



Nutrition and Liver Diseases



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Functions of the Liver

- The liver is the main metabolic organ in the body and weighs about 1.5 kg.
 - Only 10-20% of functioning liver is required to sustain life.
 - Removal of the liver will result in death within 24h.
- ☐ **Functions:**
- Production of protein building blocks, proteins (clotting factors, albumin), cholesterol and bile acids.
 - Regulation of the blood sugar level by production and use of glucose.
 - Production and supply of bile for digestion of fats.
 - The neutralization and elimination of waste products of the body's own metabolism and foreign substances such as drugs and environmental toxins.
 - Storage of nutrients, minerals and vitamins.

Liver Diseases and Complications

- Chronic liver disease currently ranks as the 12th leading cause of death in the U.S with almost 32000 people dying from it yearly.
- Liver disease, is increasingly common and is often accompanied by malnutrition as a result of reduced intake, absorption, processing and storage of nutrients.
- Malnutrition in all forms of liver disease is associated with higher rates of mortality and morbidity but it is often under recognized and under treated despite the fact that appropriate treatment can improve outcomes.
- Studies have shown a strong association between Non Alcoholic Fatty Liver Disease and Type 2 Diabetes.

Causes of Malnutrition in Liver Disease

ASPEN: “Malnutrition is a state induced by nutrient deficiency that may be improved solely by the administration of nutrients”.

□ Inadequate and/or Poor Quality Oral Intake:

- Anorexia of disease.
- Nausea/Emesis.
- Bloating/Abdominal Distention/Abdominal Discomfort.
- Ascites.
- Encephalopathy.
- Delayed gastric emptying.
- Restrictive diet (low sodium, low protein, fluid restriction).
- Dysgeuzia.
- Alcohol intake.
- Socioeconomic status.
- Poor dentition.
- Pain on eating from esophagitis, gastritis or pancreatitis.
- Generalized weakness and immobility.

Causes of Malnutrition in Liver Disease

□ Metabolic Disturbances (Catabolism):

- Alteration in glucose, lipid and protein metabolism.
- Altered pattern of energy consumption.
- Insulin Resistance.

□ Maldigestion and Malabsorption:

- Bile Acid Deficiency (cholestasis).
- Small Bowel Bacteria Overgrowth.
- Decreased capacity of the liver in store nutrients.

Chronic Liver Diseases

- Non-Alcoholic Fatty Liver Disease
- Alcohol-Related Liver Disease
- Hepatitis
- Hemochromatosis
- Primary Biliary Cirrhosis
- Wilson's Disease

World Cancer Research Fund

International: Liver Cancer Statistics

- Liver cancer is the 6th most common cancer in the world, with 782,000 new cases diagnosed in 2012.
- According to the American Cancer Society, around 40,710 new cases of liver cancer will be diagnosed in the United States this year.
- About 83% of cases of liver cancer diagnosed in less developed regions of the world
- **The World Cancer Research Fund Panel' Meeting Judgments:**
 - There is convincing evidence that greater body fatness, consumption of alcoholic drinks and higher exposure to aflatoxin-contaminated foods are causes of liver cancer.
 - Consumption of coffee probably protects against liver cancer.
 - Latest studies show that about 30% of cases of liver cancer in the U.S can be prevented by not drinking alcohol and maintaining a healthy weight.

Coffee and the Risk of Hepatocellular Carcinoma: A Systematic Review and Dose–Response Meta-Analysis

❑ **Study:** A systematic review and meta-analysis of more than 26 observational studies, with information on more than 2.25 million adults was performed to examine the association between coffee, including caffeinated and decaffeinated coffee, with hepatocellular carcinoma (HCC) and assess the influence of HCC etiology and pre-existing liver disease.

❑ **Results:**

- Drinking 1 cup of coffee/day was associated with a 20% reduced risk of HCC.
- Drinking 2 cups of caffeinated coffee/day was linked to a 35% reduction in HCC risk, while the risk of HCC was halved with consumption of up to five cups of caffeinated coffee daily.
- Drinking decaffeinated coffee was also linked to a lower risk of HCC, though to a lesser extent than caffeinated coffee (14%).

*There was evidence that the association was not significantly altered by stage of liver disease or the presence/absence of high alcohol consumption, high BMI, type 2 diabetes mellitus, smoking, or hepatitis B and C.

*The protective effect of coffee against HCC was identified among both existing coffee drinkers and those who do not normally consume the beverage.

