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ACG 2026
OCTOBER 9-14, 2026 | NASHVILLE, TN
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2026
ACG'S FUNCTIONAL GI &
MOTILITY DISORDERS SCHOOL &
ACG/MIGI MIDWEST REGIONAL
POSTGRADUATE COURSE
AUGUST 14-16, 2026 | FORT PONTCHARTRAIN A WYNDHAM HOTEL
DETROIT, MICHIGAN
Register online: meetings.gi.org

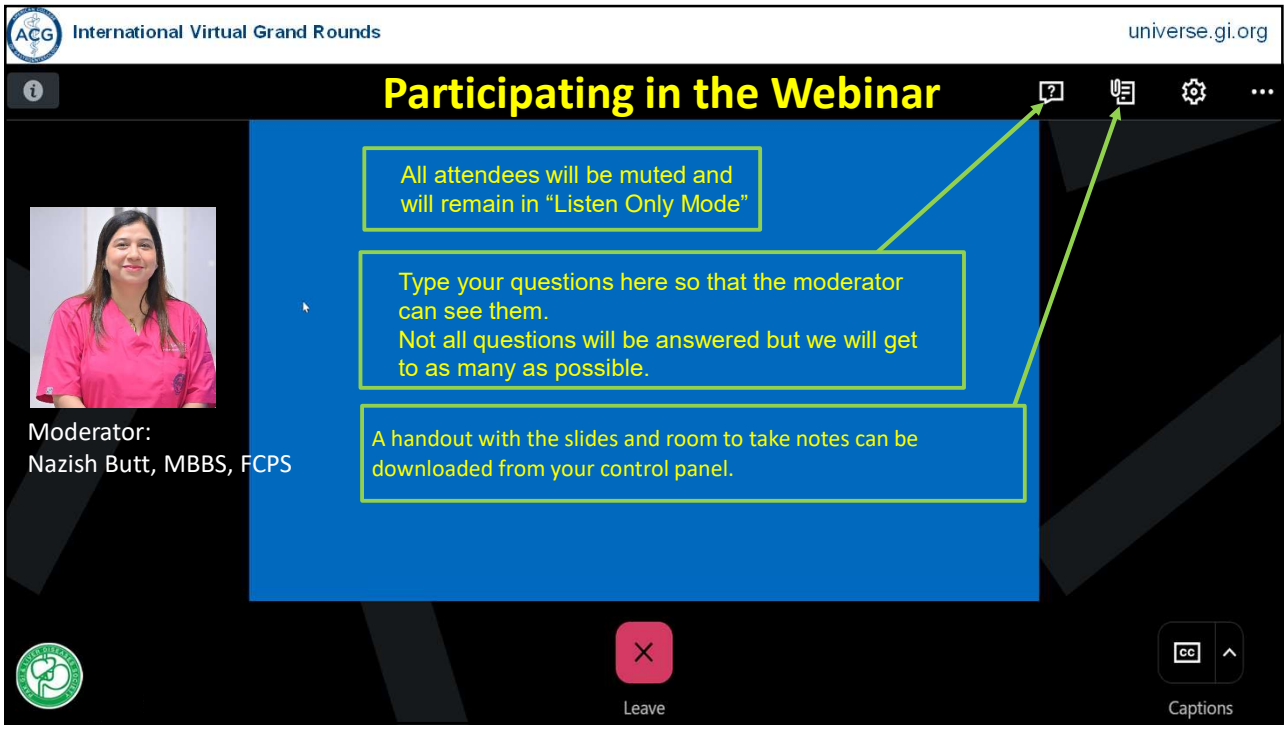
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2026
ACG'S OBESITY AND METABOLIC DISORDERS SCHOOL &
ACG/VGS/MASGNA REGIONAL POSTGRADUATE COURSE
AUGUST 28-30, 2026 | WILLIAMSBURG LODGE, WILLIAMSBURG, VA
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2026
ACG'S OBESITY AND METABOLIC DISORDERS SCHOOL &
SOUTHERN REGIONAL POSTGRADUATE COURSE
DECEMBER 4-6, 2026 | HYATT REGENCY LOUISVILLE LOUISVILLE, KY
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Participating in the Webinar
All attendees will be muted and will remain in "Listen Only Mode"
Type your questions here so that the moderator can see them.
Not all questions will be answered but we will get to as many as possible.
A handout with the slides and room to take notes can be downloaded from your control panel.
Moderator:
Nazish Butt, MBBS, FCPS
Leave
Captions

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ACG Virtual Grand Rounds
Join us for upcoming Virtual Grand Rounds!
Week 32 – Thursday, August 6, 2026
Clinical Application of the Urgency Numeric Rating Scale (UNRS): Optimizing Patient Assessment and Care
Faculty: Marla C. Dubinsky, MD
Moderator: Jana G. Al Hashash, MD, MSc, FACG
At Noon and 8pm Eastern
Week 33 – Thursday, August 13, 2026
ACG Clinical Guideline: Hepatic Encephalopathy
Faculty: Jasmohan S. Bajaj, MD, MS, FACG
Moderator: Simona S. Jakab, MD
At Noon and 8pm Eastern
Week 34 – Thursday, August 20, 2026
Gastro-Esophageal Disorders of the Geriatric Population
Faculty: Nicholas J. Shaheen, MD, MACG
Moderator: Kanwarpreet S. Tandon, MD
At Noon and 8pm Eastern
Visit gi.org/ACGVGR to Register

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VIRTUAL GRAND ROUNDS – INTERNATIONAL
Wednesday, August 5 | 10:00–11:00 am ET / 7:00 pm–8:00 pm Pakistan
Refractory Ascites and Variceal Bleeding
Simona S. Jakab, MD
Frailty and Sarcopenia in Advanced Cirrhosis
Lubna Kamani, MRCP, FRCP, FCPS,
RCP SCE Gastroenterology
Moderator: Nazish Butt, MBBS, FCPS
with the Pak GI and Liver Disease Society (PGLDS)
gi.org/ACGVGR

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# Refractory Ascites and Variceal Bleeding

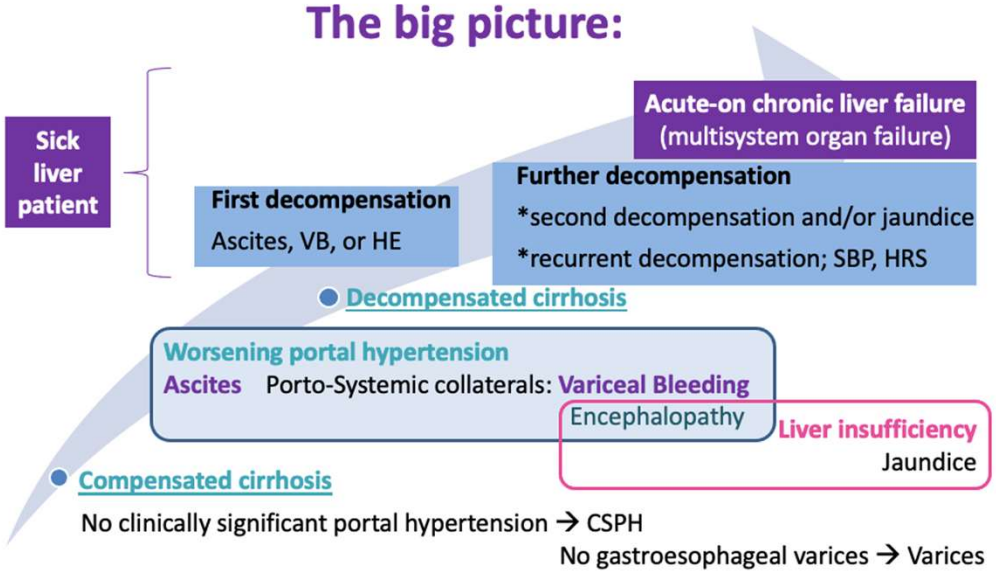
Sofia Simona Jakab, MD
Associate Professor of Medicine, Yale University
Yale New Haven Hospital/VA Connecticut Healthcare System



