Nutrition in Liver Disease

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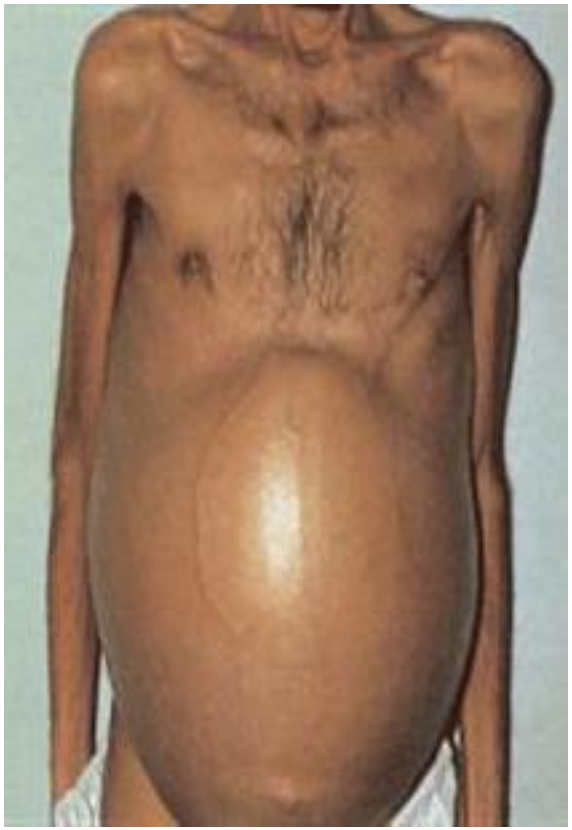
Malnutrition in Liver Disease

- Occurs irrespective of aetiology of the cirrhosis [1]
- Found in
  - 75-90% patients with decompensated disease [2,3]
  - 20% patients with compensated disease [4]
- Reported to be as high as 100% in liver transplant candidates [5]
- Direct correlation between progression of liver disease and severity of malnutrition especially in males [6]

Who is malnourished and who is at risk of malnutrition?



Why might our patients not eat well if they…

- have decompensated liver disease?
- are undergoing transplant assessment?
- are on the waiting list?
- are post transplant?
- have had substance addictions?

Malnutrition- Reduced intake

- Loss of appetite due to presence of cytokines
- Altered taste
- Early satiety due to ascites
- Nausea and vomiting due to gastroparesis, small bowel dysfunction, bacterial overgrowth
- Sodium restrictions - food unpalatable
- Lethargy affecting inclination to prepare or eat food
- Repeated investigations - fasting
- Psychological - waiting for transplant, history of depression
- Financial restrictions - social background, sick leave
- Previous high alcohol intake – eating habits

Malnutrition- Increased requirements

- Increased energy & protein requirements due to impaired energy metabolism
  - Cirrhotic liver unable to utilise energy
  - Increased requirements caused by small, inadequate glycogen stores and raised glucagon levels
  - Periods of fasting (overnight) results in increased gluconeogenesis from amino acids to meet energy needs = muscle wastage

Malnutrition- Greater losses

- Malabsorption- cholestatic disease, pancreatic insufficiency or [illegible] steatorhoea or diarrhoea
- Large volume paracentesis

  Per litre ascites drained:

  ~ 13g protein lost

  ~ approx 7g albumin given

  e.g. 10l drain = 60g losses

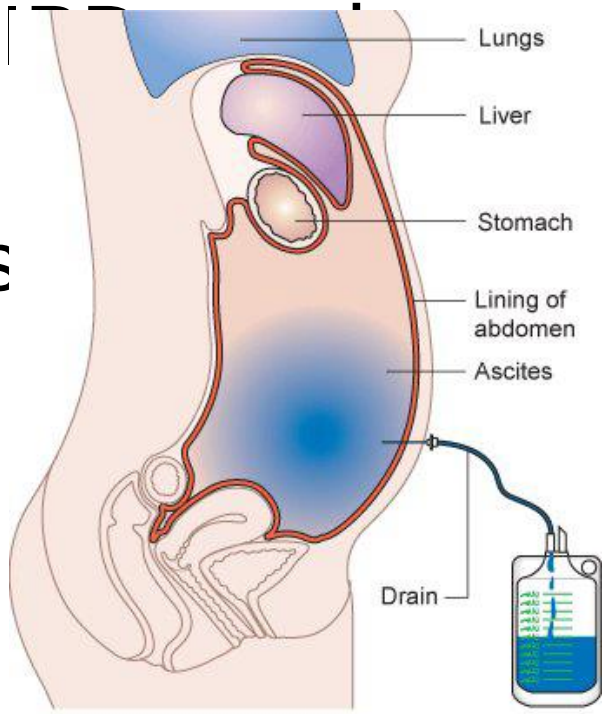


Diagram showing fluid (ascites) being drained from the abdomen

Consequence of Malnutrition

- Higher rates of encephalopathy, infection and variceal bleeding
- Twice as likely to have refractory ascites
- Associated with the progressive deterioration in liver function
- Prolonged length of hospital stay