Assessment of Nutritional Status in Liver Diseases

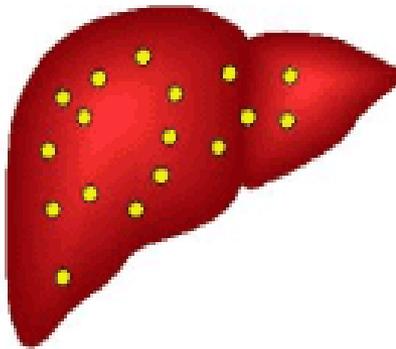
- Simple bedside nutrition screening tool and anthropometry to assess undernutrition (*ESPEN Guidelines, 2009*).
- Symptoms that affect eating & diet history.
- Anthropometry, TSF, MAMC, Grip strength, Dry weight, BMI.

Non-Alcoholic Fatty Liver Disease

- *The National Institute of Diabetes and Digestive and Kidney Diseases-US:*
One of the most common of liver disease in the US.
- A condition characterized by a buildup of fat in the liver.
- Usually diagnosed when the liver cells show fatty degeneration to over 50%.
- Does not initially restrict liver function.
- Usually does not cause any complaints and can be fully reversed.
- It may progress to an inflamed form, called steatohepatitis (NASH), which may be indistinguishable from the form caused by alcohol abuse (ASH). Both, may progress to liver cirrhosis.
- A fatty liver is particularly vulnerable and in danger of progressing to steatohepatitis in patients who fast and attempt drastic weight reduction (35-40% of body weight).Hence, a more careful and long-term weight reduction is recommended.

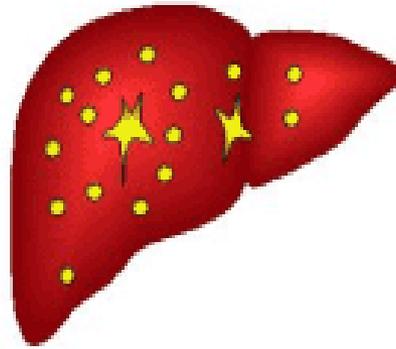
The Spectrum of NAFLD

Fatty Liver



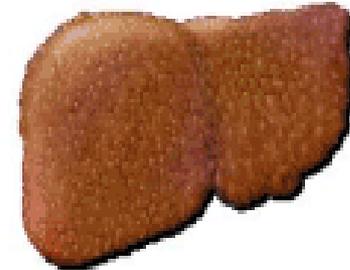
Fat
accumulates
in the liver

NASH



Fat plus
inflammation
and scarring

Cirrhosis



Scar tissue
replaces liver
cells

Young, obese and at risk of disease

Experts estimate 2 to 5 percent of American children over age 5 have nonalcoholic fatty liver disease — nearly all of them significantly overweight.

Progression of fatty liver disease

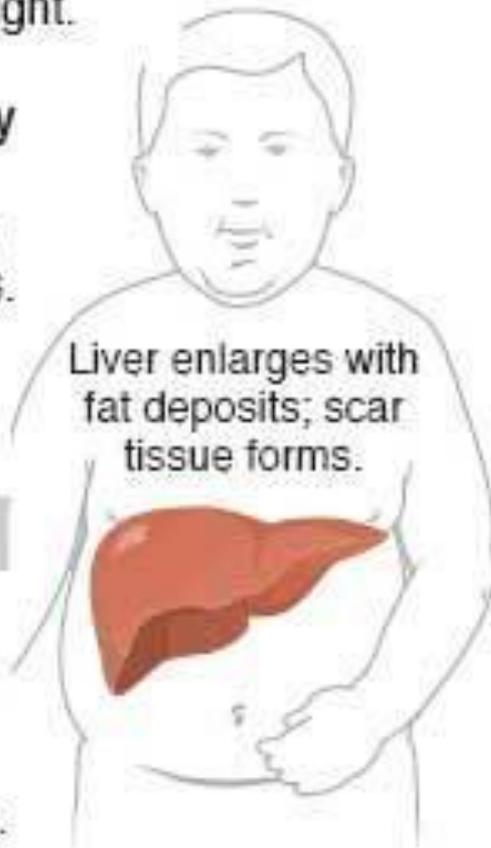
Liver can be scarred within 10 to 15 years.

Healthy

Cleans blood of bacteria, toxins and other foreign particles.



Liver enlarges with fat deposits; scar tissue forms.



Cells are injured, organ hardens and reduces in size.

Liver failure or liver cancer can follow.

Cirrhosis

Some may need a new liver by their 30s or 40s.



