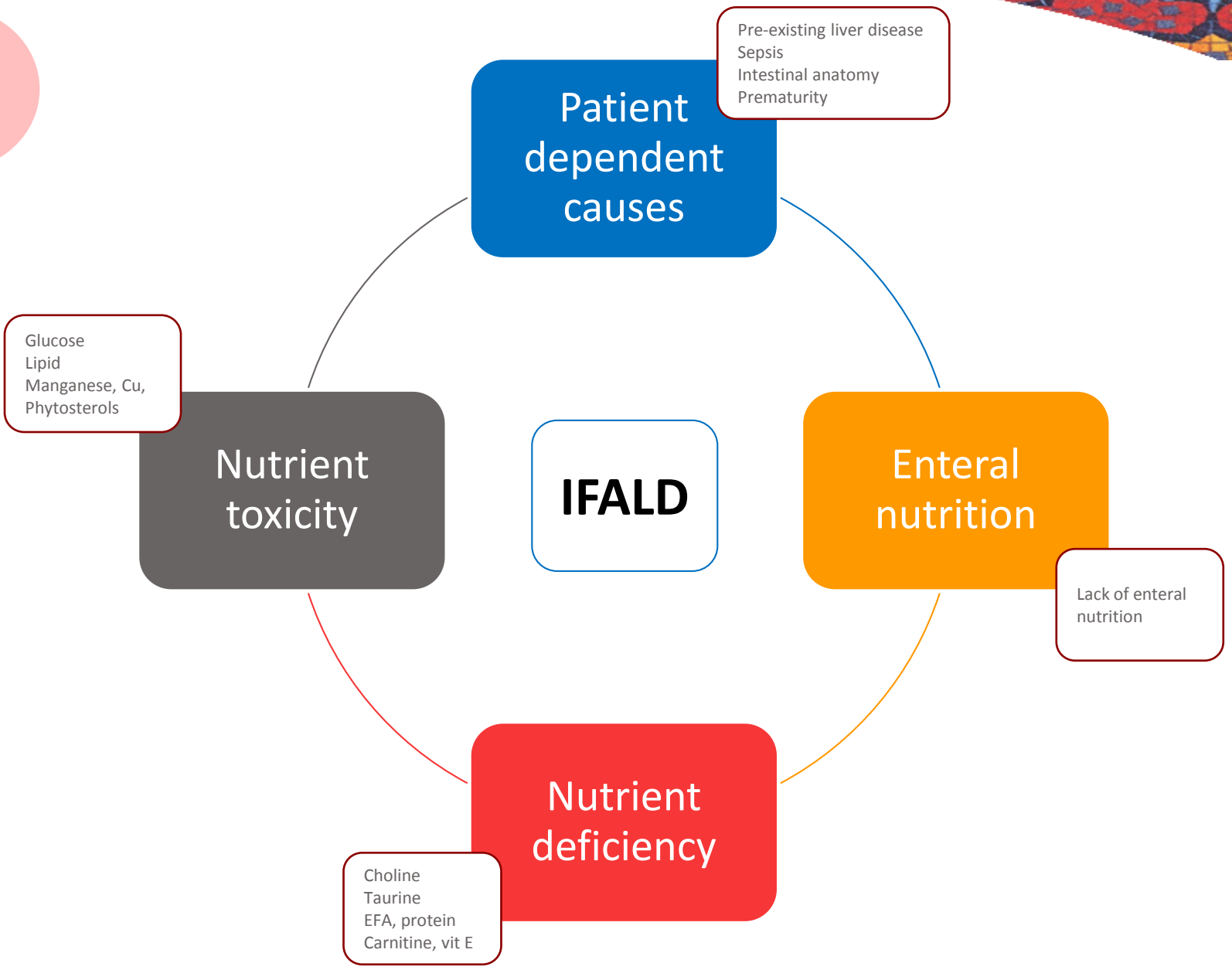
What can to do to change this?


Short-term PN
Pre-existing liver disease
or underlying disease
Sepsis
Calculus or
acalculus
cholecystitis
Abnormal LFTs on PN
Drugs
PNALD
Long-term PN