Malnutrition is a prognostic indicator of clinical outcome

- Independent risk factor for morbidity and mortality in ESLD patients
- Poorer outcome at OLTx BMI <18.5 or >40 kg/m2
- Mortality higher in malnourished patients
- Short term survival decreases in parallel to the severity of malnutrition
- Post transplant morbidity higher
- More blood products intra op, longer ventilatory support

Barriers to Accurate Assessment

- Ascites
- Oedema
- Polycystic Liver

} Wet weight

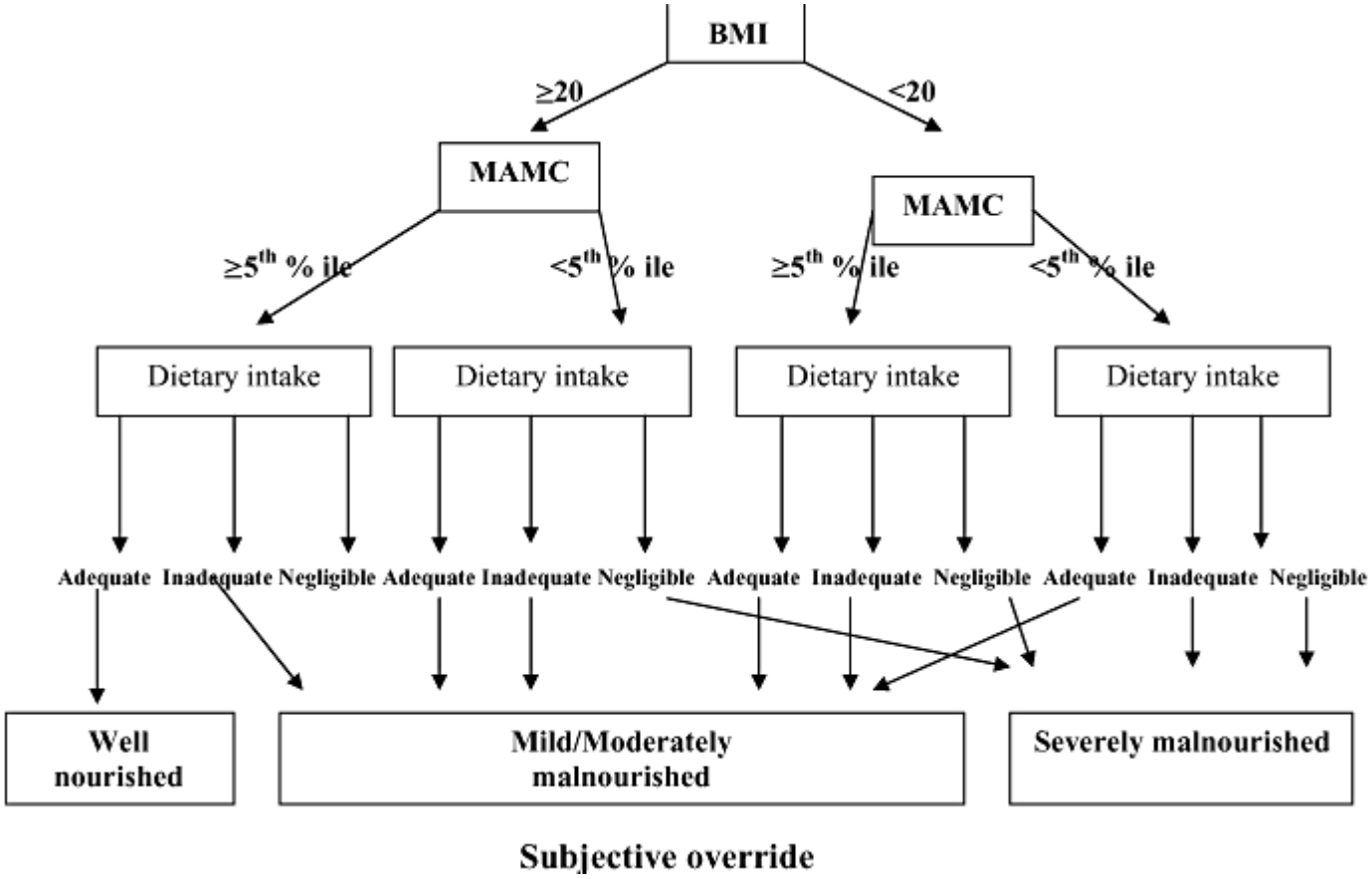
- Encephalopathy- history taking

- Obesity- affects anthropometry accuracy

Estimating Dry Weight (Mendenhall 1992)

	Ascites	Oedema
Mild	2.2kg	1.0kg
Moderate	6.0kg	5.0kg
Severe	14.0kg	10.0kg

Anthropometry and SGA



Nutritional Assessment

- Handgrip
  - sensitive marker of muscle mass depletion
  - correlates with morbidity and mortality
  - improves with increased nutritional intake
  - **but** affected by HE, low mood, fatigue

- MAMC - calculated from…
- TSF - measure of fat mass
- MAC - mid arm circumference

Calculating Energy Requirements

1. Henry Oxford Equation used to calculate basal metabolic rate
2. Add activity factor- usually our ward patients are:

mobile in bed 15% sitting 20% mobile on ward 25%

3. Add stress factor

Condition	Stress factor(%)
Compensated	0-20%
Decompensated	30-40%
Acute (fulminant) +/- ventilation	20-30%
Post transplant	30%

Calculating Protein Requirements

- Cirrhotic patients need at least 1.2 -1.3g kg/day to remain in positive N_2 balance