Nutrition Therapy for Fatty Liver Disease

The Italian Association for the Study of the Liver and the American Association for the Study of Liver Diseases in conjunction with the American College of Gastroenterology and the American Gastroenterological Association published evidence-based practice guidelines (2010, 2012) for the diagnosis and management of NAFLD: **Both guidelines endorse lifestyle changes.*

- **Weight reduction diet:** 5% initially then the aim should be around 0.5-1Kg/week & 10% over 1 year.
- **Monitoring of Waist Circumference, BMI, Weight.**
- **Adequate protein intake and supply of energy.**
- **High fiber & low saturated fats .**
- **Avoidance of high-sugar foods.**
- **Abstinence from alcohol.**
- **Exercising 30-60 minutes daily to improve insulin sensitivity.**

**Anti-obesity drugs are currently not recommended.*

**Bariatric surgery in the appropriate individual may be useful to control obesity but the guidelines indicate that bariatric surgery is not yet an established option for the treatment of NASH.*

Fatty Liver: Diagnosis of Advanced Fibrosis from Stool Microbes Shows Promise

- ❑ **Study:** University of California & Human Longevity, Inc. in San Diego.
- ❑ **Subjects:** 86 patients with NAFLD diagnosed by biopsy, including 72 with mild or moderate disease and 14 with advanced disease.

- ❑ **Methods:**
 - 1-The genes from the participants' stool samples were sequenced, analyzing the presence, location, and relative abundance of various microbe species and identified 37 species of bacteria that differentiated advanced NAFLD from the mild or moderate stage with 93.6 % accuracy.
 - 2-Findings were validated in a second group of 16 patients with advanced NAFLD and 33 healthy volunteers who acted as controls and showed that by testing the relative abundance of nine species of bacteria, (7 of which were in the 37 identified previously) they could differentiate the NAFLD patients from the controls with 88 % accuracy.

- ❑ **Results:** The stool-based test was able to predict advanced NAFLD with an accuracy of between 88 and 94% and showed promising results for a non-invasive test that only requires a stool sample.

Fatty Liver: Protein Discovery Offers New Treatment Target?

□ **Study:** Partly funded by Worldwide Cancer Research Fund, researchers in Barcelona have discovered that a protein called CPEB4 may help prevent fatty liver.

□ **Results:**

- Mice with low levels of CPEB4 developed fatty liver as they aged, and the protein played an important role in how liver cells responded to stress. (CPEB4 depletion led to fatty liver in mice).
- Feeding young CPEB4-depleted mice a high-fat diet led them to develop a more pronounced form of fatty liver disease.
- The researchers hope that the discovery will lead to treatments that fight and even prevent fatty liver and suggest that these findings could lead to studies that show people with certain variants of CPEB4 who are more susceptible to fatty liver can then be advised to improve their diets or change their eating times.