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## The big picture:

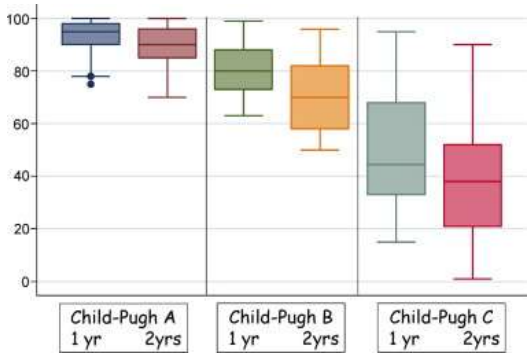



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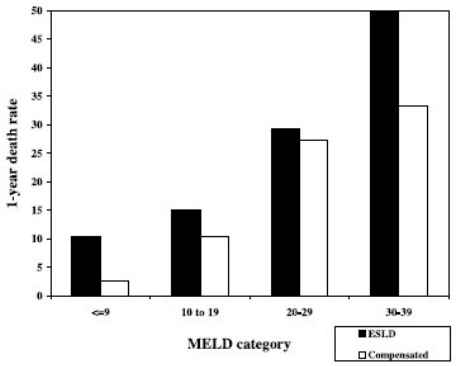
## Scores: CTP and MELD

### Child-Turcotte-Pugh (CTP)




Child-Turcotte-Pugh score
Albumin, bilirubin, INR
Ascites, encephalopathy

### MELD




MELD score
Creatinine, bilirubin, INR
(now: MELD-Na, MELD 3.0)

Assessment of the prognosis of cirrhosis: Child–Pugh versus MELD. Journal of Hepatology, 2005

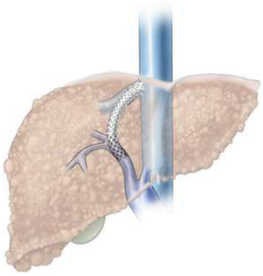
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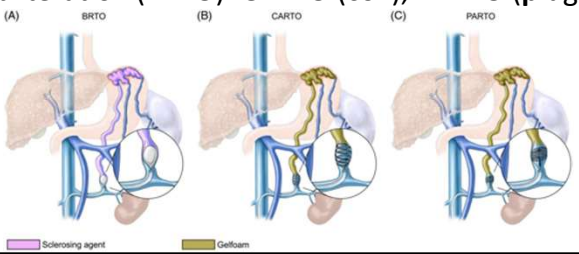
## Interventional Radiology

**Portal decompression** (ascites, variceal bleeding):
-Transjugular Intrahepatic Portosystemic Shunt (**TIPS**)

**Peritoneal decompression** (ascites):
-Peritoneovenous shunt; tunneled peritoneal drain (Pleurx)



**Variceal/collaterals obliteration**
(variceal bleeding, portosystemic encephalopathy)
-balloon-occluded retrograde transvenous obliteration (BRTO): **C**ARTO (**c**oil), **P**ARTO (**p**lug)




AASLD PRACTICE GUIDANCE: TIPS, RTO AND ATO

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# Coming soon!

AMERICAN COLLEGE OF GASTROENTEROLOGY
*Advancing Digestive Health, Improving Patient Outcomes*

Guidelines

NEW - IN PROGRESS
**Portal Hypertensive Bleeding - Guideline**
Juan Gonzalez Abraldes MD, PhD

NEW - IN PROGRESS
**Acute Kidney Injury in Cirrhosis - Guideline**
Florence Wong, MD, FACG

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# Refractory Ascites

- Role of albumin, primary prophylaxis of SBP, TIPS, catheters, alfapump

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# Ascites in Cirrhosis



According to Amount of Fluid Accumulation

| | | |
|---|---|---|
| Grade 1. Mild ascites | Only detected by ultrasound | Responsive ascites |
| Grade 2. Moderate ascites | Moderate symmetric distension of abdomen | Recurrent ascites |
| Grade 3. Large or gross ascites | Marked distension of the abdomen | Refractory Ascites |

HEPATOLOGY, VOL. 74, NO. 2, 2021

**Diuretic-resistant ascites**
- Ascites that cannot be mobilized
- Early recurrence of which cannot be prevented

Because of the lack of response to dietary sodium restriction and maximal doses of diuretics

**Diuretic-intractable ascites**
- Ascites that cannot be mobilized
- Early recurrence that cannot be prevented

Because of the development of diuretic-induced complications* that precludes the use of effective doses of diuretics