# What do I do?

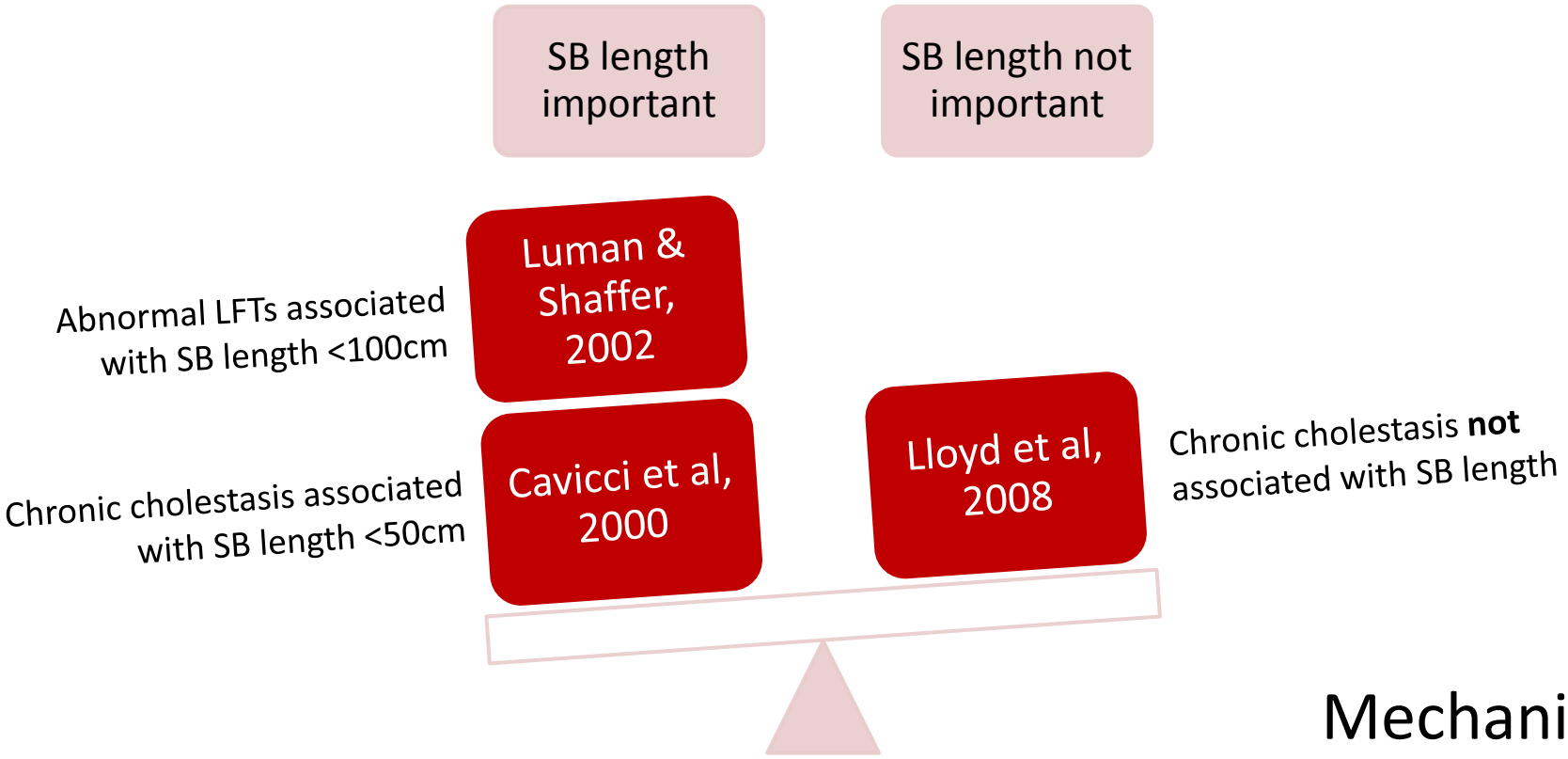

Liver USS
Liver screen
Calorie requirements
Sepsis & collections
Calories delivered
Medications
Assess
Lipid delivered

Long term PN


Patient dependent causes
Pre-existing liver disease
Sepsis
Intestinal anatomy
Prematurity
Enteral nutrition
Lack of enteral nutrition
Nutrient deficiency
Choline
Taurine
EFA, protein
Carnitine, vit E
Nutrient toxicity
Glucose
Lipid
Manganese, Cu,
Phytosterols
IFALD

Long term PN

# Intestinal anatomy




Mechanism?

# What is evil …..

- More parenteral lipid?
- More parenteral calories?