Alcohol Related Liver Disease

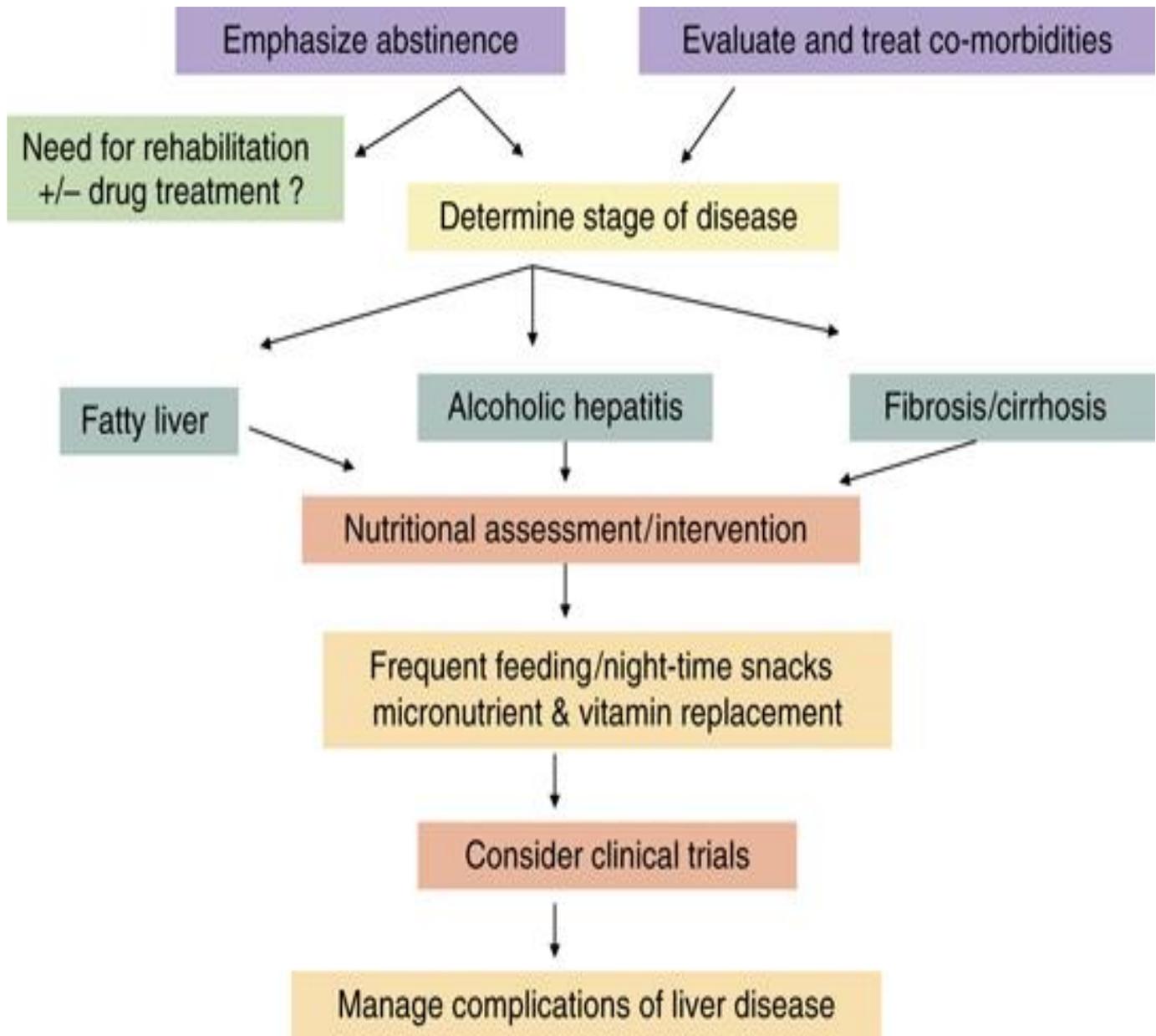
- Alcohol-related liver disease (ARLD) refers to liver damage caused by excess alcohol intake and misuse of alcohol, which over years may increase the probability of developing cirrhosis. This includes an increased risk for developing hepatic cell carcinoma.
- The risk of alcohol damage is significantly higher for women than for men.
- Alcohol steatohepatitis is a consequence of alcohol abuse but still represents a reversible transitional stage on the path from simple fatty liver to alcoholic liver cirrhosis. Severe acute alcoholic hepatitis is a life-threatening disease with high mortality.
- Crucial to therapy is an absolute abstinence from alcohol and institution of dietary therapy up to intensive therapy to prevent organ failure.

Stages of liver damage



Nutritional Assessment Techniques in Patients with Liver Cirrhosis

- The diagnosis of malnutrition can be challenging in the early stages of cirrhosis.
- There is no consensus about the best method for quantification and classification of malnutrition and the cost-effectiveness of evaluating all patients is not established.
- The dietary record is a simple tool and probably the best method available to recognize all data related to food intake.
- The Subjective Global Assessment (SGA) scale, which includes elements of the clinical history and physical examination, is validated for the assessment of nutritional status in cirrhotic patients and may provide prognostic information.
- Biochemical parameters such as albumin, pre-albumin and retinol binding protein are affected by hepatic dysfunction, which makes its use unreliable in these patients.



Diet in Cirrhosis of the Liver

- The diet of patients with liver cirrhosis is based on a standard diet with supplements addition as necessary.
- Restrictions may be harmful and should be individualized.
- Patients should maintain a healthy diet, preferably taking 5–7 small meals, distributed throughout the day in order to prevent protein overload and nausea/vomiting and absolutely avoid alcohol.
- Food should be well cooked, given the patient's increased susceptibility to infections.
- Meal schedule may be more important than the amount of food ingested, because during the postprandial period there is a suppression of protein degradation in favor of synthesis stimulation. Increasing postprandial period can improve the patient's condition.
- Sodium restriction may be required in patients with ascites/edema. In patients unresponsive to diuretic therapy, the amount of sodium should be restricted to 2g/day.
- Fluid restriction should only be recommended in severe hyponatremia ($\text{Na} < 120 \text{ mEq/mL}$) and is not indicated in compensated liver disease.

