Nutrition in Alcohol-associated Liver Disease

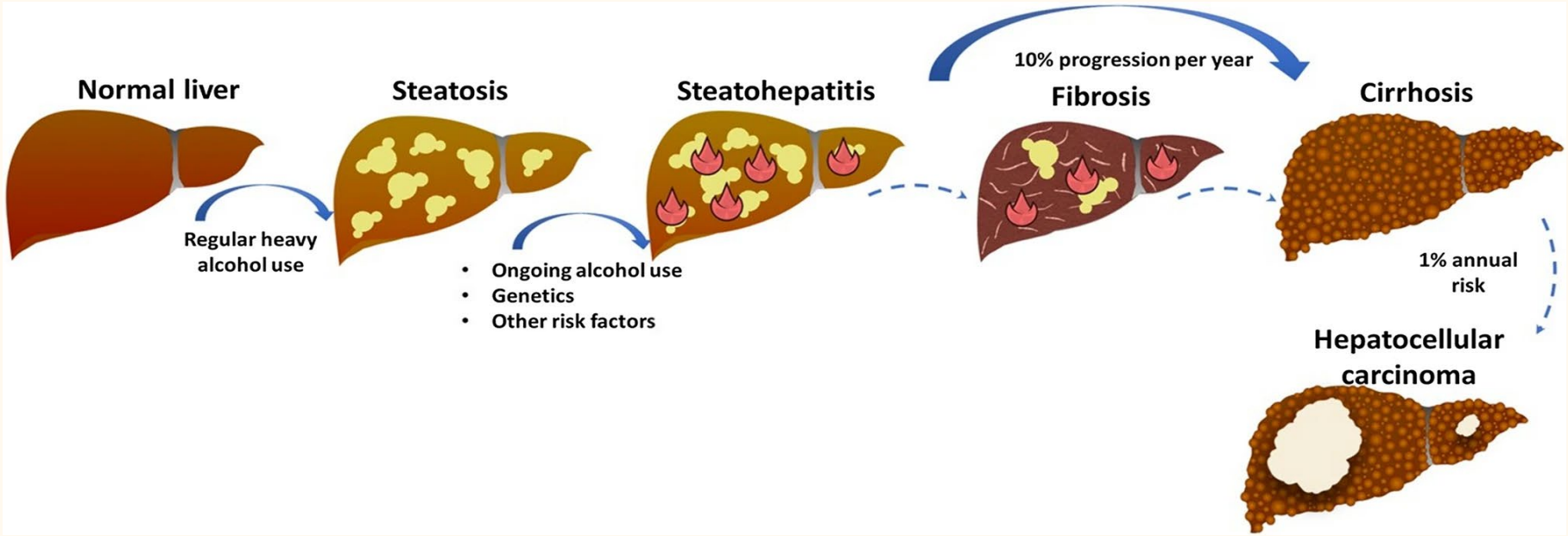


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Alcohol-associated liver disease (ALD)