Long term PN

Short term PN

# Parenteral glucose

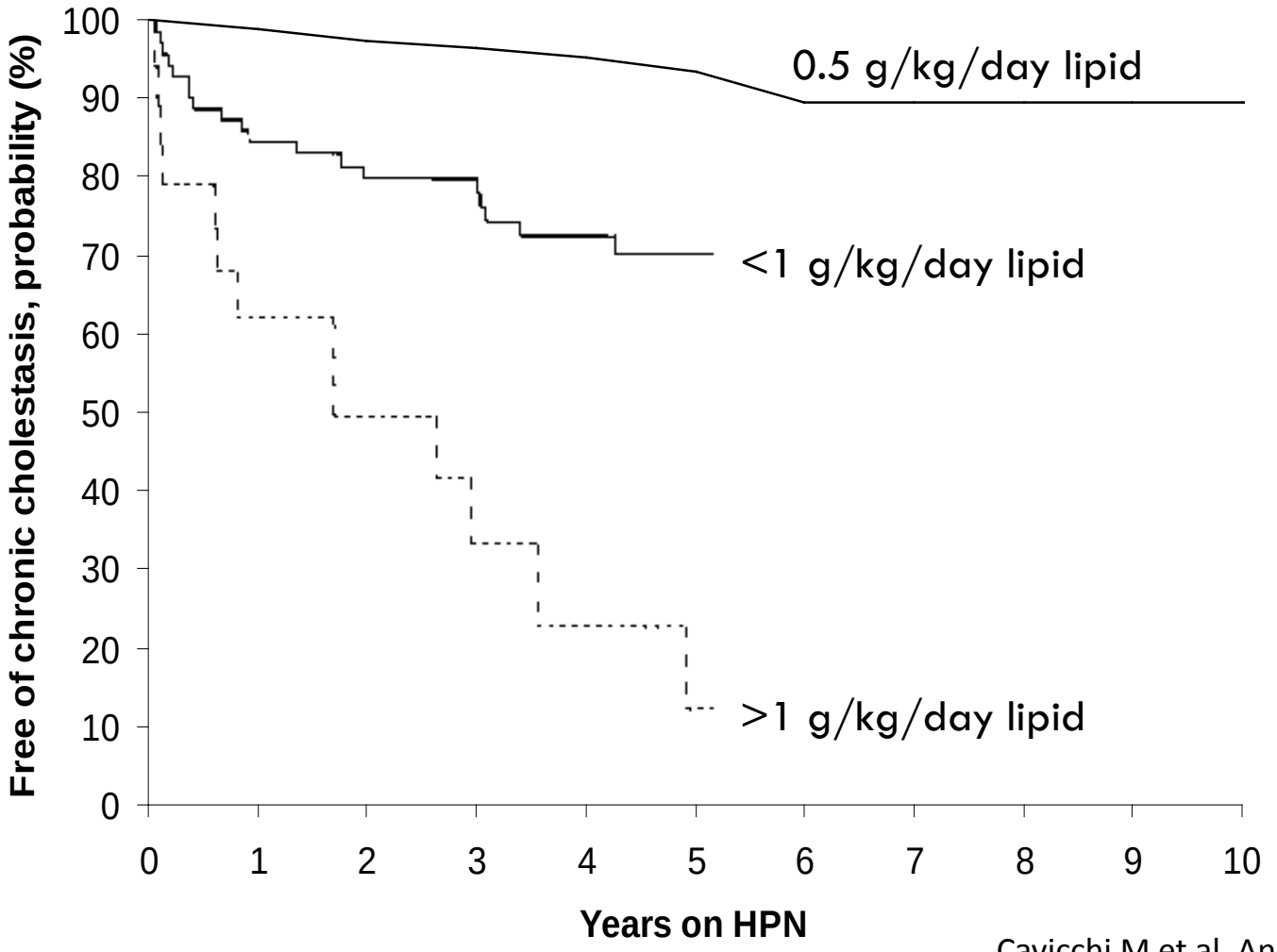

**Lindor *et al*, 1979**

Large amount of energy supplied as glucose (>GOR)

Associated with steatosis

Long term PN

# Soybean oil



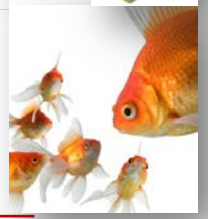

Vega *et al.*
Clin Nutr 2004
23:865-6

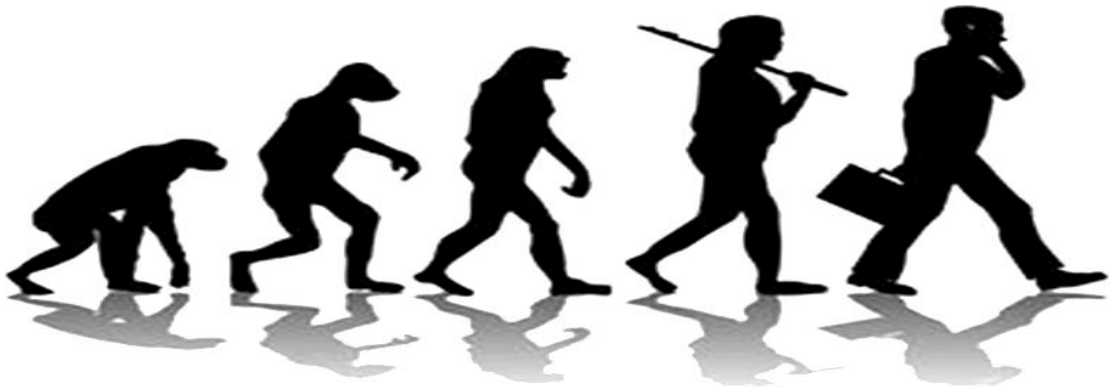
Cavicchi M et al. Ann Intern Med 2000;132: 525-32

Long term PN

# Parenteral lipid emulsions

| Generation | Description | Lipid types | Brands |
|---|---|---|---|
| 1st | Conventional lipid | LCT (soybean oil)<br>LCT (soy/safflower oil) | Intralipid |
| 2nd | Lipid emulsions with reduced PUFA | Structured lipids (MCT/LCT)<br>Olive oil based emulsion | Structolipid<br>Clinoleic |
| 3rd | Lipid emulsions with reduced PUFA & specific ω6/ω3 FA ratio | Fish oil<br>Soy/MCT/olive oil/fish oil | Omegaven<br>SMOF |

