



Managing abnormal LFTs

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The Lennard-Jones
Intestinal Failure Unit





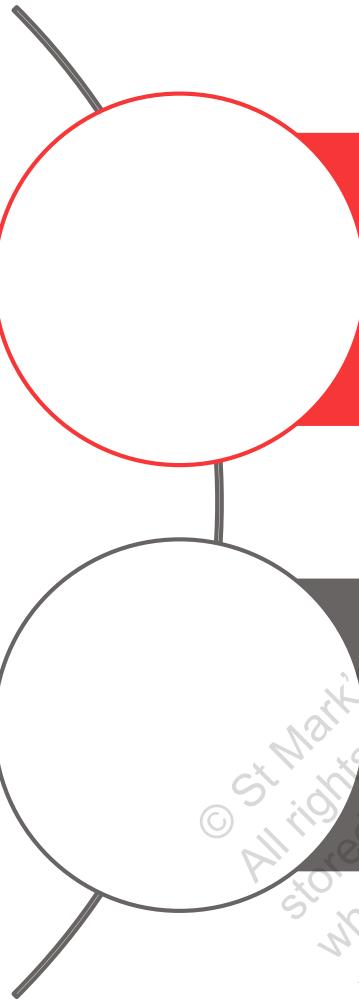
It depends ...

Short
term
PN

Long
term
PN

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Questions



How common are abnormal LFTs in patients on IVN?

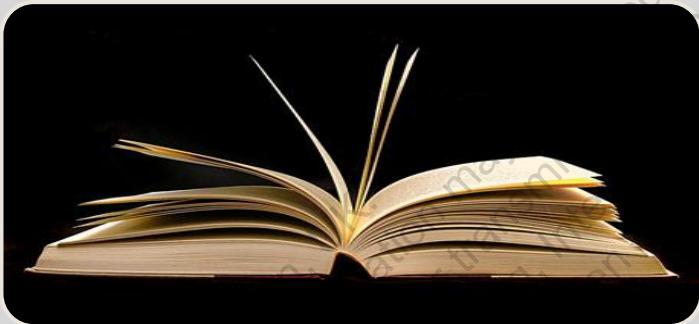
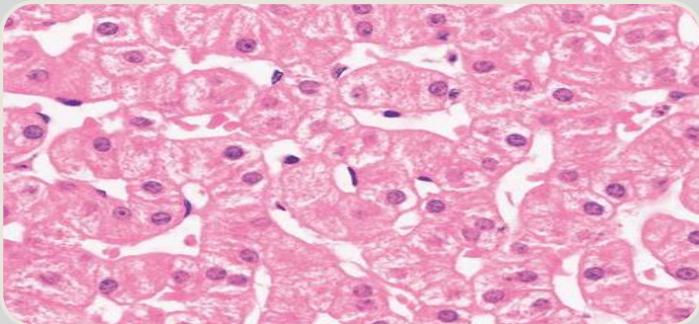
Is it the parenteral nutrition?

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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%

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

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Abnormal LFTs & short term PN

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

Abnormal LFTs before PN started (34% patients)

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

Abnormal LFTs while on PN (9% patients)

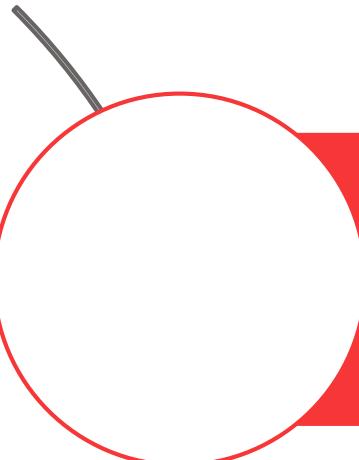
- 46% sepsis
- 24% underlying liver disease

Abnormal LFTs & long term PN

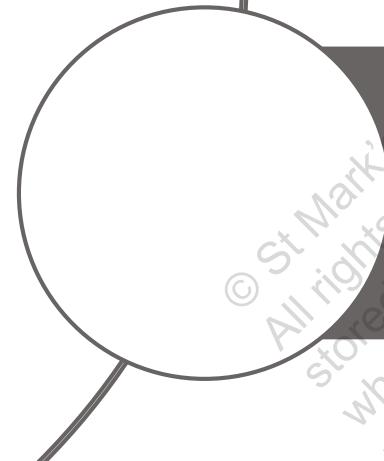
Author	No. HPN patients	Abn LFTs	Severe liver disease
Luman et al, 2002	107	48%	0%
Salvino et al, 2006	162	95%	4%
Lloyd et al, 2008	113	24% CC	
Cavicci et al, 2000	90	65% CC	26% at 2 years 50% at 5 years
Chan et al, 1999	42		14%
Ito & Shills, 1991	16		19%

CC = chronic cholestasis

Questions



What are the causes of abnormal liver function?



What can be done to change this?

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Abnormal LFTs on parenteral nutrition support