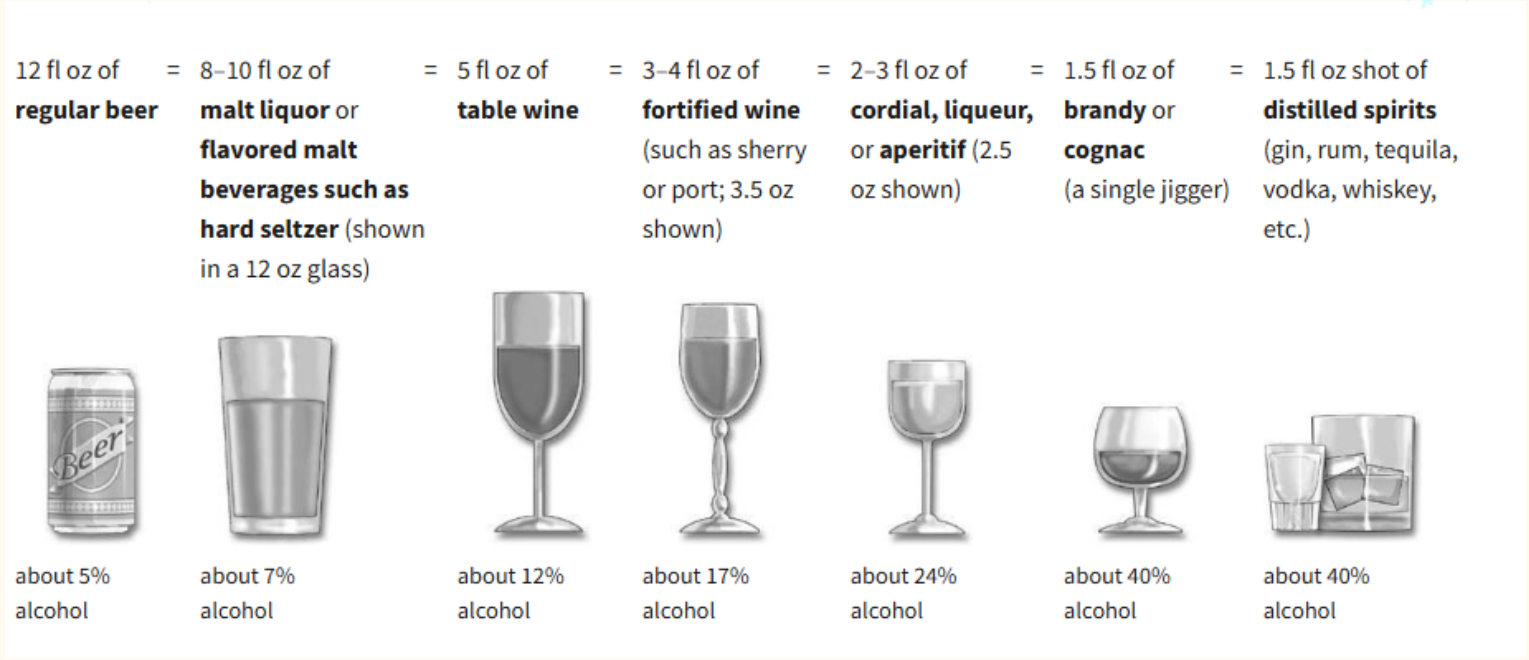


- Even very low levels of alcohol consumption (any drinking in women, or >12 g/day in men) increase the risk of **cirrhosis-related mortality** (>60 g /day increases risk by 14-fold in men and 22.7-fold in women).
- A prospective study of > 8000 patients with NAFLD: even low alcohol use doubles the risk for advanced liver disease.

Rehm, Drug Alcohol Rev. 2010

A Standard Alcoholic Drink

place	Amount of alcohol
the US and Canada	14 g
the UK	10-12 g
most European nations	8 g
WHO	10 g



Mellinger, Clin Liver Dis. 2019; Kerr, Drug; Alcohol Rev. 2012; Kalinowski, Addiction. 2016