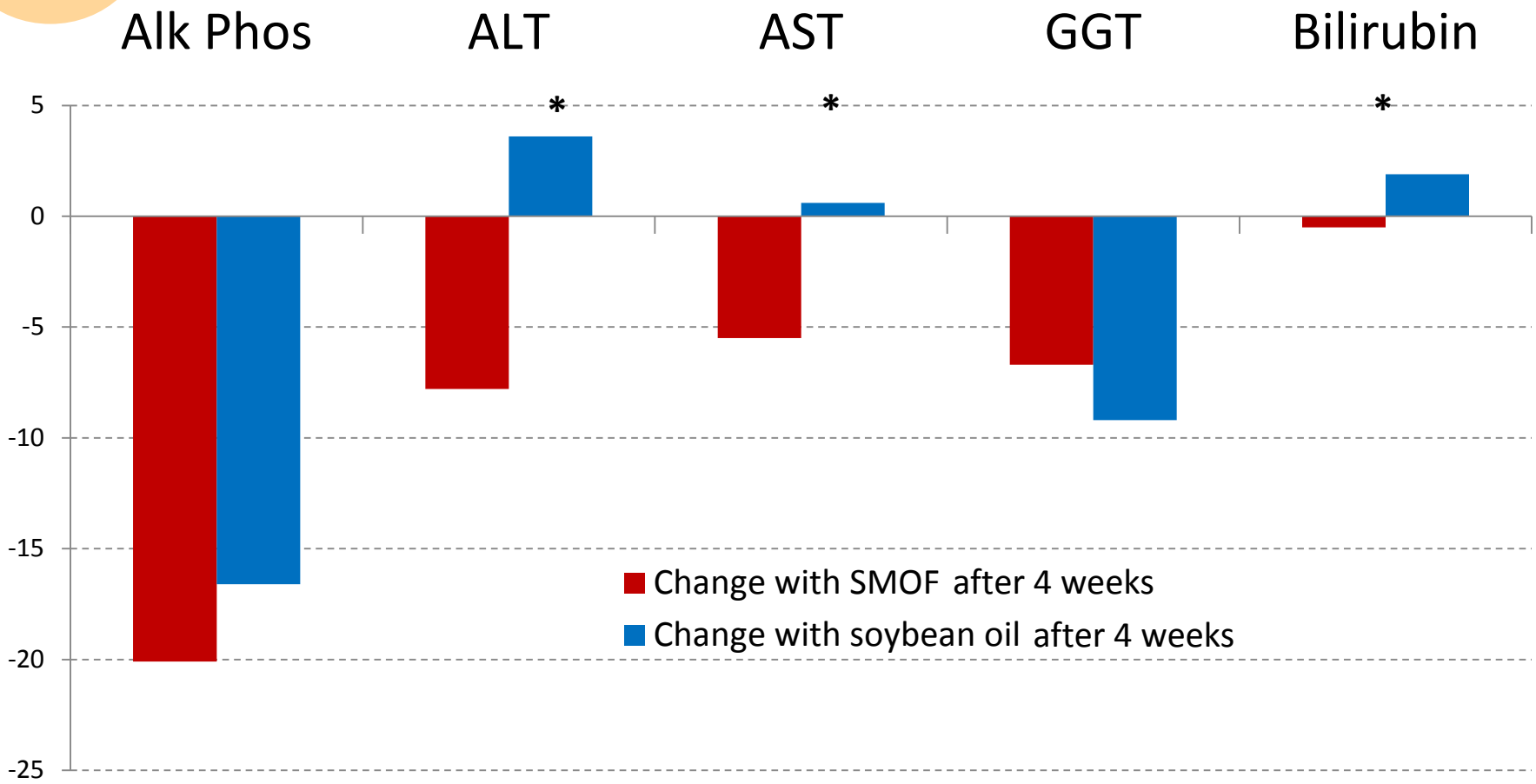




Long term PN

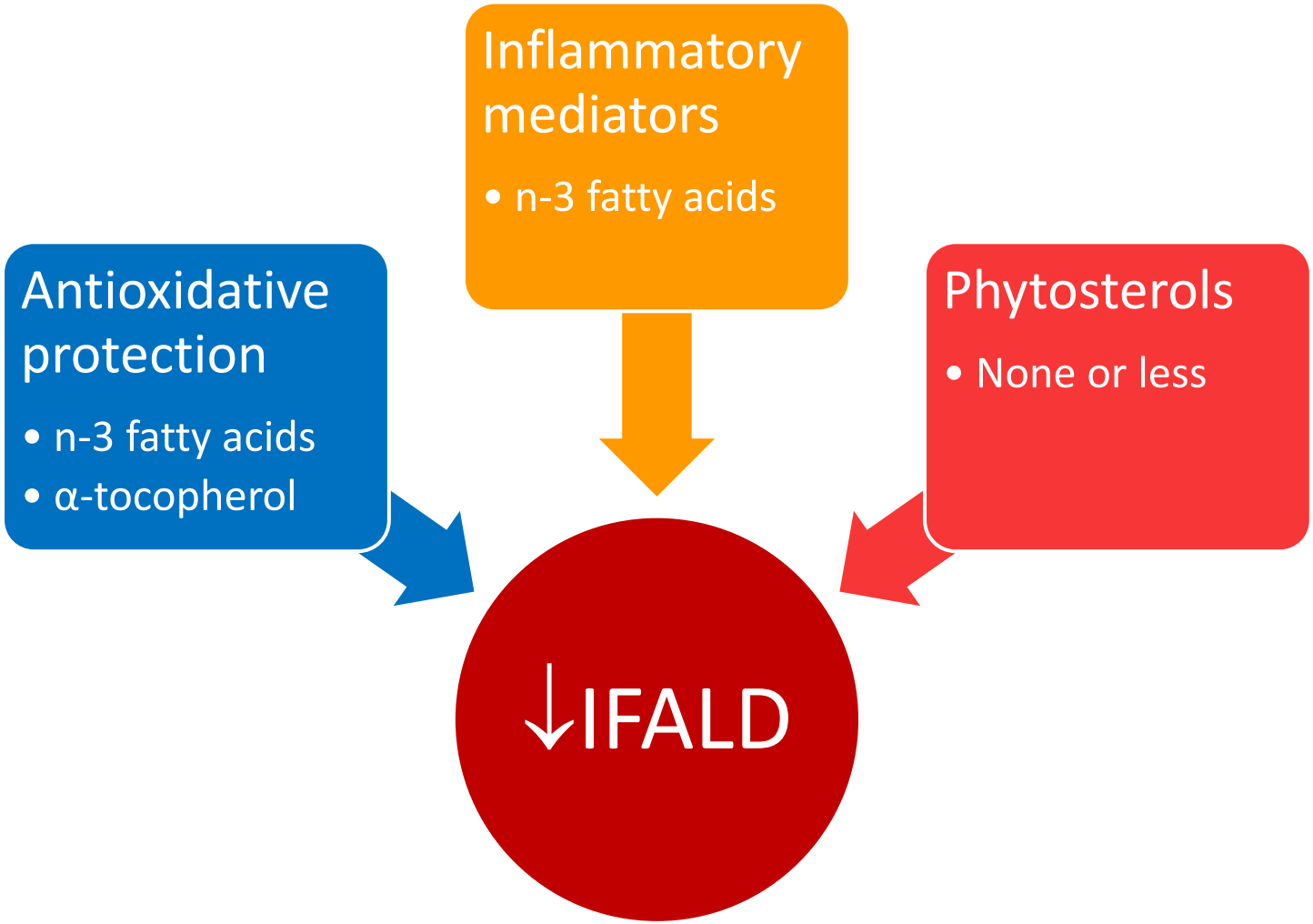
Short term PN

# RCT: SMOF v soybean oil



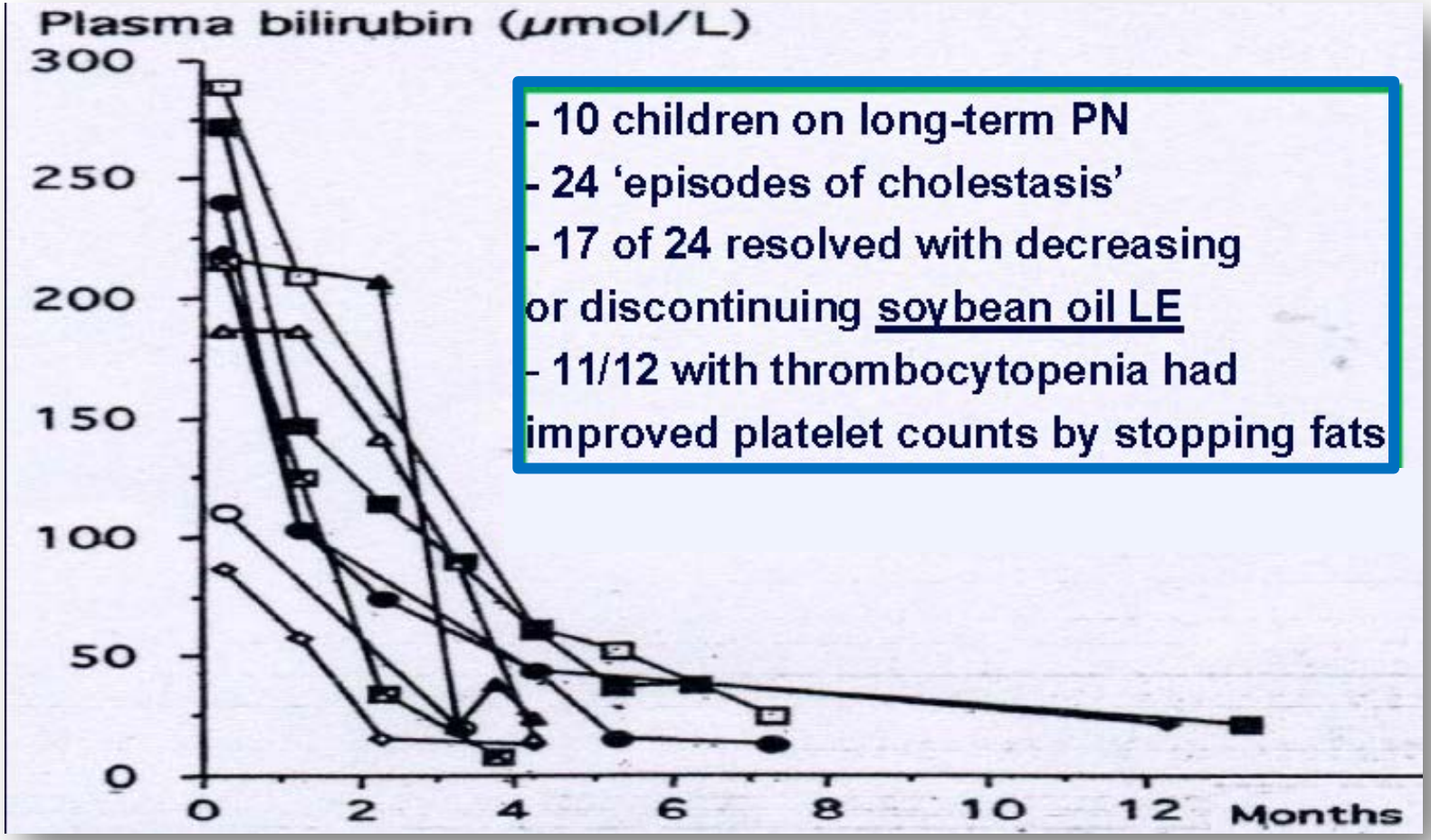

Klek et al, Clin Nutr 2013;32:224-231

# Fish oil effect: >1 mechanism

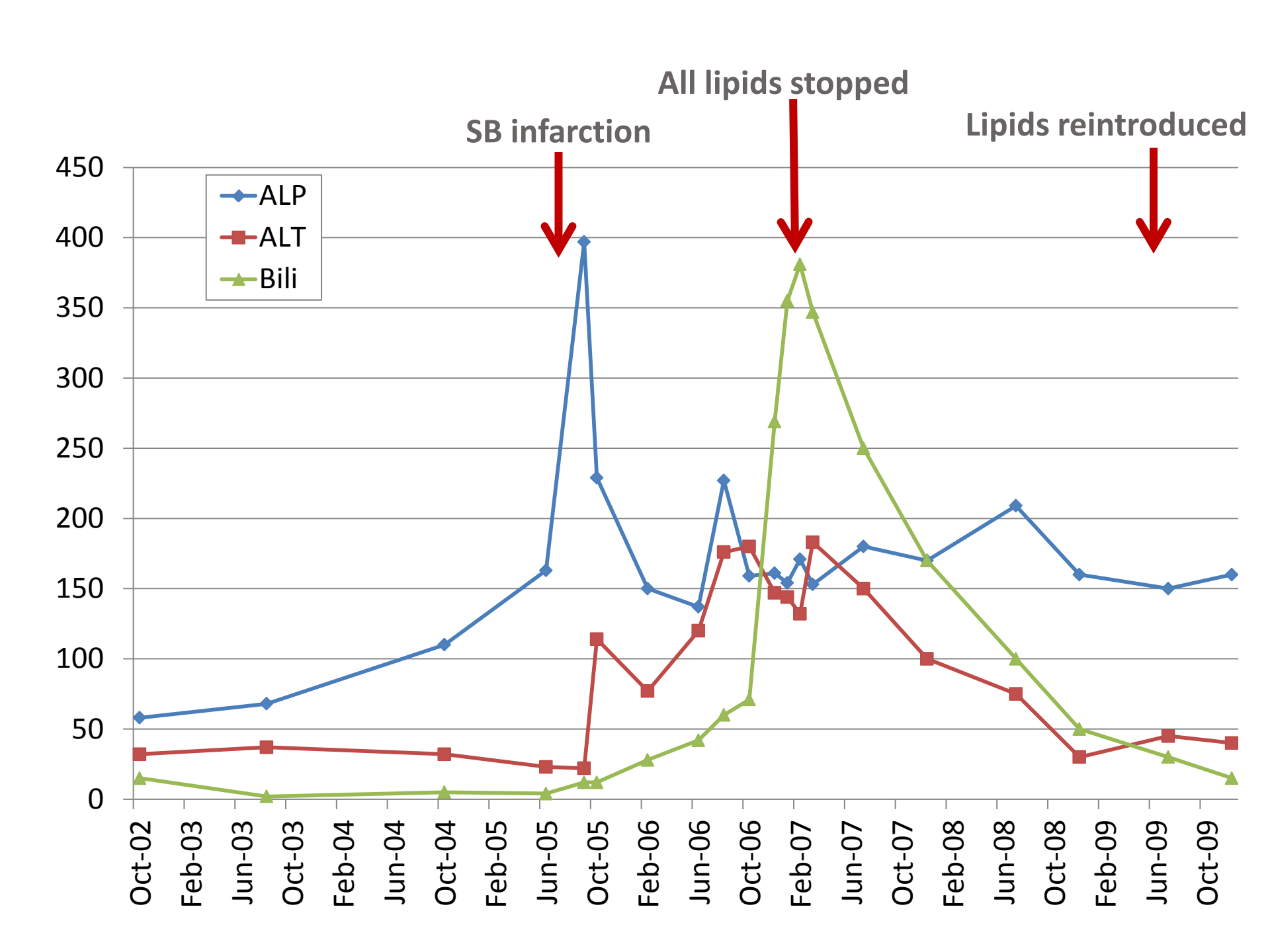


Long term PN