Energy/Protein Intakes in Malnourished Cirrhotic Patients

- The treatment goals are to improve the level of PCM, to ensure an adequate amount of nutrients, to achieve a positive nitrogen balance and to avoid hepatotoxic agents.
- Protein needs are higher in malnourished patients and in stress situations (such as bleeding, infection or surgery), provided that there is no renal dysfunction (in which may be necessary a protein restriction).
- In no case should protein intake be restricted, because, in doubtful cases, this will only be harmful.(Only in rare cases where hepatic encephalopathy is demonstrably triggered by high-protein meals, protein should intake be restricted).

◆ ESPEN Guidelines (2009):

- ***Recommended Energy Intake:*** 35-40kcal/kg/day is usually sufficient to restore/maintain nutritional status and enhance liver regeneration.

-***Recommended Protein Intake:*** 1.2-1.5g/kg/day.

Energy/Protein and Non- Protein Intakes in Malnourished Cirrhotic Patients

- There is very little published evidence on optimal ratios of glucose to lipid energy that should be given to malnourished patients with liver disease.
 - The current ESPEN guidelines suggest that glucose should provide 50–60% of non-protein energy.
 - An infusion of glucose (2–3 / g/kg(weight)/day) should be initiated when patients have to abstain from food for more than 12 h.
 - Diet should tend to be hypercaloric and foods rich in complex carbohydrates should be preferred.
 - Lipids should cover the remaining non-proteic daily needs (Adjustments should be performed in the presence of steatorrhea).
- *There is some evidence which supports the use of newer fat emulsions that have a lower content of omega-6 unsaturated fatty acids, which potentially renders them less suppressive to leucocyte and immune function.

Electrolytes & Minerals

- Most patients with severe acute or chronic liver disease have derangements in electrolyte and mineral balance that need to be monitored closely since this may also limit metabolic utilization of protein, carbohydrate and fat.
- ESPEN guidelines (2009) suggest that empirical daily supplementation should be considered to all patients.
- Refeeding syndrome is a potential problem in some liver patients who then need very generous potassium, phosphate and magnesium provision.
- ❑ **The National Institute for Health and Clinical Excellence (NICE)-UK:** Feeding regimens should start as little as 10 kcal/kg/day, building up to maintenance levels over 4–7 days, with careful monitoring and replacement of electrolytes, may be needed.
- Renal failure, secondary to hepatorenal syndrome, is also common in liver patients and may force severe restrictions on potassium, calcium and phosphorus intakes.
- Alcoholic liver patients are particularly prone to deficiencies in folate, vitamin C and thiamine (Some authors suggested 250 mg/day, prophylactic dose), while patients with cirrhosis of any origin, especially those with cholestatic liver disease, are at particular risk of developing fat soluble vitamin deficiencies.

➤ **Zinc:**

*May decrease fibrosis in NASH (*Matsumara et al, 2009*).

*Zinc May improve outcome of patients with Hepatitis C (*Matsumara et al, 2009*).

*Conflict results Zinc trials to decrease hepatic encephalopathy.

*The supplementation of zinc and magnesium can indirectly enhance food intake and nutritional status improving dysgeusia.

➤ **Vitamin A:** Deficiency and night blindness are also documented in cirrhosis.

➤ **Vitamin K:** Supplementation should be considered only in situations of high hemorrhagic risk.

• **Vitamin D:** Deficiency occurs frequently as a result of both inadequate diet and malabsorption and results in osteoporosis which is evident in 40% of patients undergoing transplantation. Some authors propose supplementation with calcium (1–1.2 /g/day) and vitamin D (400–800 UI/day), especially in cholestatic disease and in patients with osteopenia.

➤ **Copper:** often high so patients don't require more than standard multivitamin but can be low in NASH.

➤ **Manganese:** High as excretion altered (*Choi et al, 2005*).