Nutritional value

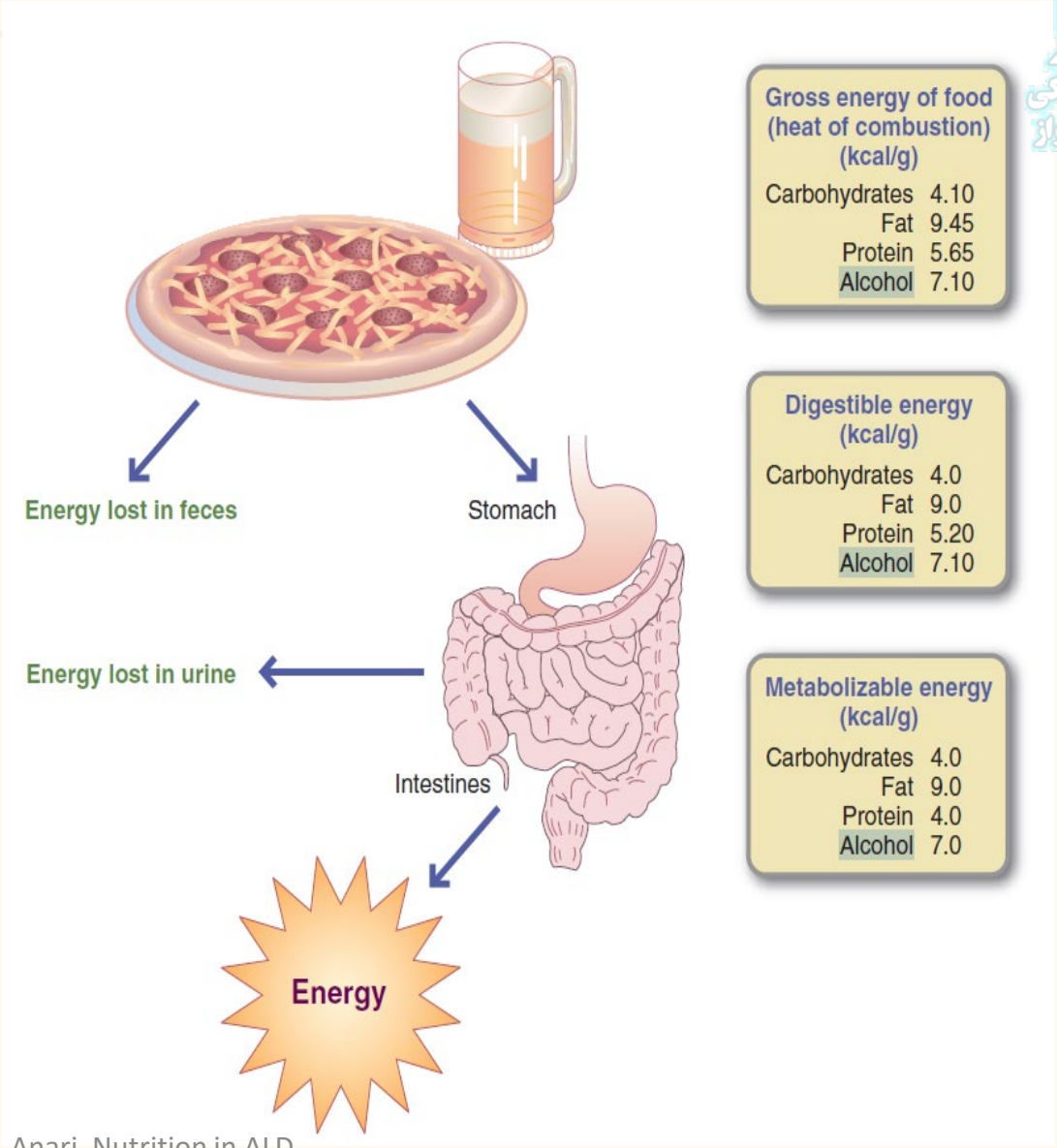
Energy:

1. Fats (9 kcal/g)
2. Alcohol (7 kcal/g)
3. Carbohydrates and Protein (4 kcal/g)

Increased REE:

In alcoholics with fatty liver, ASH, or cirrhosis (26%).

Compher et al., 2006
ESPEN, 2020

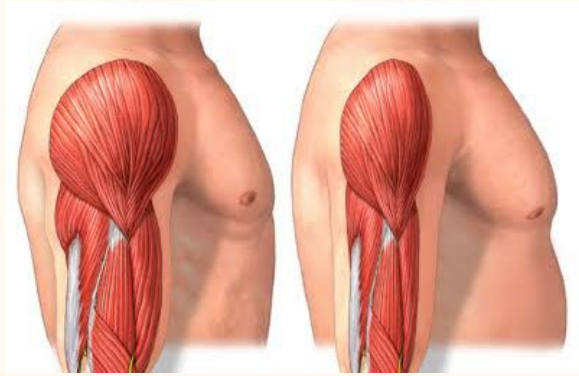


Malnutrition in ALD

- **Longer stay** in ICU and hospital stay and **higher mortality** after liver transplantation
- **Muscle wasting**, **weight loss**, and **nutritional deficiencies** commonly occur in ALD.