Sepsis
Medications

Pre-existing liver disease

Underlying disease

Acalculus cholecystitis

Gallstones

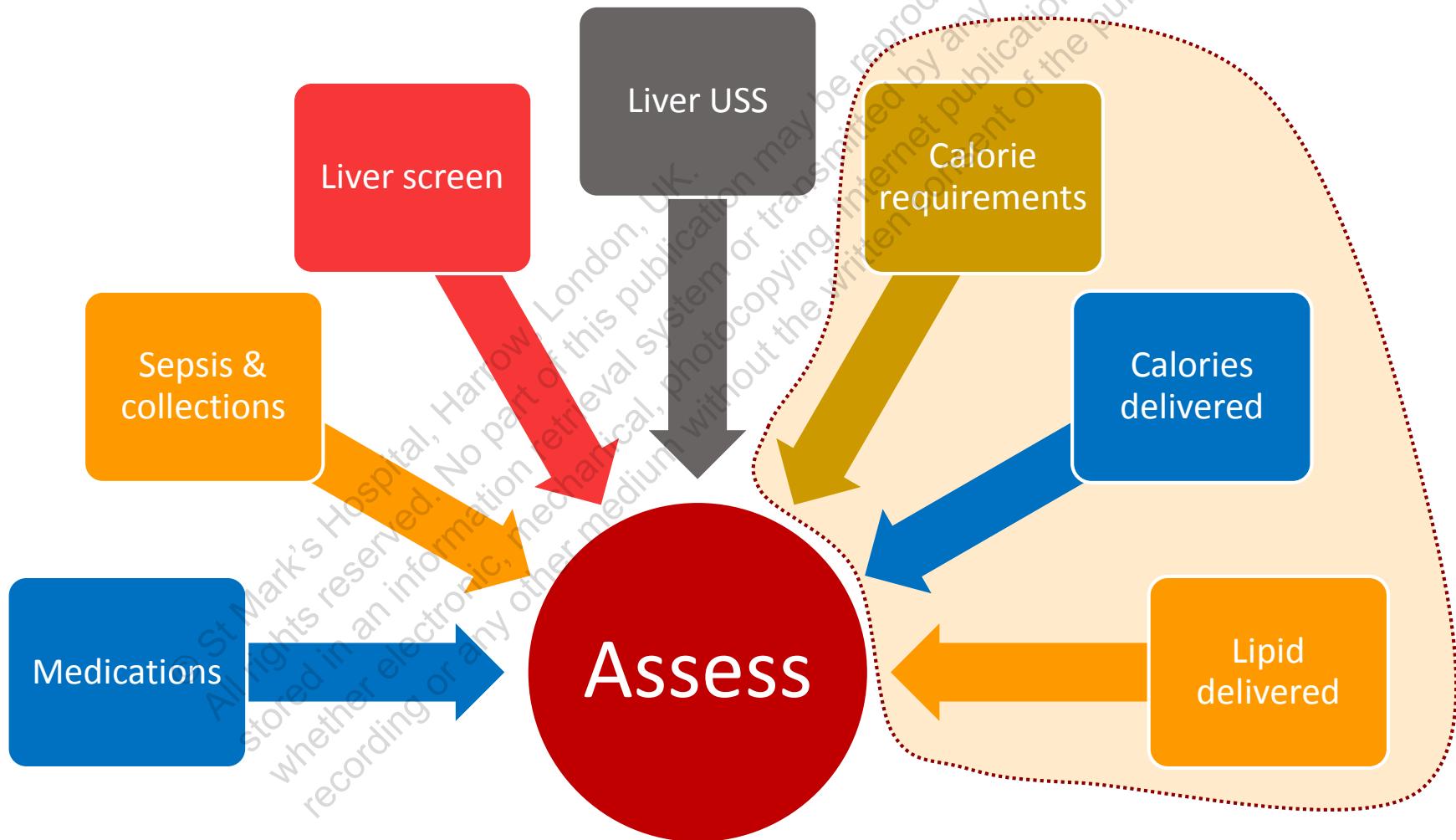
IFALD

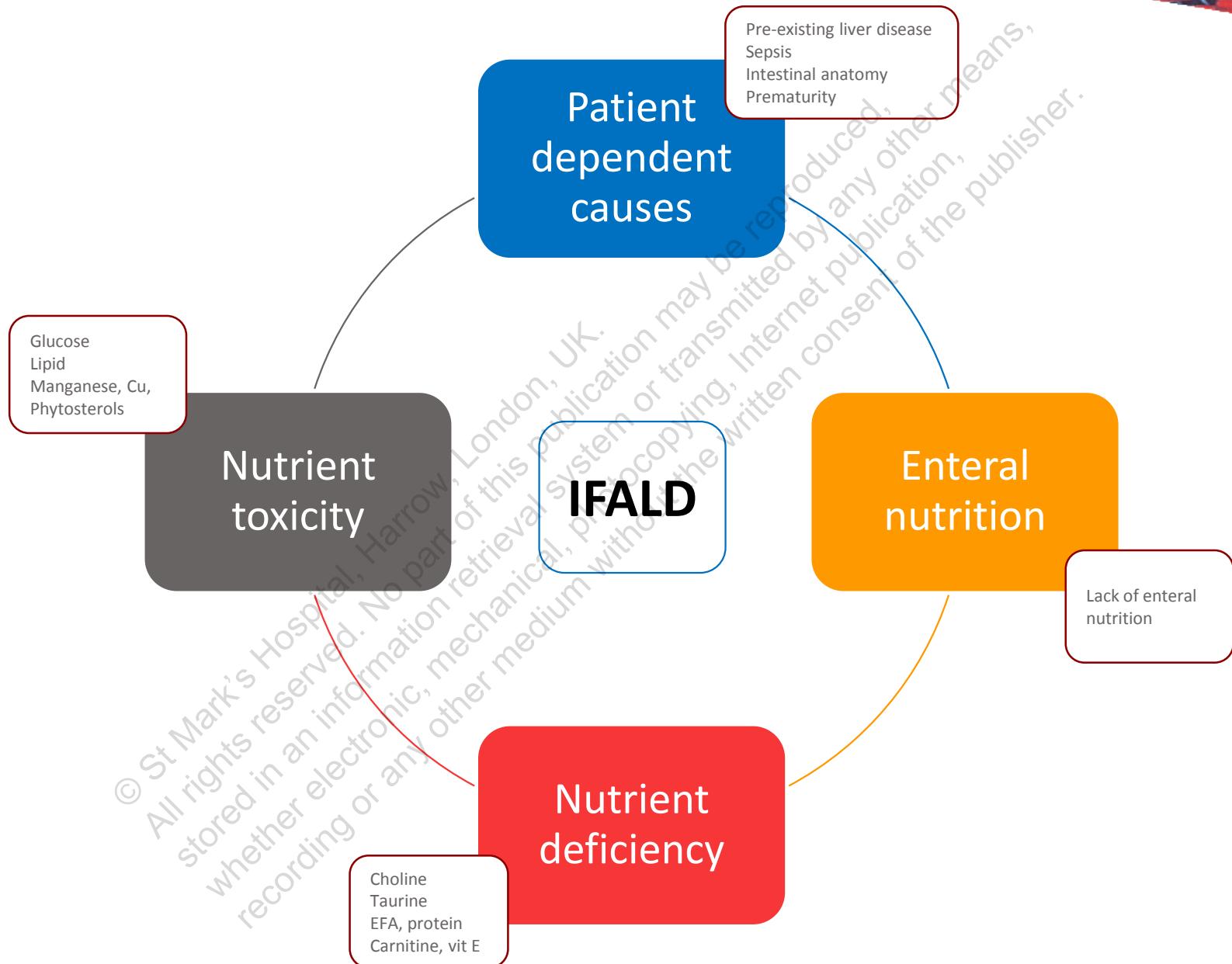
Short term PN

Long term PN

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What do I do?





Intestinal anatomy

SB length
important

SB length not
important

Fibrosis associated with
ultra SB (<20cm)

Cazals-Hatem
et al, 2017

Abnormal LFTs associated
with SB length <100cm

Luman &
Shaffer, 2002

Chronic cholestasis associated
with SB length <50cm

Cavicci et al,