➤ **Antioxidants:** No evidence to support or refute use in liver disease, results conflicting (*Cochrane Reviews, 2010*)

Study: Mediterranean Diet, Antioxidant Supplements Beneficial for NAFLD

- ❑ **Study:** Researchers at the Università Catanzaro in Italy, conducted a randomized, prospective study of 50 Caucasian patients with a BMI >25 kg/m², who were enrolled in an outpatient gastroenterology clinic from June 2015-2016.
- ❑ **Methods:** The patients were randomized by a systematic sampling procedure into 3 groups: A, B, or C.
 - A personalized moderately low-calorie Mediterranean diet (1400–1600 kcal per day) was prescribed to group A and B patients for a 6-month period.
 - In association with the diet, group B patients were administered two pills of antioxidant complex daily for the same amount of time.
 - Liver ultrasound was performed to diagnose NAFLD.
 - The hepatic fat accumulation grade was calculated according to Hamaguchi score.
- ❑ **Results:** A statistically significant decrease was observed in body weight, BMI, waist and hip circumference, and systolic blood pressure, as well as in ALT, fasting glucose, insulin, TG, total cholesterol, and LDL blood levels in patients, who underwent both diet and antioxidant complex treatment, and a statistically significant reduction in fasting glucose, insulin levels, and, consequently for group B, compared with group A patients.

DASH Diet for the Fatty Liver: More Than Just Hypertension Benefits

- ❑ **Study:** An RCT trial on 60 overweight and obese patients with NAFLD. Patients were randomly allocated to consume either the control (n = 30) or the DASH eating pattern (n = 30) for 8 weeks. Both diets were designed to be calorie-restricted.
 - Both diets were consisted of 52-55% carbohydrates, 16-18% proteins and 30% total fats; however, the DASH diet was designed to be rich in fruits, vegetables, whole grains, and low-fat dairy products and low in saturated fats, cholesterol and refined grains.
- ❑ **Results:**
 - Consumption of DASH diet for 8 weeks among patients with NAFLD had beneficial/ significant improvements in liver function test results, weight, body mass index, insulin resistance issues, insulin sensitivity, triglyceride levels, total/HDL cholesterol ratio and hs-CRP.

Nutrition Support

- In cirrhotic patients who cannot meet their nutritional requirements from normal food despite adequate individualized nutritional counseling, ESPEN recommend starting enteral nutrition in order to prevent progression of malnutrition.
- EN should be initiated as soon as possible (first 24–48h/in patients unable to ingest a minimum of 1 g/kg(weight) (>50 g) daily proteins.
- **Recommended Energy Intake: 35-40kcal/kg**
- **Recommended Protein Intake=1.2-1.5 Protein/Kg**
- Diabetes, Glucose intolerance and insulin resistance should also be monitored.
- Important to have a late evening carbohydrate snack (*Plank et al; Hepatology 2008*)
- ◆ **Studies:** Cabre *et al* in an RCT demonstrated a 47% reduction in mortality in hospitalized (malnourished) cirrhotic patients treated with enteral tube feeding and several other RCTs have shown that tube feeding can reduce markers of disease severity and possibly reduce mortality (*Gastroenterology 1990;98:715–20*).

Parenteral Nutrition

- Parenteral Nutrition should only be used in moderate or severely malnourished cirrhosis who cannot be fed either orally or enterally or if fasting > 72 h (ESPEN, 2009).
- The greatest risk of infection of PN versus the risk of aspiration of EN should always be considered.
- When PN is initiated, supplements of fat and hydrosoluble vitamins should be added.
- Thiamine supplementation should be initiated prior to an infusion of glucose, to reduce the risk of Wernicke encephalopathy.
- Some patients, such as those with alcoholic disease, may require supplemental pancreatic enzymes due to the presence of pancreatic insufficiency