**Fails sodium restriction**
- 88 mmol or 2,000 mg/day

**Fails maximum doses of diuretics**
- Spironolactone 400 mg/day or amiloride 30 mg/day
- Furosemide 160 mg/day

Both for at least 1 week

**Lack of treatment response**
- Mean weight loss of <0.8 Kg over 4 days
- Urinary sodium less than sodium intake

**Early recurrence of ascites**
- Reappearance of grade 2 or grade 3 ascites within 4 weeks of initial mobilization

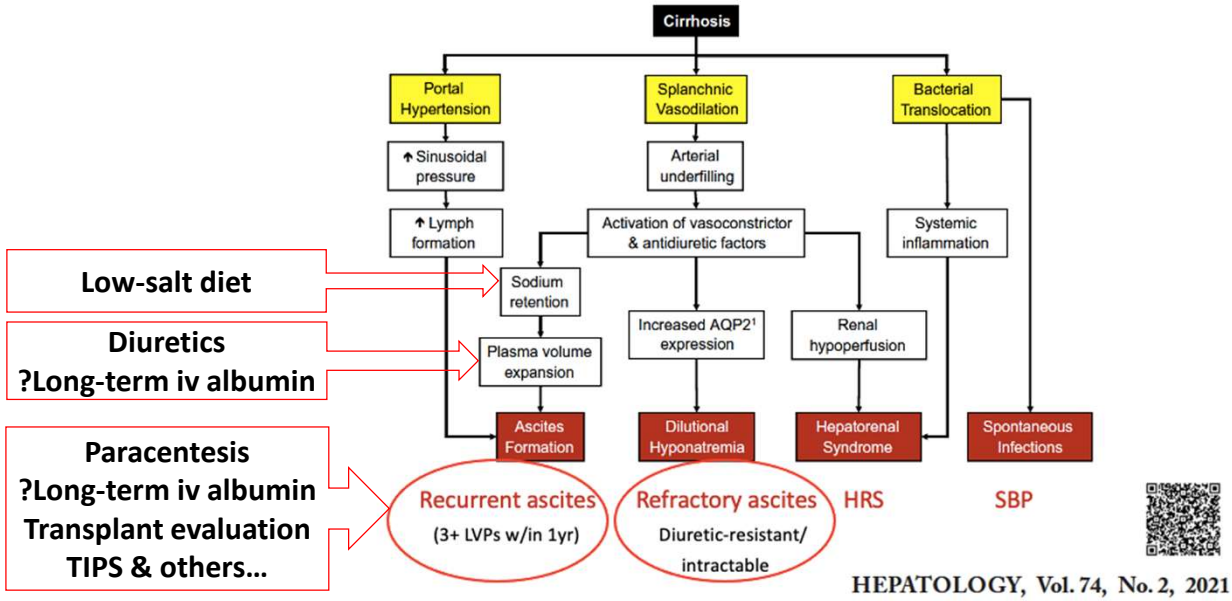
***Diuretic-induced complications**
- Renal impairment: increase in serum creatinine by >100% to a value >2.0 mg/dL
- Hyponatremia with a decrease of >10 mmol/L or an absolute value of <125 mmol/L
- Hypo- or hyperkalemia of <3 mmol/L or >6 mmol/L
- Hepatic encephalopathy

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# Ascites Management




HEPATOLOGY, Vol. 74, No. 2, 2021

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# Long-Term Albumin Infusion for RA: Improved survival and hospitalizations

- 45 patients
- Not randomized
- 20 g albumin, 2x/week
- Compared to SOC

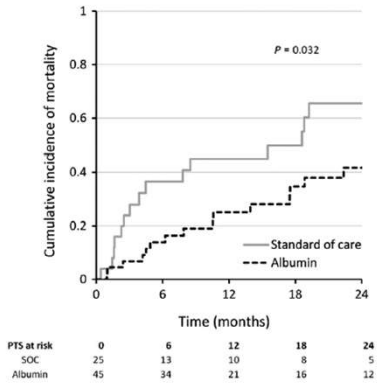



**FIGURE 1** In patients with cirrhosis and refractory ascites, the cumulative incidence of 24-mo mortality was significantly reduced by long-term administration of albumin compared to treatment according to standard of care

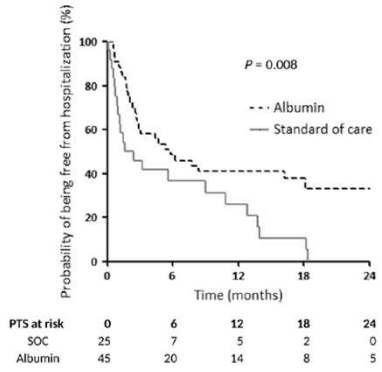


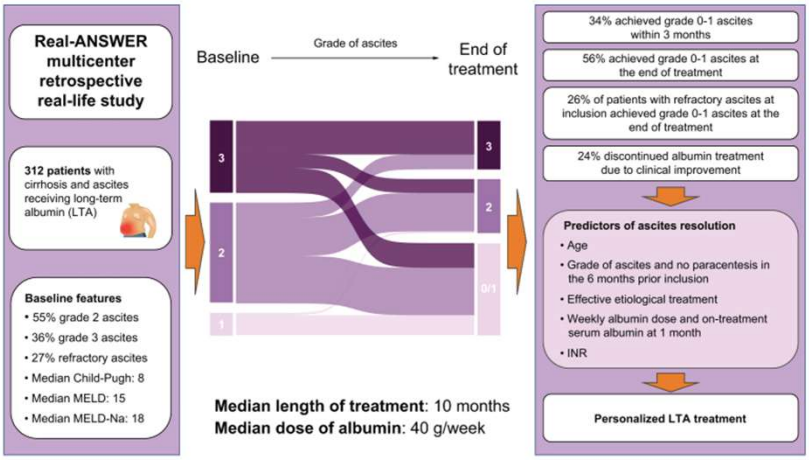

**FIGURE 2** In patients with cirrhosis and refractory ascites, long-term administration of albumin significantly improved the 24-mo probability of being free from emergent hospitalizations

Di Pascoli, Liver Int. 2019 Jan;39(1):98-105.

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# Long-Term Albumin Infusion for RA

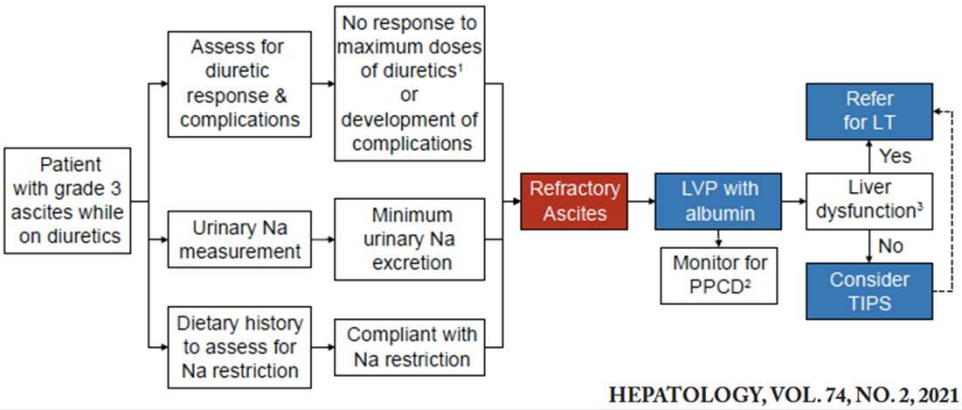



Pompili, JHEP Rep. 2024 Sep 17;6(12):101221.

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# Management of Refractory Ascites

- Why is it important?
- Affects 5-10% of patients with cirrhosis/ascites → 6-month survival of 50%




HEPATOLOGY, VOL. 74, NO. 2, 2021

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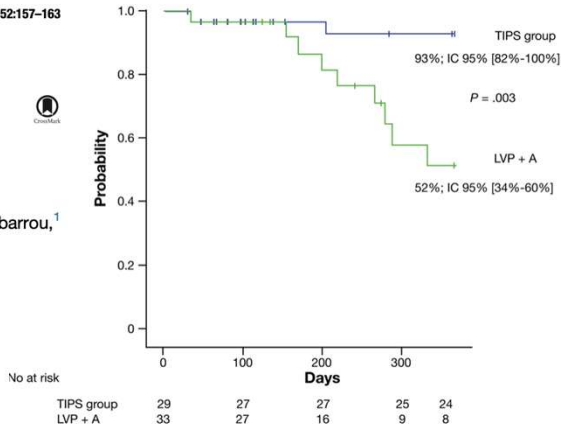


# Transjugular Intrahepatic Portosystemic Shunt for RA

Gastroenterology 2017;152:157–163

**Transjugular Intrahepatic Portosystemic Shunts With Covered Stents Increase Transplant-Free Survival of Patients With Cirrhosis and Recurrent Ascites**