2000

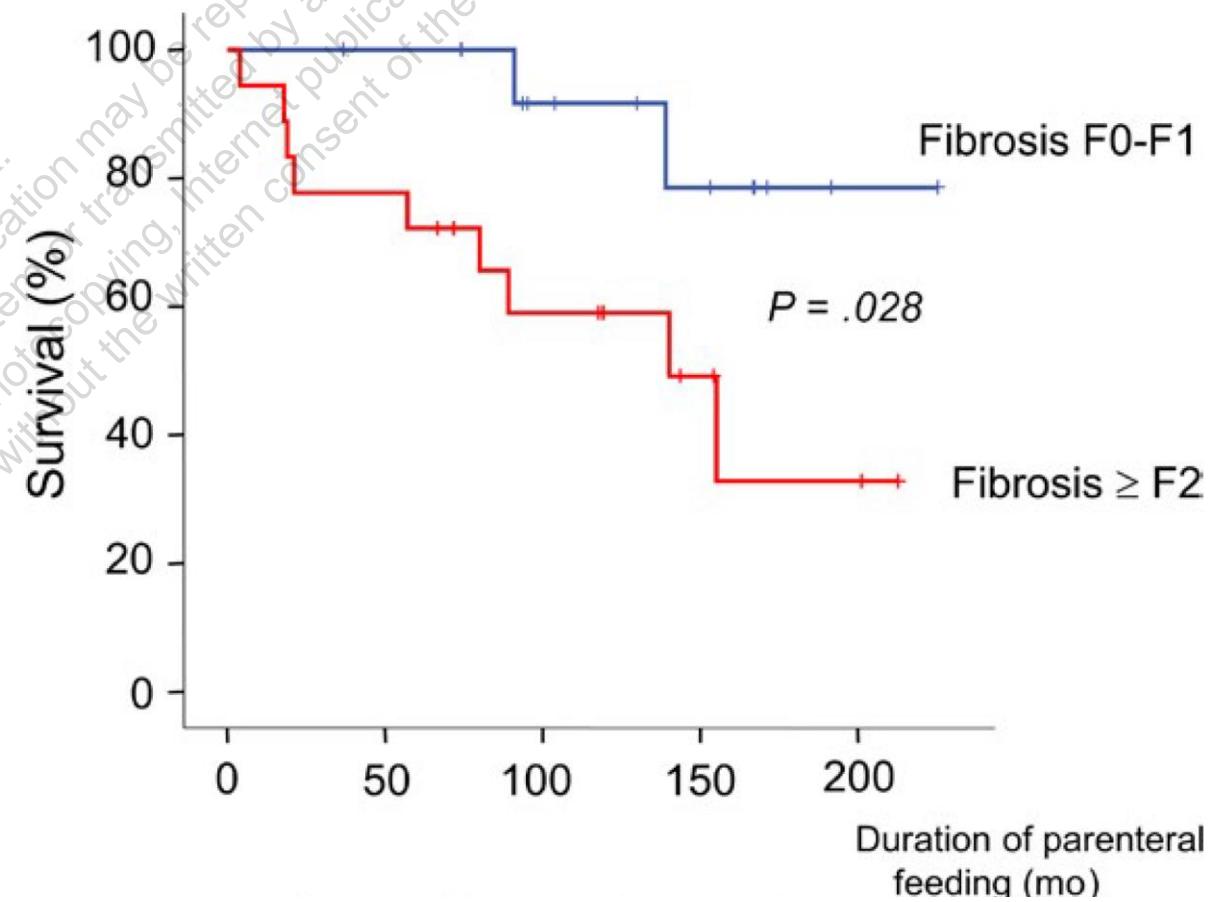
Lloyd et al,
2008

Chronic cholestasis not
associated with SB length

Mechanism?

Ultra-short bowel, alcohol & liver fibrosis

- 32 patients had a liver biopsy 55 months (9-201) after starting PN
 - ▣ 81% had a short bowel (gut < 200 cm)
 - ▣ 37% had an ultra-short bowel (gut < 20 cm)
- Liver fibrosis associated with
 - ▣ Ultra-short bowel (risk ratio 12.4)
 - ▣ Alcohol consumption (risk ratio 7.4)



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What is evil

More parenteral lipid?

More parenteral calories?