- **Mechanisms:**

- **Poor dietary intake -** due to anorexia, altered sense of taste and smell, nausea and vomiting, and gastritis.
- **Maldigestion and malabsorption -** pancreatic insufficiency, bile acid deficiency, mucosal damage, protein-losing enteropathy, and steatorrhea impair absorption of **protein** and micronutrients like **folate** and **vitamin B12**.
- **Bacterial overgrowth -** due to reduced motility
- **Loss of proteins -** secondary to portal hypertension and protein-losing enteropathy
- **Impaired protein synthesis –** due to cytokine-induced inflammatory responses
- **Hypermetabolic state**
- **Insulin resistance**



Malnutrition in liver disease

- Malnutrition is unrecognized in some patients with liver disease because weight loss can be masked by **fluid retention** or **obesity** (sarcopenic obesity).
- The **loss of glycogen stores** predisposes patients with advanced liver disease to enter a starvation state within a few hours of fasting, which can lead to further protein catabolism.

- **Validated Malnutrition Screening tools:**

❑NRS-2002 (Nutritional Risk Screening-2002)

❑MUST (Malnutrition Universal Screening Tool)

❑**Royal Free Hospital Nutrition Prioritizing Tool**



NRS-2002

Developed from 128 studies on the effectiveness of nutritional support geared towards identifying under-nourished patients who would probably respond adequately to nutritional support.

- ✓ BMI
- ✓ Food intake
- ✓ Weight loss
- ✓ Age

Low risk(score=0)-> repeat screening <u>weekly</u> in hospital

Pre-Screening	
Is the BMI of the patient < 20.5 kg/m^2	Yes
Did the patient lose weight in the past 3 months?	Yes
Was the patient's food intake reduced in the past week?	Yes
Is the patient critically ill?	Yes
If yes to one of those questions, proceed to screening. If no for all answers, the patient should be re-screened weekly.	