Hepatitis

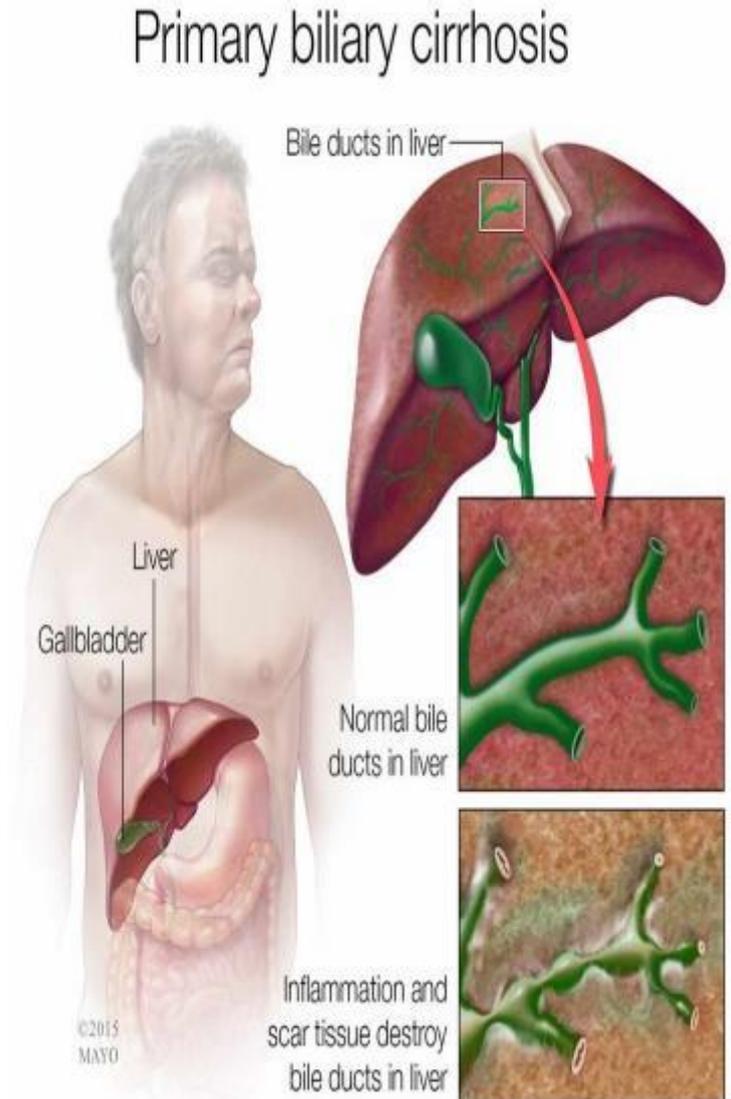
- Viral hepatitis is one the most common infectious diseases worldwide, with both acute and chronic forms, claiming 1.34 million lives in 2015 according to the World Health Organization.
- Some types of hepatitis can develop into liver cirrhosis.
- WHO Global Hepatitis Program launched the first "Global Hepatitis Report" at the International Liver Congress in April 2017 for the prevention and action against hepatitis.

Hepatitis: Nutrition Therapy

- Dietary therapy plays no important role in the treatment of viral hepatitis.
- Special forms of diet previously propagated and recommended (bland liver diet) have no value and should not be implemented.
- ◆ **In the Acute Phase:** It often helps to keep to a light normal diet, which is easy to digest.
- ◆ **In the hospital:**
 - Hepatitis patients are usually given a light standard diet excluding foods and beverages that are generally hard to digest.
 - Only in the phase of treatment with corticosteroids is it important for patients to watch for increased appetite with resulting weight gain and possible increase in blood sugar levels.
- Zinc supplementation therapy improves the outcome of patients with chronic hepatitis C. (*Matsumara et al, 2012*).

Primary Biliary Cirrhosis

- A rare chronic liver disease whose rate of progression varies from case to case.
- It occurs mainly in women.
- The causes are not yet clear but it is assumed that an autoimmune disease causing damage of the smallest bile ducts and leading to cirrhosis is involved.
- As the disease progresses, the disturbance of bile formation results in too little bile acid being produced for the digestion and absorption of normal dietary fats.
- Patients may experience an energy deficit, weight loss and inadequate absorption of the fat-soluble vitamins A, D, E and K, resulting in deficiency syndromes including night blindness, reduced sense of taste, weak bones and a tendency to bleed.



Primary Biliary Cirrhosis: Nutrition Therapy

- Patients may be helped by medium-chain triglycerides diet (Unlike the LCFA they are absorbed without the help of bile acids).
- In general, dietary therapy in patients with PBC is similar to that recommended for patients with cirrhosis due to other causes.
- Frequently the fat soluble vitamins (A, D, E and K) are required at increased doses.
- If there is osteopenia, vitamin D and calcium must be administered.

Hemochromatosis

- This hereditary disorder leads to the absorption of abnormally large amounts of iron in the small bowel, resulting in an iron overload for the body and damage to the liver (cirrhosis), heart (heart muscle weakness), joints (damage to joint cartilage) and internal glands (diabetes).
- **Nutrition Therapy:**
 - A low-iron diet is advised but may be practically impossible to maintain, since iron occurs in a great variety of foods.
 - Currently, no attempt is generally made to treat hemochromatosis with dietary measures. However, high- iron foods such as innards and large amounts of meat, sausage or cold cuts should be avoided.

Wilson's Disease

- The liver, due to an inherited defect, is unable to excrete excess copper, resulting in copper overload in the organism.
- This causes damage to the liver (cirrhosis) and the nervous system.