Christophe Bureau,[1,2] Dominique Thabut,[3] Frédéric Oberti,[4] Sébastien Dharancy,[5] Nicolas Carbonell,[6] Antoine Bouvier,[4] Philippe Mathurin,[5] Philippe Otal,[2,7] Pauline Cabarrou,[1] Jean Marie Péron,[1,2] and Jean Pierre Vinel[1,2]




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# Transjugular Intrahepatic Portosystemic Shunt (TIPS)

## Would my patient benefit from TIPS?

**Indications:**
- ✓ Ascites or hepatohydrothorax which are
  - Recurrent: 3 or more procedures within 1 year
  - Refractory: not controlled despite maximum possible dose of diuretics (or dose limited by complications)
- ✓ Pre-emptive or rescue or salvage TIPS for variceal bleeding
- ✓ Less common: portal vein thrombosis, Budd-Chiari syndrome, portal hypertensive gastropathy

**Contraindications:**
- ❖ Congestive heart failure, severe valvular heart disease, moderate-severe pulmonary hypertension
- ❖ Sepsis, anatomical barriers (cyst, tumor, biliary obstruction)
- ❖ Refractory hepatic encephalopathy, severe liver failure if not transplant candidate (MELD>30, CTP score >13)

**Investigations required prior to TIPS:**
- ❑ Labs to assess MELD/CTP score, renal function, infection
- ❑ Imaging to evaluate vascular patency and liver lesions
- ❑ Echocardiogram

## DISCUSS possible complications from TIPS

- ➢ Immediate postprocedure complications (i.e. bleeding)
- ➢ Overt hepatic encephalopathy requiring medications and driving limitations
- ➢ Worsening liver function
- ➢ Worsening heart function

## TIPS procedure

**Ideal patient:**
- ✓ Age <65, MELD <15, no encephalopathy
- ✓ Normal cardiac and renal function, no infection
- ✓ No portal vein thrombosis, liver cancer or anatomical barriers

**Ideal setting**
- ✓ Experienced interventional radiology group
- ✓ Multidisciplinary approach – hepatology, anesthesiology, consultants (cardiology, pulmonary, nephrology, hematology)

**Ideal stent**
- ✓ ePFTE-covered stent, controlled expansion (initial 6-8 mm)

## Post TIPS follow up

**Acute post-procedure management:**
- Overnight observation
- No routine need for antibiotics or blood products
- Labs post procedure: CBC, Chem 7, LFTs, PT/INR
- Discharge meds: home diuretics dose, lactulose prn; stop betablocker if TIPS gradient >12

**Long-term management:**
- Clinical assessment of encephalopathy, hepatic/cardiac complications
- Early TIPS venogram (w/in 1-2 months) in patients who may need reintervention (progressive dilatation for ascites; PVT)
- Echocardiogram at 3 months if high-risk for cardiac dysfunction
- Surveillance ultrasound q6 months if TIPS for variceal bleeding
- No need for EGDs/beta-blocker if patent TIPS with gradient >12 mm Hg

Veterans Affairs National Gastroenterology and Hepatology Program

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# When TIPS Not An Option: Percutaneous Drain

Received: 9 February 2022 | First decision: 2 March 2022 | Accepted: 19 May 2022
DOI: 10.1111/apt.17066

Alimentary Pharmacology & Therapeutics WILEY

## Home-based, tunnelled peritoneal drainage system as an alternative treatment option for patients with refractory ascites

Tammo L. Tergast[1] | Marie Griemsmann[1] | Lena Stockhoff[1] | Benjamin Heidrich[1] | Hendrik Schirmer[2] | Henrike Lenzen[1] | Heiner Wedemeyer[1,3] | Markus Cornberg[1,3,4] | Elmar Jaeckel[1] | Benjamin Maasoumy[1,3]

[1]Department of Gastroenterology, Hepatology and Endocrinology, Hannover Medical School, Hannover, Germany
[2]German Centre for Higher Education Research and Science Studies (DZHW), Hannover, Germany
[3]German Centre for Infection Research (Deutsches Zentrum für Infektionsforschung, DZIF), Partner Site Hannover-Braunschweig, Hannover, Germany
[4]Centre for Individualised Infection Medicine (CiiM), Hannover, Germany

**Correspondence**
Benjamin Maasoumy, Hannover Medical School, Carl-Neuberg-Str. 1, 30625 Hannover, Germany.
Email: maasoumy.benjamin@mh-hannover.de

**Summary**

**Background:** Onset of refractory ascites is the hallmark of end-stage liver disease. If liver transplantation (LTx) is not available and contraindications for a transjugular portosystemic shunt (TIPS) are present, repeated paracentesis remains the standard of care (SOC). Home-based, tunnelled peritoneal catheters (PeCa) have been suggested as an alternative treatment option. However, data on patients with cirrhosis are scarce.

**Aim:** To evaluate the safety of PeCa in these patients compared to SOC.

**Methods:** Overall, 223 patients with cirrhosis, a contraindication for TIPS and refractory ascites were included in this retrospective study. PeCa implant was performed in 152 patients, whereas 71 were treated with SOC. Analysed end points included device explant-free survival, mortality, acute kidney injury (AKI) and hyponatraemia. In the second approach, propensity score matching (PPSM) was performed to adjust for confounding factors.

PeCa (152) vs SOC (71)

PeCa at 90 days:
Median time to explant: 74 days

Lower mortality, similar peritonitis rate
Higher risk of AKI, hypoNa, hospitalization

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Haddadin *et al. Trials (2025) 26:193*
https://doi.org/10.1186/s13063-025-08873-z

Trials

STUDY PROTOCOL Open Access

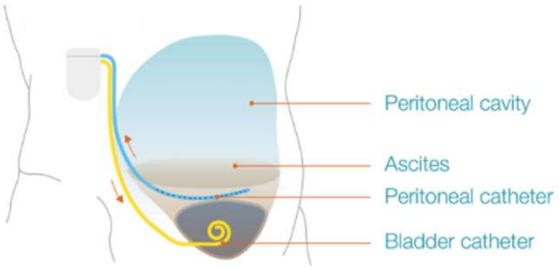
# Palliative long-term abdominal drains vs. large volume paracentesis for refractory ascites secondary to cirrhosis: protocol for a definitive randomised controlled trial (REDUCe2 study)

Yazan Haddadin[1,2], Vasso Anagnostopoulou[3], Stephen Bremner[3], Helena Harder[4], Rachel Starkings[4], Debbie Lambert[5], Alison Porges[5], Nicky Perry[5], Wendy Wood[5], Amy Arbon[5], Heather Gage[6], Matthew Glover[6], Lucia Macken[1,2], Malcolm Johnston[7], Bhaskar Ganai[7], Dhiraj Joshi[7], Ben Hudson[8], Claire Butler[9], Alison Richardson[10,11], Mark Wright[10,11], Wendy Prentice[12], Alastair O'Brien[13], Joan Bedlington[14], Shani Steer[15], Tom Gaskin[15] and Sumita Verma[1,2*]

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# When TIPS Not An Option: Alfapump




- **Elimination/decrease requirement of LVP**
- **Increased quality of life**
- **Improved nutritional status**
- **Safety events: AKI, infections (SBP, UTI), reinterventions (catheter or pump malfunction), explants (cellulitis)**