# Reversal of cholestasis



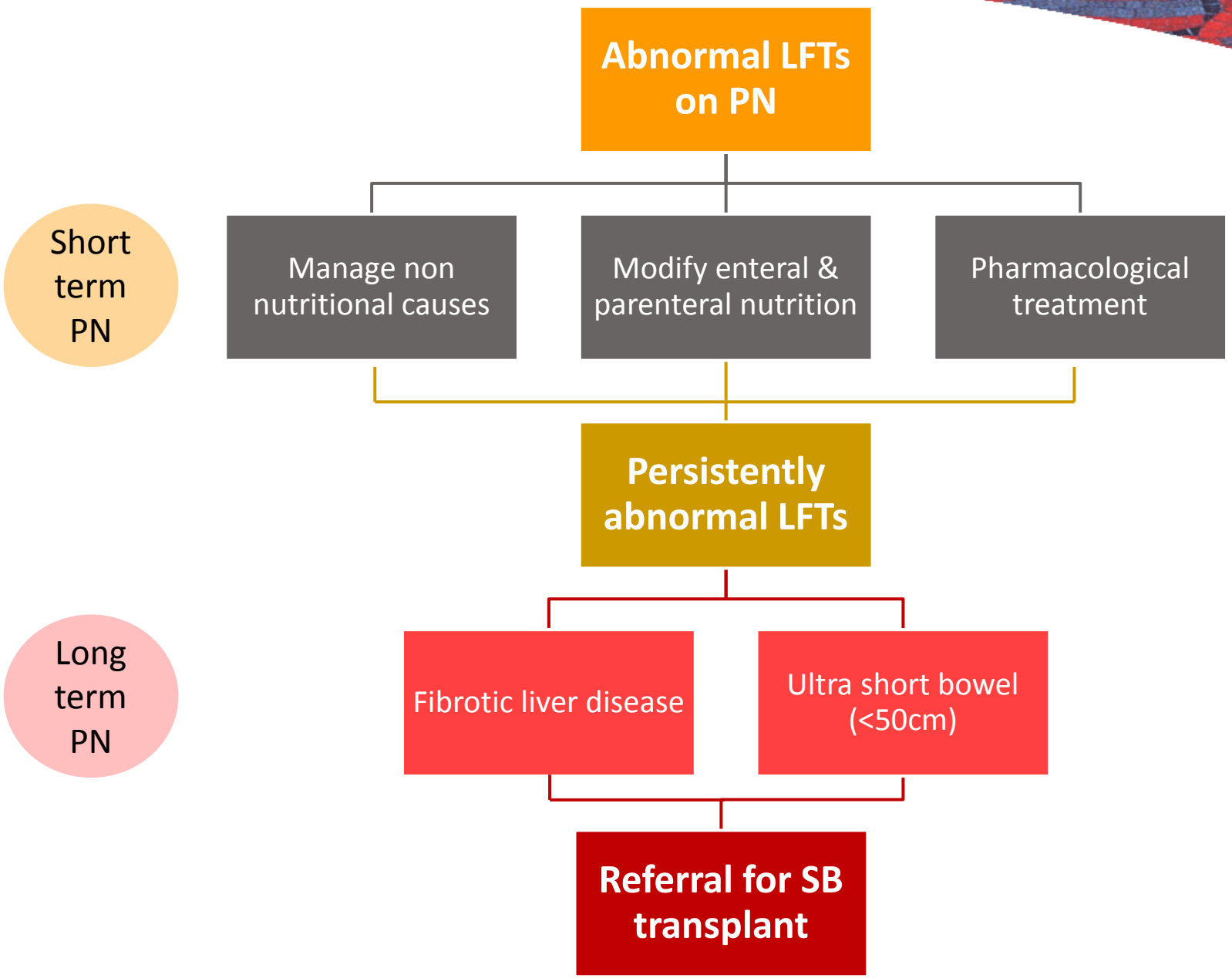

Colomb et al. JPEN 2000; 24(6): 345-50


All lipids stopped
SB infarction
Lipids reintroduced
ALP
ALT
Bili
450
400
350
300
250
200
150
100
50
0
Oct-02
Feb-03
Jun-03
Oct-03
Feb-04
Jun-04
Oct-04
Feb-05
Jun-05
Oct-05
Feb-06
Jun-06
Oct-06
Feb-07
Jun-07
Oct-07
Feb-08
Jun-08
Oct-08
Feb-09
Jun-09
Oct-09

| <1g/kg/day (60kg patient) | 0.11g/kg/h (60kg patient & 12h infusion) | 500ml 20% lipid emulsion |
|---|---|---|
| <60g | 80g | 100g |

- Best way to achieve <1g/kg/day is **NO DAILY LIPIDS**
- Could use
  - 10% lipid emulsion
  - Less 20% lipid

} but bag is less stable


Abnormal LFTs on PN
Short term PN
Manage non nutritional causes
Modify enteral & parenteral nutrition
Pharmacological treatment
Persistently abnormal LFTs
Long term PN
Fibrotic liver disease
Ultra short bowel (<50cm)
Referral for SB transplant

# Questions

Do you give cyclical parenteral nutrition?

Fibroscan or liver biopsy?