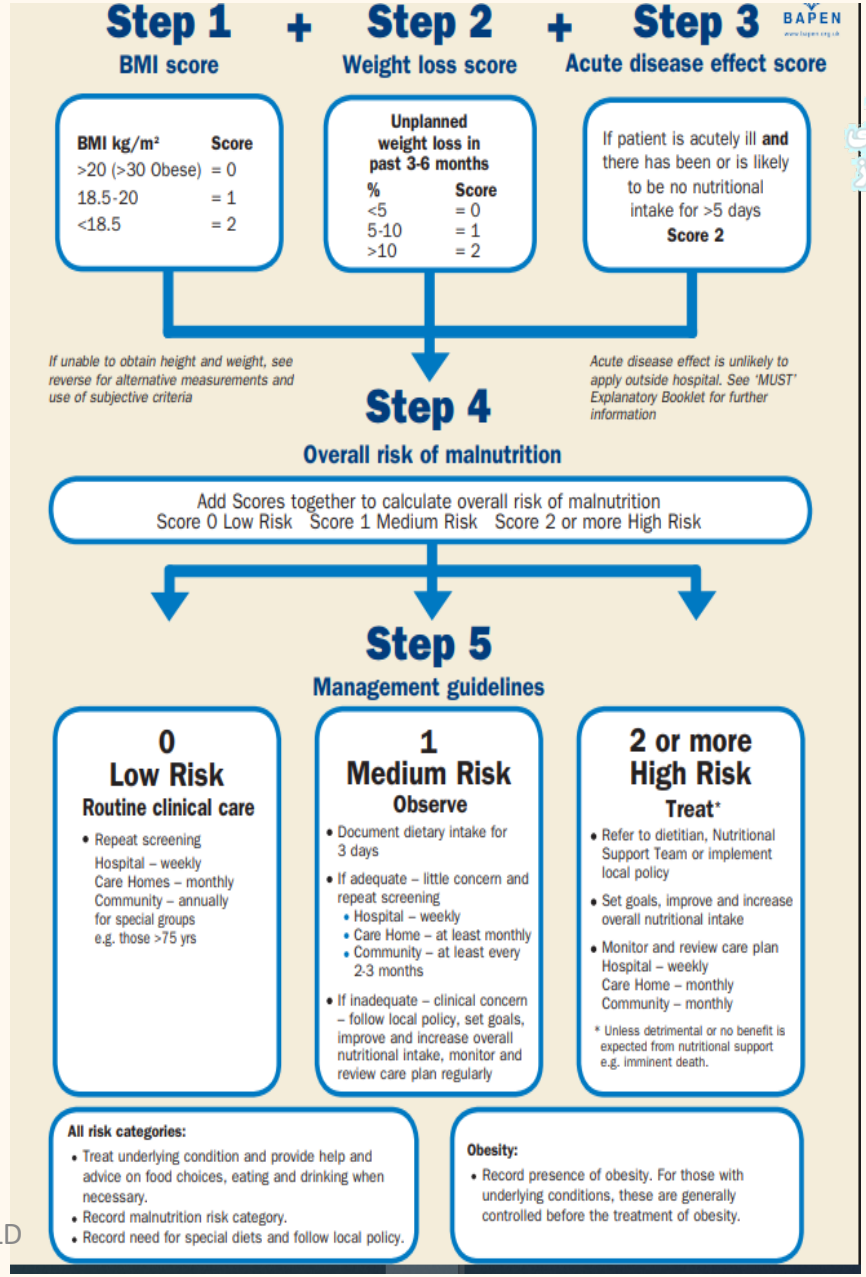
Screening			
Nutritional status	score	Stress metabolism (severity of the disease)	score
None	0	None	0
Mild Weight loss >5% in 3 months OR 50–75% of the normal food intake in the last week	1	Mild stress metabolism Patient is mobile Increased protein requirement can be covered with oral nutrition *Hip fracture, chronic disease especially with complications* e.g., *liver cirrhosis, COPD, diabetes, cancer, chronic hemodialysis*	1
Moderate Weight loss >5% in 2 months OR BMI 18.5–20.5 kg/m^2 AND reduced general condition OR 25–50% of the normal food intake in the last week	2	Moderate stress metabolism Patient is bedridden due to illness Highly increased protein requirement, may be covered with ONS *Stroke, hematologic cancer, severe pneumonia, extended abdominal surgery*	2
Severe Weight loss >5% in 1 month OR BMI <18.5 kg/m^2 AND reduced general condition OR 0–25% of the normal food intake in the last week	3	Severe stress metabolism Patient is critically ill (intensive care unit) Very strongly increased protein requirement can only be achieved with (par)enteral nutrition *APACHE-II >10, bone marrow transplantation, head traumas*	3
Total (A)		Total (B)	
Age			
<70 years: 0 pt ≥70 years: 1 pt			
TOTAL = (A) + (B) + Age			
≥3 points: patient is at nutritional risk. Nutritional care plan should be set up <3 points: repeat screening weekly			

MUST

Developed by the British Association for Parenteral and Enteral Nutrition (BAPEN) :