**Effects of alfapump™ system on kidney and circulatory function in patients with cirrhosis and refractory ascites**

Elsa Solà, Santiago Sanchez-Cabús, Ezequiel Rodriguez, Chiara Elia, Raquel Cela, Rebeca Moreira, Elisa Pose, Jordi Sánchez-Delgado, Nuria Cañete, Manuel Morales-Ruiz, Francisco Campos, Jaume Balust, Mónica Guevara, Juan Carlos García-Valdecasas, Pere Ginès

First published: 24 April 2017 Full publication history

Alfapump® system *vs.* large volume paracentesis for refractory ascites: A multicenter randomized controlled study☆

Christophe Bureau[†], Danielle Adebayo[†], Mael Chalret de Rieu, Laure Elkrief, Dominique Valla, Markus Peck-Radosavljevic, Anne McCune, Victor Vargas, Macarena Simon-Talero, Juan Cordoba[‡], Paolo Angeli, Silvia Rosi, Stewart MacDonald, Massimo Malago, Maria Stepanova, Zobair M. Younossi, Claudia Trepte, Randall Watson, Oleg Borisenko, Sun Sun, Neil Inhaber, Rajiv Jalan

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# The Effects of Alfapump on Ascites Control and Quality of Life in Patients With Cirrhosis and Recurrent or Refractory Ascites

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Florence Wong, MD, FACG[1], Hugo E. Vagas, MD, FACG[2], K. Rajender Reddy, MD, FACG[3], Mangesh R. Pagadala, MD[4], Christine Pocha, MD[5], Vinay Sundaram, MD[6-10], Jasmohan S. Bajaj, MD, MS, FACG[7], Eran Shlomovitz, MD[1], Emily Bendel, MD[8], Jeroen Capel, MSc[9] and Patrick S. Kamath, MD[8] The POSEIDON Study Group

*Am J Gastroenterol 2025;120:2291–2301.*

INTRODUCTION: **The alfapump system has been shown to be a possible alternative to repeat therapeutic paracentesis (TP) in selected patients with refractory ascites (RA). The objective of this study was to assess the safety and efficacy of alfapump on ascites control and quality of life in these patients.**

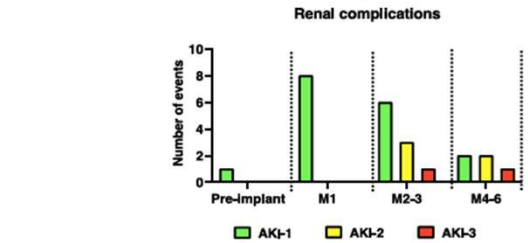
METHODS: **Patients with cirrhosis and RA requiring ≥2 TPs 30 days prior were enrolled and followed for 24 months postimplant. Primary efficacy end point assessed at 6 months was reduction in paracentesis requirement; safety end point was device-related adverse events resulting in intervention, explant, or death.**

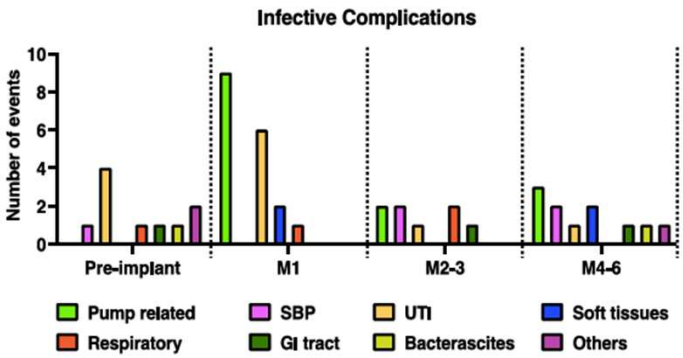
RESULTS: **Forty patients with RA (mean Model of End-stage Liver Disease-Sodium: 15 ± 4) received an alfapump. TP requirement was decreased from 3.2 ± 1.5 sessions per month preimplant to 0.2 ± 0.6 sessions per month at 6 months postimplant ($P < 0.001$), with 77% of patients having ≥50% reduction. Six pumps (15%) were explanted within 6 months due to device-related adverse events, 3 (7.5%) due to pump site skin erosion, and 3 (7.5%) due to bladder discomfort. Twenty-four renal events occurred in the 0–6 month postimplant period; 16 cases were readily reversible stage 1 acute kidney injury. Ascites-related symptoms assessed with an Ascites Q score improved from 51.0 ± 19.3 preimplant to 32.2 ± 21.9 at 6 months postimplant ($P < 0.001$). Physical but not mental components of Short Form 36 improved ($P < 0.001$). The 5 deaths within 6 months postimplant were not directly related to the device or alfapump therapy.**

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# Safety

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- 24 renal events: 16 AKI stage 1
- 6 pumps explanted within 6 months
  - 3 - pump site skin erosion
  - 3 - bladder discomfort

*Am J Gastroenterol 2025;120:2291–2301.*

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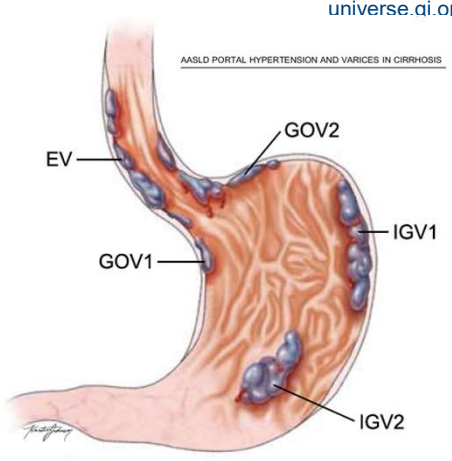
# Summary: Refractory Ascites

- Evolving role of long-term albumin
- NO long-term primary prophylaxis of SBP
- TIPS works! Patient selection and follow up are essential
- Alternatives to TIPS: percutaneous catheters, alfapump (awaiting more data on patient selection, safety/benefits)