- Decompensation= 1.2 -1.5g kg per day
- Repletion= up to 1.8g/kg per day
- No protein restrictions
- Evenly distribute protein throughout the day
- Stable cirrhotics are capable of positive nitrogen balance and formation of LBM

Case Study

40 year old male ALD, ascites, jaundice
Mobile on ward
Actual weight 70kg
Dry weight (moderate ascites -6kg) = 64kg
Dry BMI **19.7kg/m2**

Kcal requirements BMR = 14.2 x 64 +593 (age/ gender)
40% stress
25% activity
= 2479kcal (weight maintenance)
+ 400 - 1000 kcal **for weight gain = 2879 - 3479 kcal**

Protein requirements
1.2 -1.5g x 64 = 76.8 -96g protein/ day
1.8 x 64 **= 123.3g for repletion**

Late Evening Snack

- 2-3 hourly eating pattern
- 50g CHO late evening snack

- ↑CHO oxidation rate
- ↓ Lipid and protein oxidation rate

- Improves nitrogen balance

50g CHO Late Evening Snack

- 2 crumpets with 200mls milk
- 1 milk based 1.5kcal/ml supplement
- ¾ juice based 1.5kcal/ml supplement
- 2 ½ thick slices of bread
- Breakfast cereal with milk
- 1 slice fruit cake
- Scone with jam and 300mls of milk
- 5 dried dates and 200mls milk
- Small square of flapjack and 300mls milk

Oral Nutritional Supplements

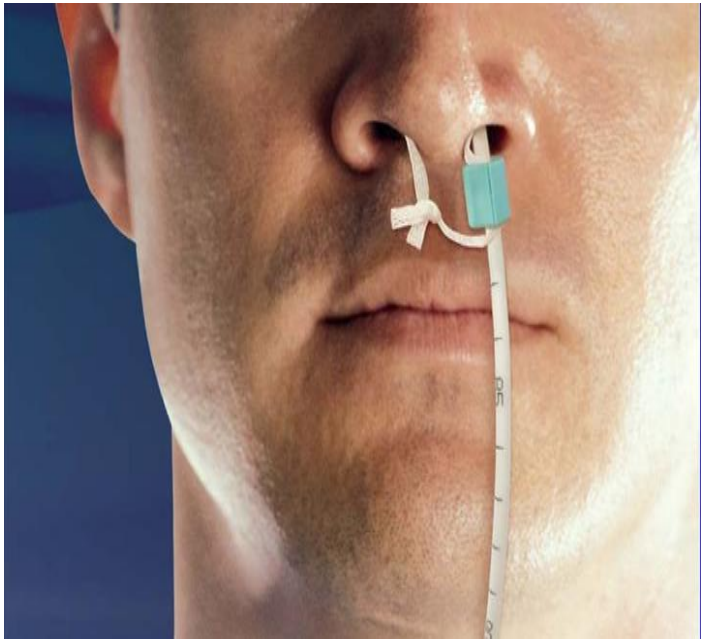
- Useful in early satiety, fatigue, loss of appetite
- Prescribe at times to minimise fasting periods
- Prescribe at times which will not affect meals
- Adjust diabetic medication as necessary to optimise glycaemic control
- Aim to allow these in addition to fluid restriction if in place
- **All supplements are not equal**