- ✓BMI
- ✓Weight loss
- ✓Acute illness

Low risk(score=0)-> repeat screening <u>weekly</u> in hospital

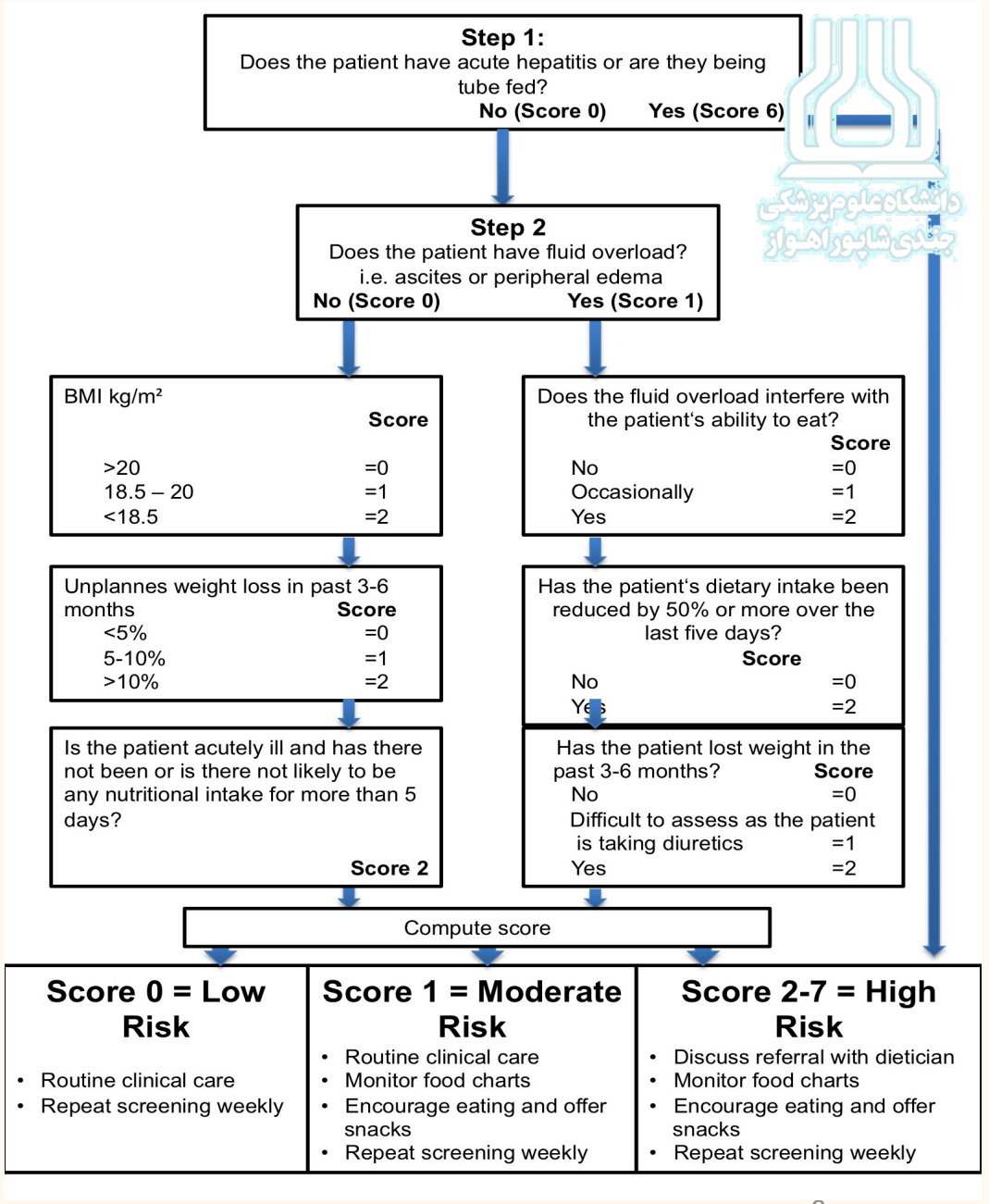


Royal Free Hospital Nutrition Prioritizing Tool (RFH-NPT)

- Was developed as a screening tool for malnutrition in **liver disease** patients.
- More sensitive than NRS-2002 in identifying **malnutrition in liver patients**.

- **Components**:

the presence of acute hepatitis or tube feeding, ascites or edema, BMI, weight loss (3-6mo), food intake (last 5 days)



Amodio, Hepatology. 2013

Borhofen, Dig Dis Sci 2016

Nutritional consequences of Alcohol use

- Chronic problematic alcohol use contributes to:

❑**disrupting appetite regulation**

❑**primary nutritional insufficiency-** via increasing intake of energy-dense, nutrient-poor foods during and between drinking episodes



❑**secondary malnutrition:**

- **impairs nutrient absorption** in the gastrointestinal tract
- **alters the metabolism of essential vitamins and minerals**- particularly water-soluble vitamins B1 (thiamine), B6 (pyridoxine), B12 (cyanocobalamin), and B9 (folate), and fat-soluble vitamins like A and D, as well as electrolytes like magnesium and zinc.