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# Variceal Bleeding



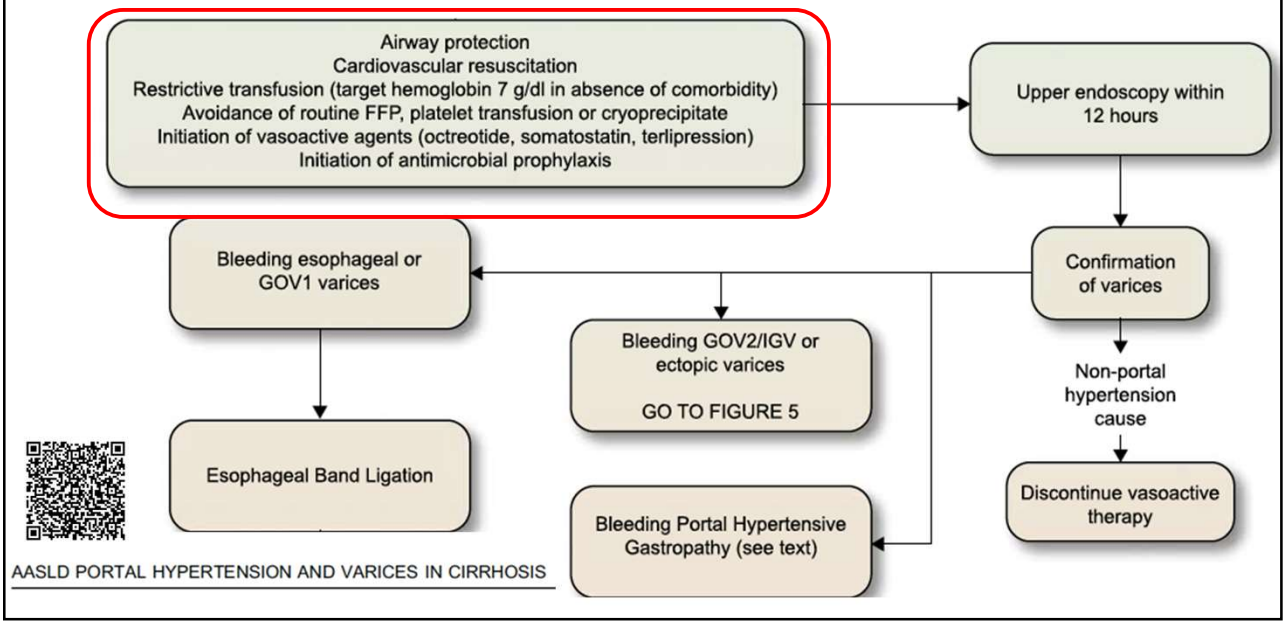

- Medical and endoscopic management, role of interventional radiology procedures

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## Acute GI Bleed in Cirrhosis




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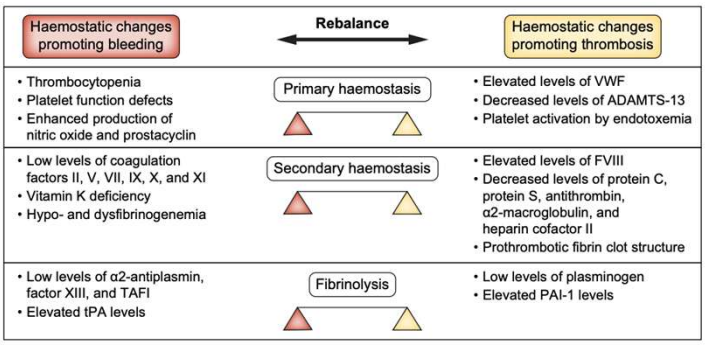
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## Do not "fix" INR/platelets

Hemostatic changes in cirrhosis are **NOT adequately captured by traditional laboratory measures** such as PT, PTT, and platelet count

INR reflects liver synthetic dysfunction, not bleeding risk

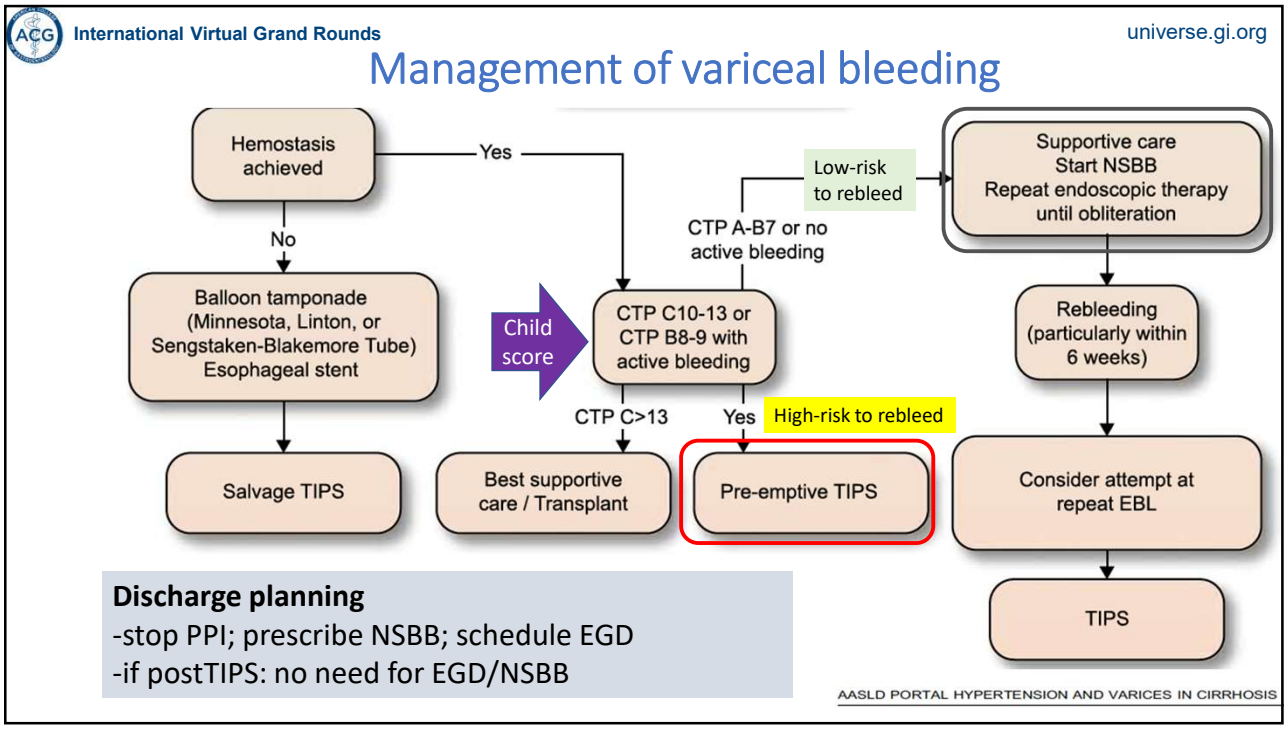
Overtransfusion can increase rebleeding risk