Short
term
PN

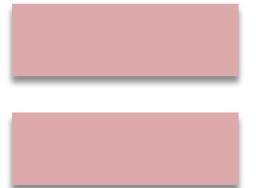
Long
term
PN

Parenteral glucose

Glucose



Fast or
excessive
infusion



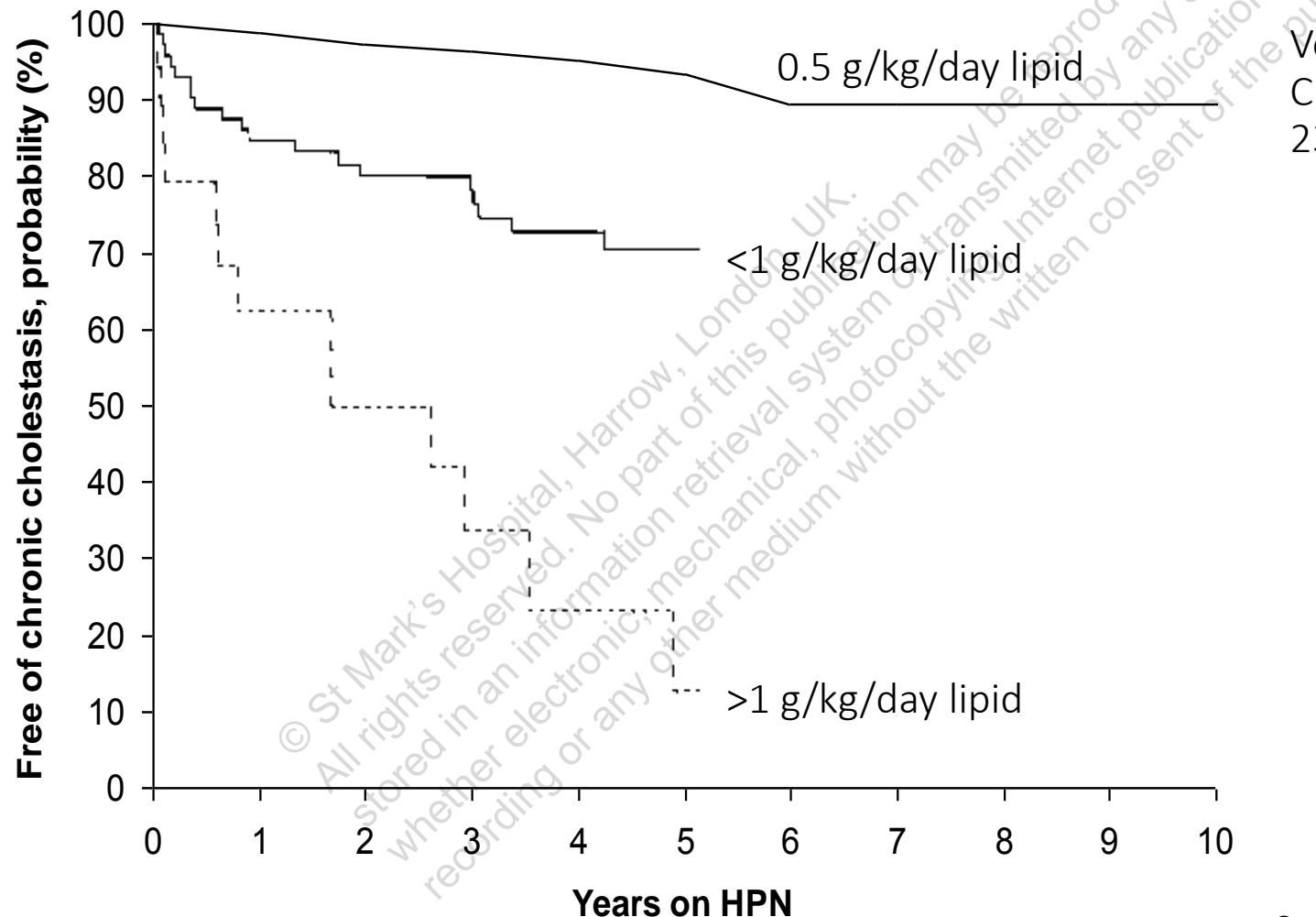
Steatosis

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Lindor *et al*, 1979

Large amount of energy supplied as glucose (>GOR)
Associated with steatosis

Soybean oil



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

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

Parenteral lipid emulsions

Generation	Description	Lipid types	Brands
1 st	Conventional lipid	LCT (soybean oil) LCT (soy/safflower oil)	Intralipid
2 nd	Lipid emulsions with reduced PUFA	Structured lipids (MCT/LCT) Olive oil based emulsion	Structolipid Clinoleic
3 rd	Lipid emulsions with reduced PUFA & specific $\omega 6/\omega 3$ FA ratio	Fish oil Soy/MCT/olive oil/fish oil	Omegaven SMOF