Alcohol-related nutritional deficiencies

- vitamin B1 deficiency- confusion, oculomotor dysfunction, ataxia and psychosis (Wernicke encephalopathy)

- Magnesium deficiency- may aggravate withdrawal symptoms (such as delirium tremens and cardiac arrhythmias).

*__RBC magnesium__ levels are more useful in assessment than serum magnesium levels, which may remain “normal” even with severe magnesium deficiency. Because magnesium deficiency is so common in alcoholics, deficiency should be presumed to be present.

- B12 deficiency- causes neuropathy



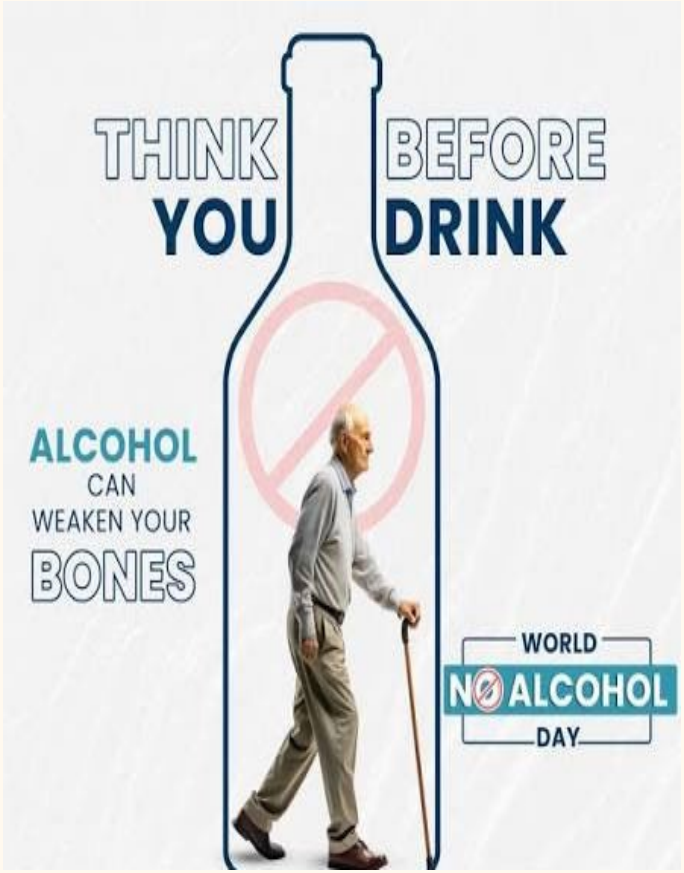
Reginster et al., 2012; Ridley, Alzheimers Res Ther. 2013; Day, Cochrane Database Syst Rev. 2013

Alcohol-related nutritional complications

Osteoporosis - a direct influence of alcohol use or due to the associated poor diet of alcoholics.

*Key nutrients to improve bone density:

- Strontium: 340-680 mg/day
- Vitamin D: 1000 -2000 IU (*Vitamin D inhibits strontium absorption)
- Magnesium: 200 mg
- Vitamin K: 150 mcg
- Boron: 3 mg
- Calcium is best obtained from food sources, such as dairy foods, sardines, dark green vegetables, and seeds.



Common vitamin and micronutrient deficiencies in ALD

Nutrient Deficiency	Clinical Signs/Symptoms	Recommended Supplementation
Thiamine (vitamin B_1)	Wernicke-Korsakoff encephalopathy, beriberi cardiomyopathy	100 mg/d
Pyridoxine (vitamin B_6)	Neuropathy, sideroblastic anemia	2 mg/d
Vitamin B_{12}	Macrocytic anemia, neuropathy, spinal cord degeneration	50 µg/d (may require more)
Folate	Macrocytic anemia	1 mg/d
Vitamin A	Night blindness	10,000 U/d
Vitamin C	Scurvy, poor wound healing	60 mg/d
Zinc	Dysgeusia, dermatitis	220 mg BID
Magnesium	Cardiomyopathy, neuromuscular abnormalities	400 mg daily

Shah, Clinical Therapeutics. 2022

Nutrition in addiction recovery

- When possible, the best approach is to evaluate deficiencies through **blood tests** and then replete as needed: thiamin, iron, folic acid, Mg, Se



or

- Assume **poor nutritional status** and provide a broad **multivitamin/mineral supplement (**recommend use for 6 months**)** and a diet containing **high-quality protein** (25-30% of calories) **and fats**.