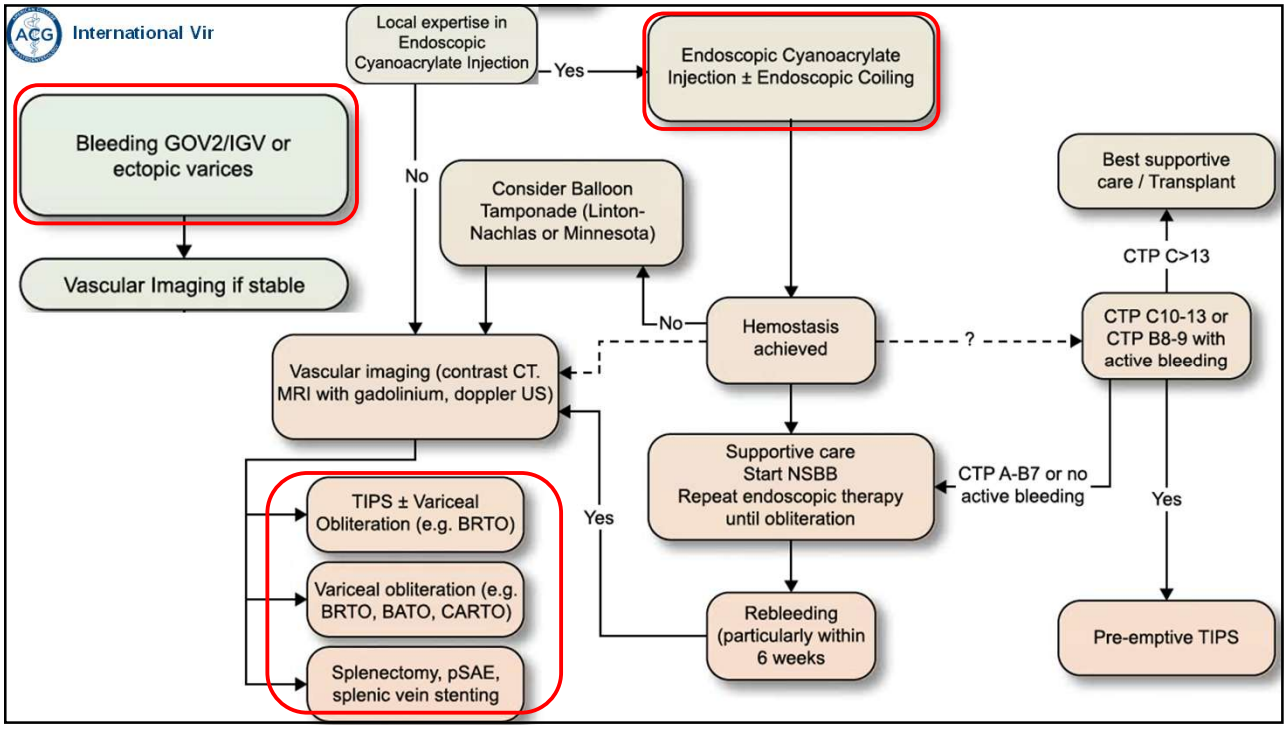

Lisman, J Hep, 2022

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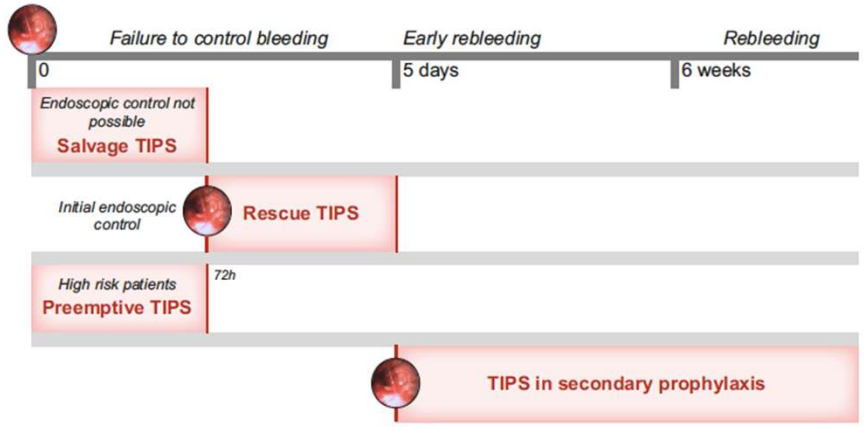

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Management of variceal bleeding
Hemostasis achieved
Yes
No
Balloon tamponade (Minnesota, Linton, or Sengstaken-Blakemore Tube) Esophageal stent
Salvage TIPS
Child score
CTP C10-13 or CTP B8-9 with active bleeding
CTP A-B7 or no active bleeding
Low-risk to rebleed
Supportive care Start NSBB Repeat endoscopic therapy until obliteration
Rebleeding (particularly within 6 weeks)
CTP C>13
Yes
High-risk to rebleed
Best supportive care / Transplant
Pre-emptive TIPS
Consider attempt at repeat EBL
TIPS
Discharge planning
-stop PPI; prescribe NSBB; schedule EGD
-if postTIPS: no need for EGD/NSBB
AASLD PORTAL HYPERTENSION AND VARICES IN CIRRHOSIS

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International Vir
Local expertise in Endoscopic Cyanoacrylate Injection
Yes
Endoscopic Cyanoacrylate Injection ± Endoscopic Coiling
Bleeding GOV2/IGV or ectopic varices
Vascular Imaging if stable
No
Consider Balloon Tamponade (Linton-Nachlas or Minnesota)
Best supportive care / Transplant
CTP C>13
No
Hemostasis achieved
?
CTP C10-13 or CTP B8-9 with active bleeding
Vascular imaging (contrast CT. MRI with gadolinium, doppler US)
Supportive care Start NSBB Repeat endoscopic therapy until obliteration
CTP A-B7 or no active bleeding
Yes
TIPS ± Variceal Obliteration (e.g. BRTO)
Variceal obliteration (e.g. BRTO, BATO, CARTO)
Splenectomy, pSAE, splenic vein stenting
Yes
Rebleeding (particularly within 6 weeks
Pre-emptive TIPS

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## TIPS indications for variceal bleeding




Journal of Hepatology, **July 2025**. vol. 83 | 177–210

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## Summary: Variceal Bleeding

Multidisciplinary approach is required for optimal management

- MICU: resuscitation/supportive therapy, vasoactive agents
- GI/hepatology: endoscopic treatment, consideration of TIPS
- Interventional radiology
- Transplant surgery

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# Thank you!

Simona.Jakab@yale.edu

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# Frailty and Sarcopenia in Advanced Cirrhosis





**Prof. Lubna Kamani, MRCP, FRCP, FCPS, RCP SCE Gastrocentrology**

Director GI residency program,

Liaquat National Hospital, Karachi, Pakistan.

President Pak GI & Liver Disease Society.

Co-Chair women in hepatology forum, SAASL.

Chair women's committee MAIDEN-APASL.

Member WGO guideline & IBD committee.

Women Disruptor award winner, ACG 2023, Vancouver.

ACG SCOPY award winner 2025, Phoenix.

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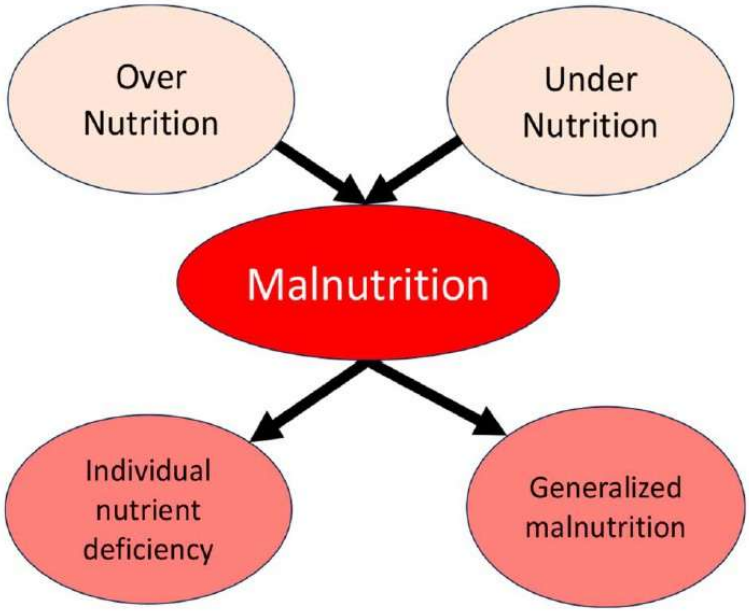



**Figure 1.** Pathways and presentations of malnutrition.

Singal AK, *et al*. AJG 2025.