□ Nutrition Therapy:

- Patients with Wilson's disease should maintain a low-copper diet.
- Foods rich in copper, which should be avoided, are seafood, sea fish, innards, large amounts of meat and sausage, nuts, dried fruit, particularly raisins, mushrooms and cocoa.

Dietary Counseling, Special Menus and Oral Nutritional Supplements

- In practice, achieving significant changes in oral intake through dietary counseling and special menus alone can be difficult.
- Consuming small meals should be encouraged as many patients complain of early satiety, particularly those with ascites, and the ‘little and often’ approach, especially with a late evening carbohydrate snack, has also been shown to improve nitrogen balance in cirrhotic patients, probably by limiting the demands on amino acids for gluconeogenesis.

Effects of Omega-3 Fatty Acid in Nonalcoholic Fatty Liver Disease: A Meta-Analysis

□ **Study:** A meta-analysis was conducted to assess the effect of omega-3 fatty acid supplementation in lowering liver fat, ALT, AST, GGT, TG, TC, HDL, and LDL in patients with NAFLD or NASH.

□ **Methods:**

*MEDLINE/PubMed, EMBASE, Cochrane Central Register of Controlled Trials, and Chinese National Knowledge Infrastructure (CNKI) were searched for relevant randomized controlled trials on the effects of omega-3 PUFAs in patients with NAFLD from inception to May 2015.

*577 cases of NAFLD/NASH in ten randomized controlled trials (RCTs) were included.

□ **Results:**

- Omega-3 PUFAs improved liver fat, GGT, TG, and HDL in patients with NAFLD/NASH but was not significant on ALT, AST, TC, and LDL.

Omega 3 may be a new treatment option for NAFLD?

Patients with Type 2 Diabetes, Liver Disease Should Watch Out for CVD!

- ❑ **Study:** A new study presented at the European Association for the study of Diabetes Annual Meeting in Portugal this year, analyzing the medical data of more than 133,000 people with type 2 diabetes, aged 40-89 y (2004-2013, Scotland) showed that those with diabetes and a medical history of NAFLD have a significantly higher risk of cardiovascular disease and mortality.
- ❑ **Methods:** The researchers looked at the data of individuals diagnosed with diabetes while also targeting a "clinically significant" history of NAFLD with at least one hospital admission on the basis of NAFLD-associated symptoms.
 - Of these, 1,998 had also been admitted to hospital due to NAFLD over an average follow-up period of 4.7 years.
 - Confounding factors - including age, sex, socio-economic status, smoking habits, hypertension and high cholesterol were also adjusted as part of the analysis.
- ❑ **Results:**
 - For people with diabetes, NAFLD was linked to an approximately 62% higher incidence rate for serious cardiovascular events, such as strokes or recurrent CVD.
 - NAFLD in people with type 2 diabetes was associated with a 40% higher risk of CVD-related mortality.
 - The risk of all-cause death was also doubled, and there was a 41-fold increase in death due to cancer of the liver, or hepatocellular carcinoma.

Coffee and Herbal Tea Consumption is Associated with Lower Liver Stiffness in the General Population: The Rotterdam Study

- ❑ **Subjects:** Data was available on 2,424 participants (>45 y) from a large cohort study called the Rotterdam Study.
- ❑ **Methods:** Participants underwent a full physical check-up (anthropometry, blood tests and abdominal scans for examining the liver).
 - Food and drinking habits were assessed using a FFQ comprising 389 questions, including detailed items about tea and coffee intake.
 - Participants were divided into three categories: no consumption, moderate tea and coffee consumption (defined as up to 3/day), and frequent consumption (defined as >3/day).
- ❑ **Results:** Frequent coffee and herbal tea consumption consistently correlated with a significantly lower risk of liver stiffness. These results were independent of lifestyle factors or BMI.

-Additionally, the beneficial effect of coffee on liver stiffness could be seen both in participants who had a fatty liver and those who did not.

Frequent coffee and tea intake may prevent liver fibrosis long before the signs of liver disease start to appear?

Conclusion

- Malnutrition is very common in liver disease and gets worse with the severity of the underlying liver problem.
- It is generally easy to recognize but often overlooked. Simple screening tools can highlight risk, and other measurements are useful as prognostic indicators.
- It is important that nutrition is provided in appropriate amounts at appropriate stages of the clinical course, especially in patients who are metabolically unstable with poorly functioning livers.
- There is evidence that careful nutritional support is beneficial, and by implementing a targeted practical approach in clinical settings, improvements in patient outcomes can be seen.

Thank You!