Short
term
PN

Long
term
PN

RCT: SMOF v soybean oil

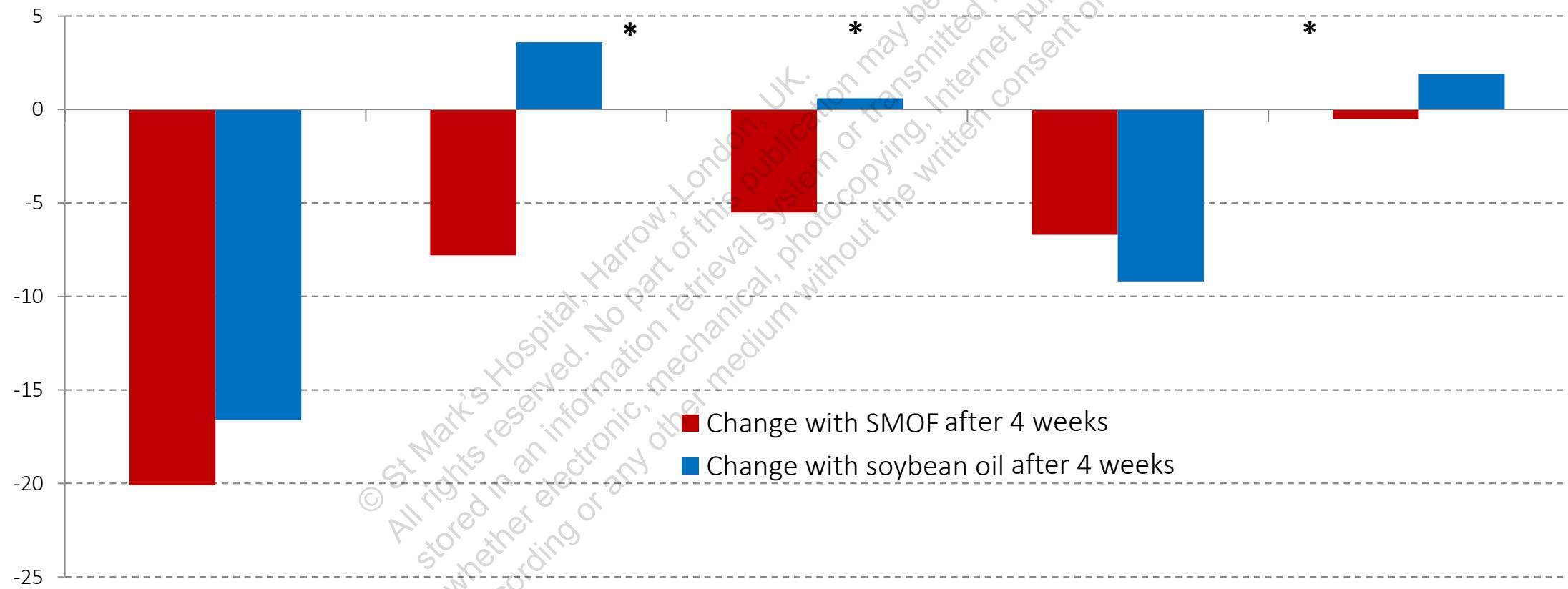
Alk Phos

ALT

AST

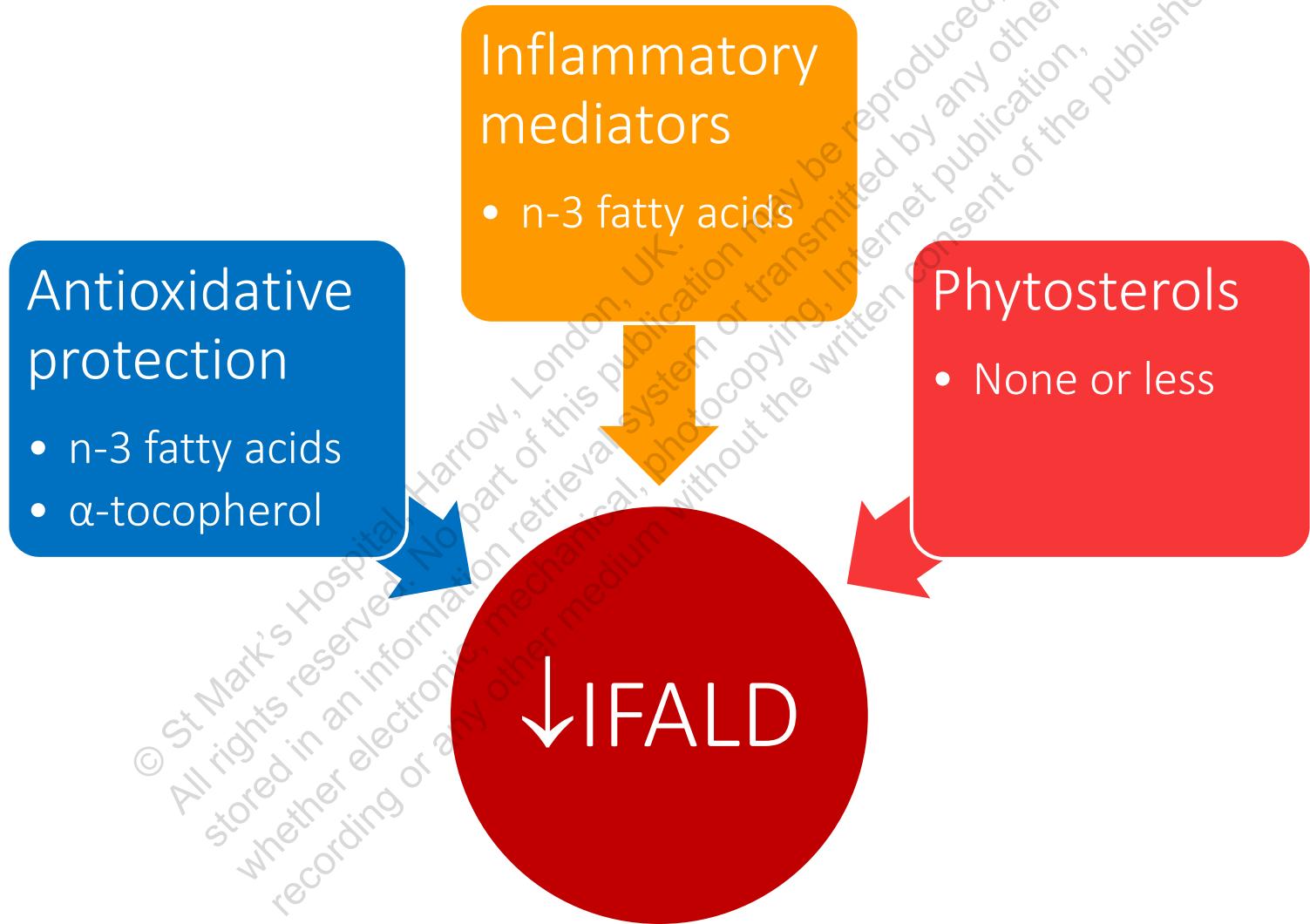
GGT

Bilirubin