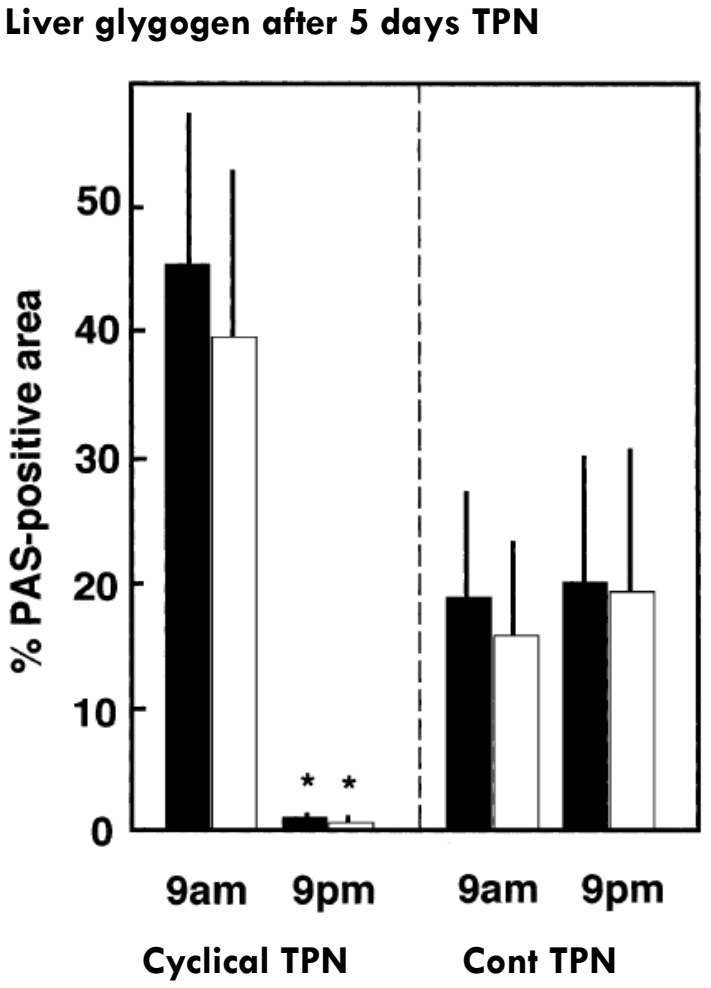
# PN: continuous *vs* cyclical

## Continuous PN

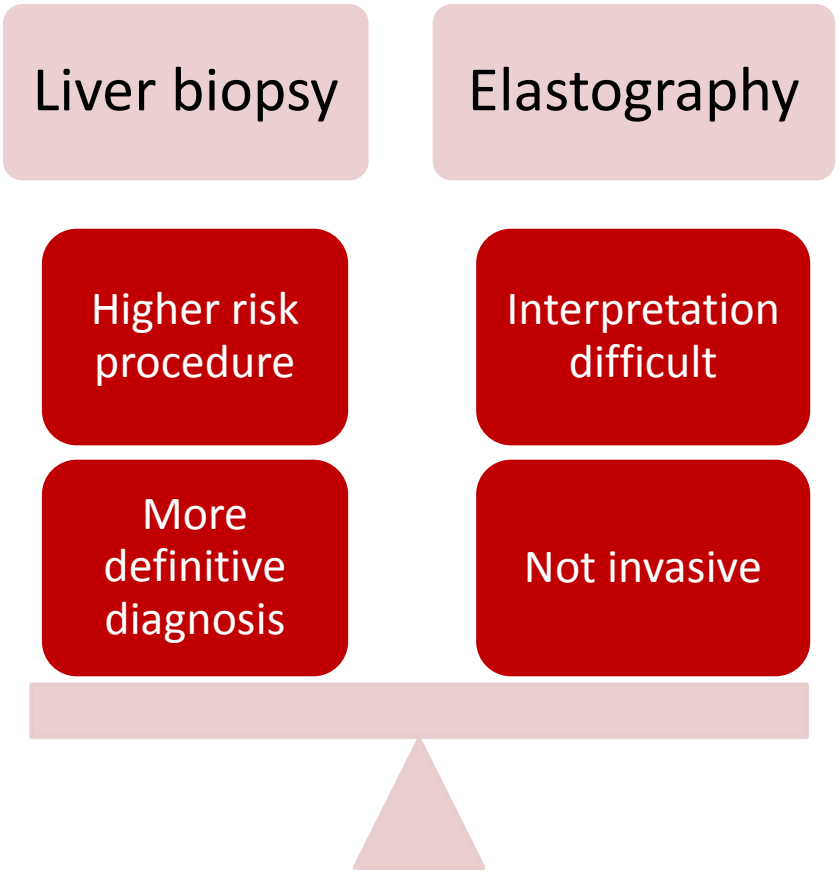
- Jeopardizes hepatic mitochondrial re-energization
- ↑Liver glycogen deposition when given PN for 5 days

## Circadian PN pattern

- May reduce the risk of post-ischaemic mitochondrial liver dysfunction

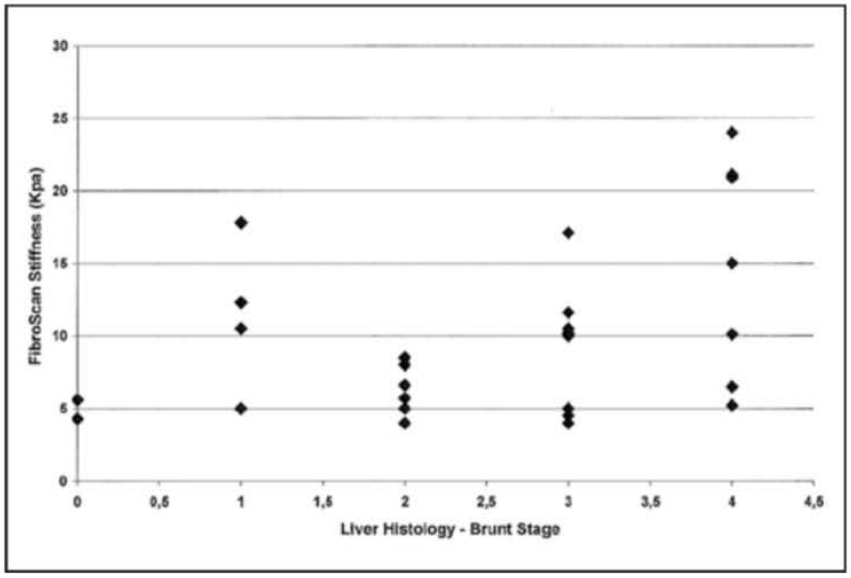


# Which one?

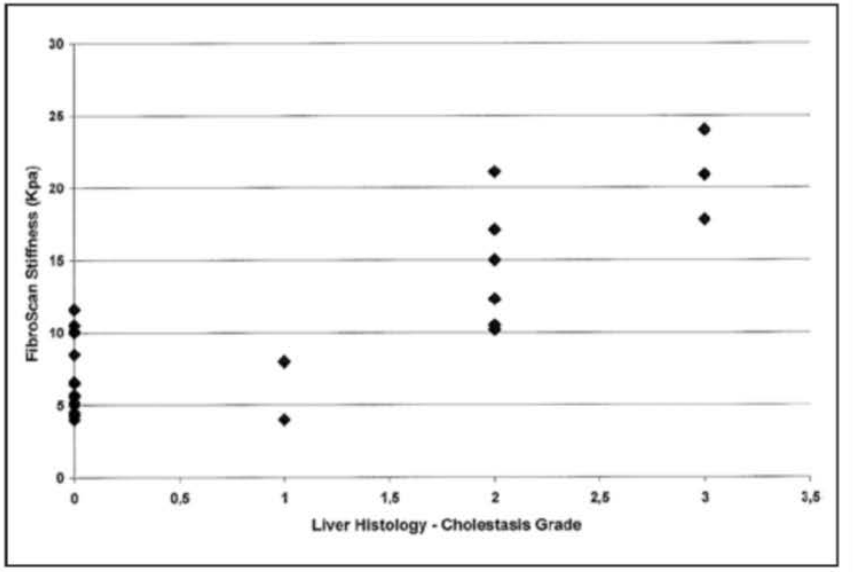

Liver biopsy
Elastography
Higher risk procedure
Interpretation difficult
More definitive diagnosis
Not invasive

# FibroScan stiffness

- Significant correlation with bilirubin & histological cholestasis
- No correlation with histologic fibrosis




Fibroscan value and Brunt stage (histological fibrosis score)




Fibroscan value and histological cholestasis grade

Van Gossum et al. JPEN 2014:DOI: 10.1177/0148607114538057

# How can this affect your practice?

## Acute IF (Type 1)

- Look for causes other than the IV nutrition
- Reasonable to give daily lipid
- Do not overfeed
- Best type of lipid?
  - Need more comparative studies
  - Anti-inflammatory & anti-oxidative properties of fish oil is attractive

## Chronic IF (Type 2-3)

- Key message is to give lipid according to EFA requirements (<1g/kg/day)
- **Do not** increase glucose calories as a result
- IFALD patients
  - Decrease further/stop lipid
  - Use 2nd or 3rd generation lipid but stability issues may mean that the lipid is given separately