Selected ONS Composition

Product	Volume (ml)	Energy Kcal	Protein (g)	K (mmol)	Na (mmol)
Fresubin Energy	200	300	**12.5**	8	6
Fresubin Protein	200	300	**19.8**	8	6
Fresubin 2Cal	200	400	**20**	8	6
Fresubin Jucy	200	300	**8**	0	0
Fresubin 5cal shot	30	100	**0**	0	0
Prosource	30	100	**10**	2	0
Fortisip Compact	125	300	**12.5**	10	8

Nasogastric Feeding

- Minimise the post absorptive period as much as possible
- Rest periods not always appropriate and 24 hour feeding may be necessary
- 1.5-2.0kcal/ml feeds often necessary
- Use nasal bridles if patients persistently pulling out tubes
- Consider enteral feeding earlier than in some patient groups due to metabolic changes and likely background of malnutrition



Ascites

- Sodium restriction
  - 5.2g salt/day
  - No added Salt approach
  - Approx. 90 mmol sodium

Case Study revisited

- 900ml Fresubin HP Energy and 1000ml Fresubin Energy = 2850kcal 123.5g protein 90mmol Na
- 800ml Nutrison Energy 1000ml Nutrison Concentrated = 3200kcal 123g protein 90mmol Na
- **Standard feeds** meet requirements without excessive sodium

Steatorrhoea

- Common in PSC & PBC
- May compromise nutritional status
- Fat soluble vitamins and calcium
- Not often in other liver diseases but always assessed for e.g. in presence of jaundice or if bilirubin +300umol/l
- Consider supplements and/or enteral feed type
- MCT fats better for fat malabsorption
- Discuss with dietitian
- Consider PERT (Past medical history)

Hepatic Encephalopathy

- Protein energy malnutrition is a risk factor
- In outpatient environment- spreading protein out through day
- Minimise fasting periods
- 4-6 meals a day
- Consider enteral feeding- 24 hour

Summary

- PEM frequently exists in patients with liver disease
- Nutritional support is frequently used to aid improvement in mortality, hepatic regeneration and outcome
- Consider early use of supplements or enteral feeding- treat malnutrition aggressively
- Discuss symptoms with dietitian e.g. jaundice, steatorrhoea, ascites, encephalopathy
- Where possible prioritise meeting nutritional requirements over fluid restrictions, Na restrictions, type of diabetes treatment

1 Thuluvath PJ, Triger DR. (1994) Evaluation of nutritional status by using anthropometry skills in adults with alcoholic and nonalcoholic liver disease. *American Journal of Clinical Nutrition* 60: 269-273.

2 Carvalho L, Parise ER. (2006) Evaluation of nutritional status of nonhospitalized patients with liver cirrhosis. *Arquivos degastroenterologia* 43: 269-274.

3 DiCecco SR, Wieners EJ, Wiesner RH, Southorn PA, Plevak R, Krom RA. (1989) Assessment of nutritional status of patients with end-stage liver disease undergoing liver transplantation. *Mayo Clinic Proceedings* 64: 95-102.

4 Coltorti M. Del Vecchio-Blanco C, Caporaso N, Gallo C, Castellano L. (1991) Liver cirrhosis in Italy. A multicentre study on presenting modalities and the impact on health care resources. National Project on Liver Cirrhosis Group. *Italian Journal of Gastroenterology* 23: 42-48.

5 Alvares-da -Silva MR, Reverbel da Silviera T. (2005) Comparison between standard handgrip strength, subjective global assessment, and prognostic nutritional index in assessing malnutrition and predicting clinical outcome in cirrhotic patients. *Nutrition* 21: 113-117.

6 Tandon P, Ney M, Irwin I, Ma MM, Gramlich L, Bain VG, Esfandiari N, Baracos V, Montano-Loza AJ, Myers RP. (2012) Severe Muscle Depletion in Patients on the Liver Transplant Wait List: Its Prevalence and Independent Prognostic Value. *Liver Transplantation* 18: 1209-1216.