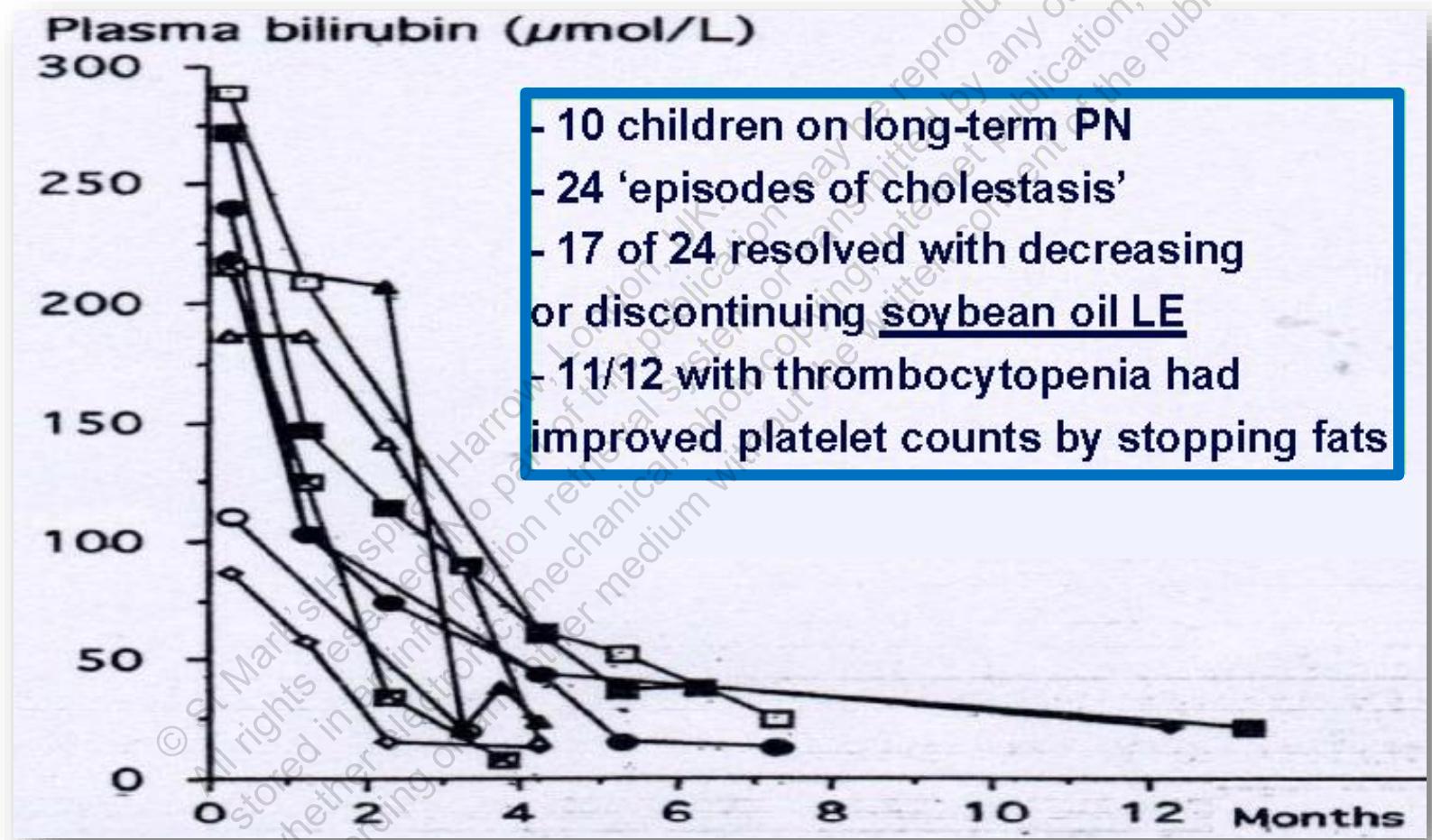


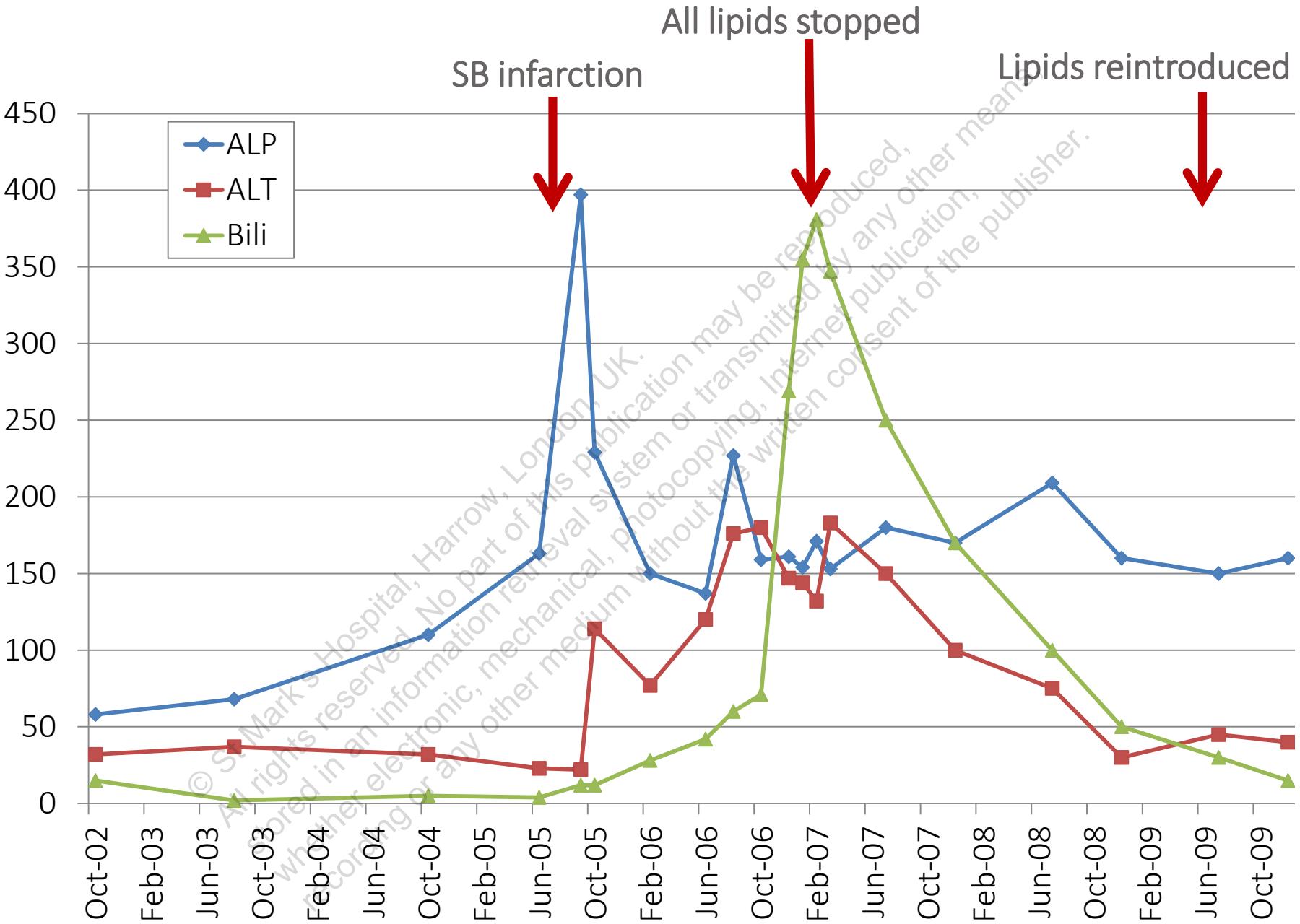
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Fish oil effect: >1 mechanism