- **Liberal nutritionally adequate diet:** 300-450 mg caffeine, moderate use of desserts to mediate withdrawal, moderate fiber, adequate fluid intake, and inclusion of dairy foods

Weiss, 2013

Nutrition in addiction recovery

- Adequate **amino acids**, **B vitamins**, **minerals (especially Mg),** and **omega-3 fatty acids** (800-1000 mg/day)

- **Magnesium** and **NAC** are also helpful.

- In an acute setting, presume that **B vitamin** and **magnesium** deficiencies are present, and treat them rather than wait for laboratory results.



Bondi et al., 2014; McClure et al., 2014

Alcoholic steatohepatitis (ASH)

- Malnutrition in severe ASH patients(50-100%).
- Malnutrition adversely affects the response to corticosteroids and oxandrolone in moderate ASH.
- **Increased REE**
- **Poor oral intake and lower calorie and protein intake** increase mortality and morbidity.
- Oral feeding is preferred as long as providing energy and protein goal.

- Advantages of oral feeding (a regular diet) over EN or PN for **gut mucosal integrity**.



Liver cirrhosis



❑ Common deficiencies/problems:

- **Potassium, magnesium, phosphate, and other intracellular minerals**.
- **Water-soluble vitamins(mainly B)**
- **Fat-soluble vitamins (A and D)-**in cholestasis-related steatorrhea, bile salt deficiency, and alcoholics
- Reduced **glucose oxidation** rate and insulin resistance and increased rate of **lipid oxidation** (in fasting state), Insulin Resistance

❑ Recommendations:

- **BCAAs** in addition to standard of care treatment in cirrhosis and hepatic encephalopathy*
- **Late evening snacks -**to improve BMI, LBM, and reduce the risk of ascites and hepatic encephalopathy. Metabolic conditions after an overnight fast are similar to prolonged starvation in healthy individuals!
- Vit A supplementation with caution (probability of toxicity)

* Strong recommendation, moderate quality of evidence

Singal, ACG Clinical Guideline. Am J Gastroenterol. 2025 May

Liver transplantation (LTx)



❖**Preoperative:**

ERAS approach to prevent unnecessary starvation

Increase energy (30-35 kcal/kg) and protein (1.2-1.5 g/kg BW) (in obesity: 20-25 kcal and 2-2.5 g/kg IBW)

BCAA-enriched ONS: fewer postoperative infections

Probiotics (Lactobacillus spp. and other lactic acid metabolizing bacteria): fewer postoperative infections

Standard nutrition regimens: no advantage of a special immune-enhancing diet on morbidity or mortality.

❖**Postoperative**

food and/or EN within 12-24 h (EN reduced complication rates and costs compared to PN)

Increase energy (30-35 kcal/kg) and protein (1.2-1.5 g/kg BW)

ERAS protocol

BCAA-enriched formulas?

To sum up …

- **Malnutrition** in **Chronic alcohol consumption** (with/without ALD) -poorer outcomes in chronic liver disease.
- Emphasize regular assessment for **malnutrition** and if required, nutritional supplementation of calories, protein, and vitamins.



- **Nasogastric tube feeding** benefits patients unable to maintain adequate intake.
- Both ***excess alcohol consumption*** and ***chronic liver disease*** are independent risk factors for **osteoporosis**.

- Individualized Medical Nutrition Therapy: special attention to **B vitamins, magnesium, and amino acid** deficiencies

Guañabens, Liver Int., 2018



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