Reversal of cholestasis







<1g/kg/day
(60kg patient)

0.11g/kg/h
(60kg patient &
12h infusion)

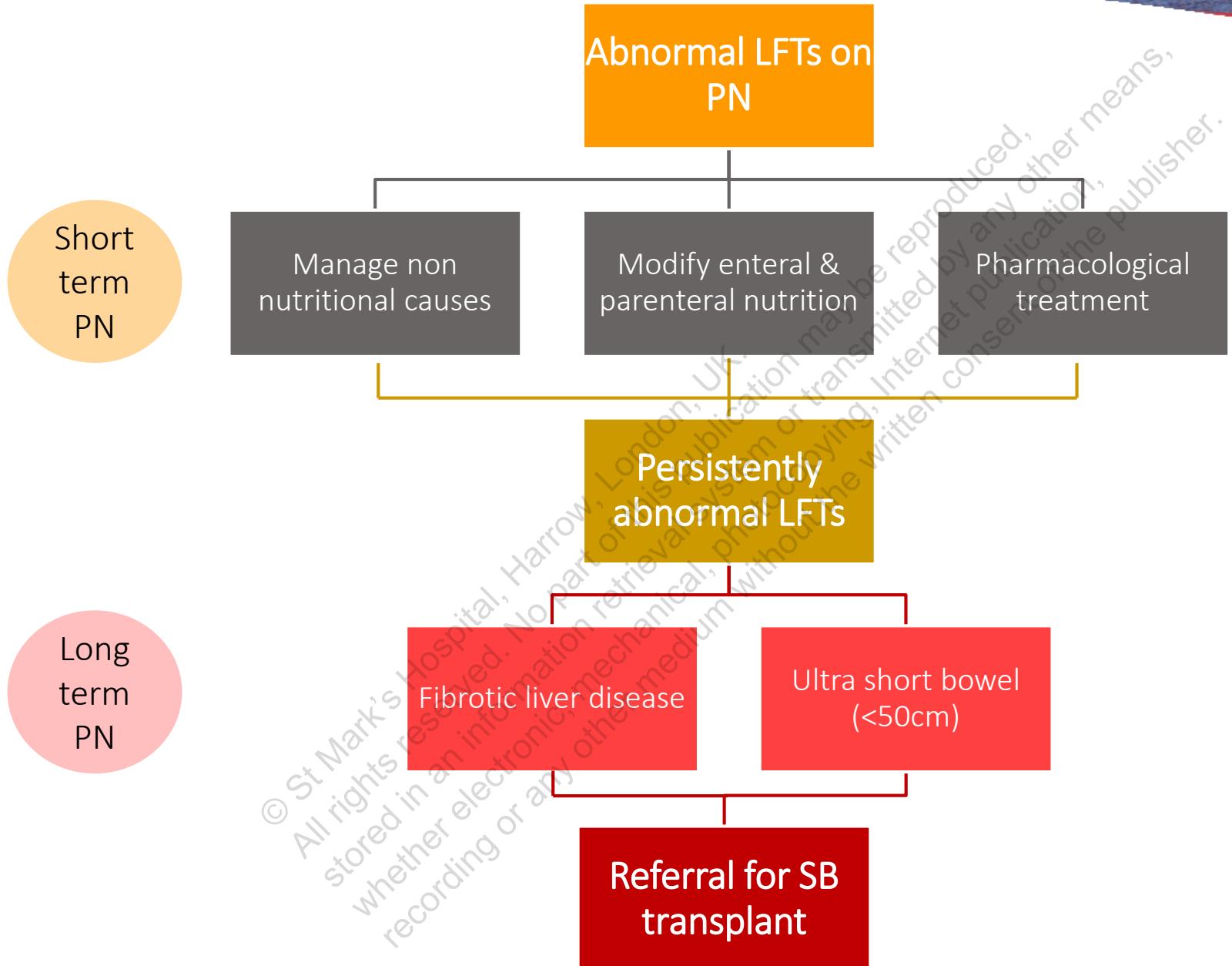
500ml 20% lipid
emulsion

<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



Questions

Do you give cyclical parenteral nutrition?

Fibroscan or liver biopsy?

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PN: continuous vs cyclical

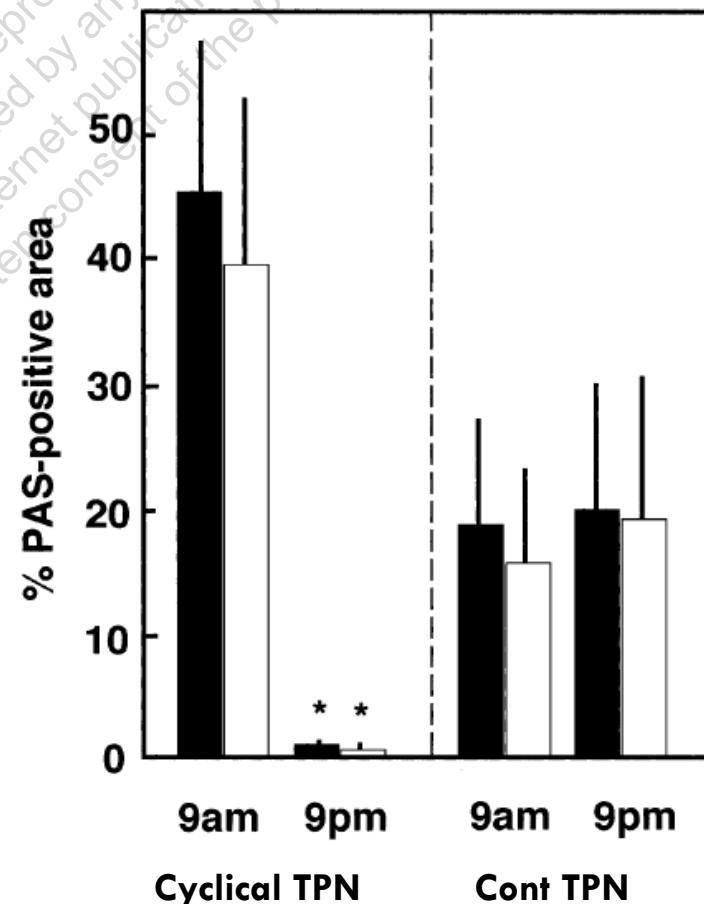
Continuous PN

- 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

Liver glycogen after 5 days TPN





Which one?

Liver biopsy

Elastography

Higher risk procedure

Interpretation difficult

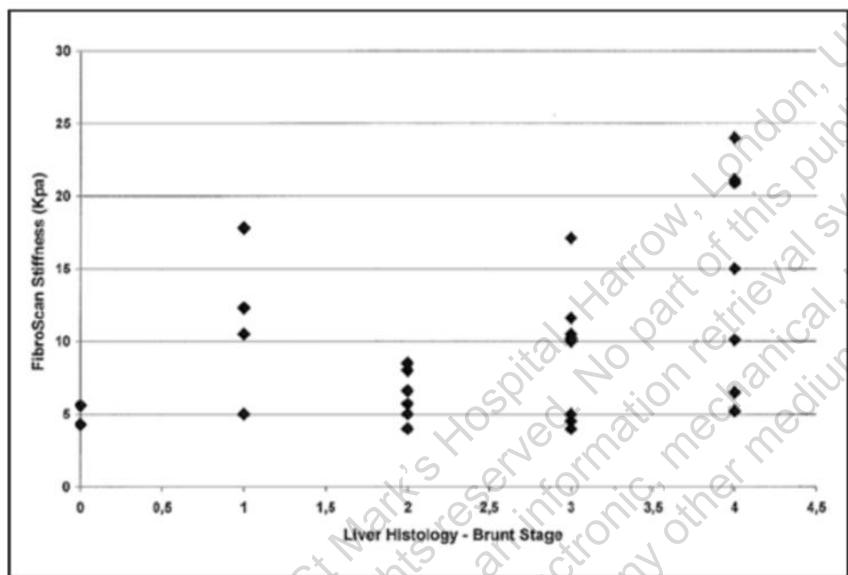
More definitive diagnosis

Not invasive

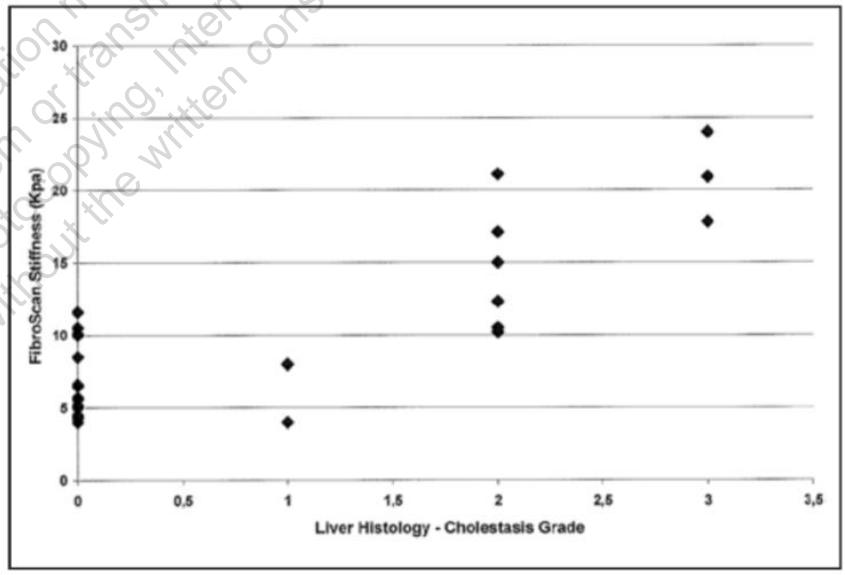
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FibroScan stiffness

- 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

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