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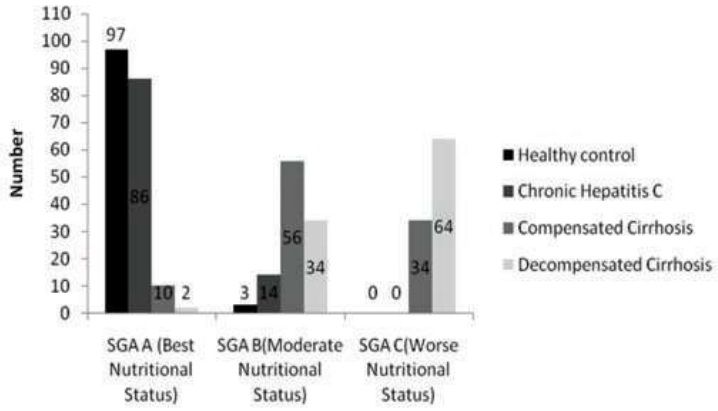
# Malnutrition and sarcopenia in cirrhosis

- Malnutrition is a frequent burden in cirrhosis
  - In 20% of patients with compensated cirrhosis
  - In >50% of patients with decompensated cirrhosis[1]
- Progression of malnutrition is associated with progression of liver failure
  - May be less evident in compensated cirrhosis
  - Easily recognizable in patients with decompensated cirrhosis
- Both adipose tissue and muscle tissue can be depleted
  - In female patients, depletion of fat deposits is more frequent
  - In men, loss of muscle tissue is more rapid[1,2]

1. Italian multicentre cooperative project on nutrition in liver cirrhosis. J Hepatol 1994;21:317–25;
2. Caregaro L, et al. Am J Clin Nutr 1996;63:602–9
EASL CPG nutrition in chronic liver disease. J Hepatol 2018; doi: 10.1016/j.jhep.2018.06.024

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# Nutrition Status in Cirrhosis




Ismail F, Khan R, Kamani L et al; J CPSP 2012

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# Perception and Knowledge About Dietary Intake in Patients with Liver Cirrhosis and its Relationship with the Level of Education

Demographic data of dietary perception of the patients with cirrhosis in educated and uneducated group.

| Characteristics | Uneducated (n = 45) | Educated (n = 45) | p-value |
|---|---|---|---|
| Age in years with SD | 50.78 ± 10.76 | 47.64 ± 10.44 | 0.16 |
| Gender | | | |
| Male | 20 (44.4) | 32 (71.1) | 0.01 |
| Female | 25 (55.6) | 13 (28.9) | |
| BMI kg/m² | 23.17 ± 4.64 | 22.37 ± 4.05 | 0.26 |
| Diagnosis | | | |
| Hepatitis B Cirrhosis | 03 (6.7) | 04 (8.9) | |
| Hepatitis C Cirrhosis | 38 (84.4) | 34 (75.6) | 0.08 |
| B+C Cirrhosis | 04 (8.9) | 04 (8.9) | |
| B+D Cirrhosis | 00 | 03 (6.7) | |
| Child Pugh Class | | | |
| A | 30 (66.7) | 24 (53.3) | 0.19 |
| B | 15 (33.3) | 21 (46.7) | |
| C | – | – | – |
| Socioeconomic class | | | |
| Upper class | 03 (6.7) | 04 (8.9) | |
| Middle class | 14 (31.1) | 34 (75.6) | < 0.001 |
| Lower class | 28 (62.2) | 07 (15.6) | |
| Occupation | | | |
| Business | 02 (4.4) | 09 (20) | |
| Housewife | 25 (55.6) | 10 (22.2) | |
| Private service | 10 (22.2) | 14 (31.1) | 0.006 |
| Government employee | 01 (2.2) | 07 (15.6) | |
| Unemployed | 05 (11.1) | 04 (8.9) | |
| Farmer | 02 (4.4) | 01 (2.2) | |
| Diet | | | |
| Diet restricted | 35 (77.8) | 31 (68.9) | 0.34 |
| Diet not restricted | 10 (22.2) | 14 (31.1) | |

*SD = Standard deviation; BMI = Body mass index*

Ismail F, Khan R, Kamani L et al; J CPSP 2012

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# What is frailty and Sarcopenia?

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## Frailty

- **Frailty is loss of physical, cognitive, and physiological reserve leading to a vulnerable state and it is considered a form of nutrition-related disorder**
- Person who is unable to complete 6 min walk test, has significant hazard ratio of mortality 3.26 (CI 1.38–7.69) compared to those who can do it.
- It is noninvasive test and can be done serially in out-patient settings and waiting for consultation.

**Martin-Ponce E, ; Sci Rep 2014;**



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# Sarcopenia



- It is a physical state defined by the loss of functional skeletal muscle mass.
  - Physiological- age related
  - Pathological- abnormal metabolism- cirrhosis
- Results in marked physical limitation, weakness, and frailty, which results in an increased risk of disability, morbidity, and mortality.
- Patients with sarcopenia has ↑ hospital stay, ↑ increased susceptibility to infection and ↓ survival.

Studenski SA et al. The FNIH sarcopenia project: rationale, study description, conference recommendations, and final estimates. J Gerontol A Biol Sci Med Sci. 2014

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universe.gi.org

## Assessment Strategy: Phenotype Matrix

| Frailty | Sarcopenia |
|---|---|
| **What it Measures:** Muscle Contractile Function | **What it Measures:** Muscle Mass / Quantity |
| **Ideal Use-Case:** Ambulatory settings, longitudinal tracking, evaluating quality of life. | **Ideal Use-Case:** Acute/critically ill patients (cannot perform physical tests), very young children/pediatrics. |
| **Primary Method:** Performance-based tests (grip, chair stands). | **Primary Method:** Cross-sectional imaging (CT L3 SMI). |

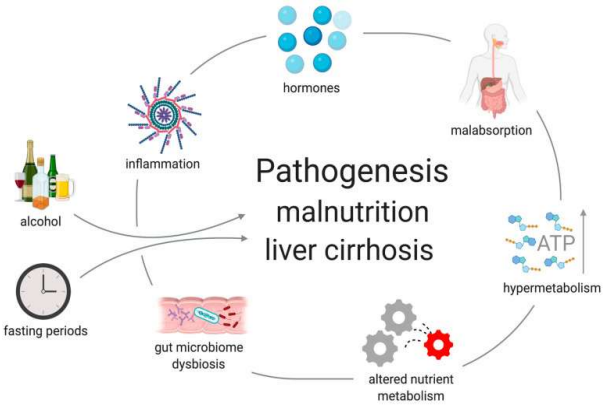
**Guidance Tracker**
**Guidance Statements 6a & 6b:** Frailty testing is optimal for ambulatory longitudinal assessment. Sarcopenia testing is optimal when physical admiinistration is unfeasible (e.g., acute severe illness).

NotebookLM

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# Cirrhosis is a condition of altered metabolism

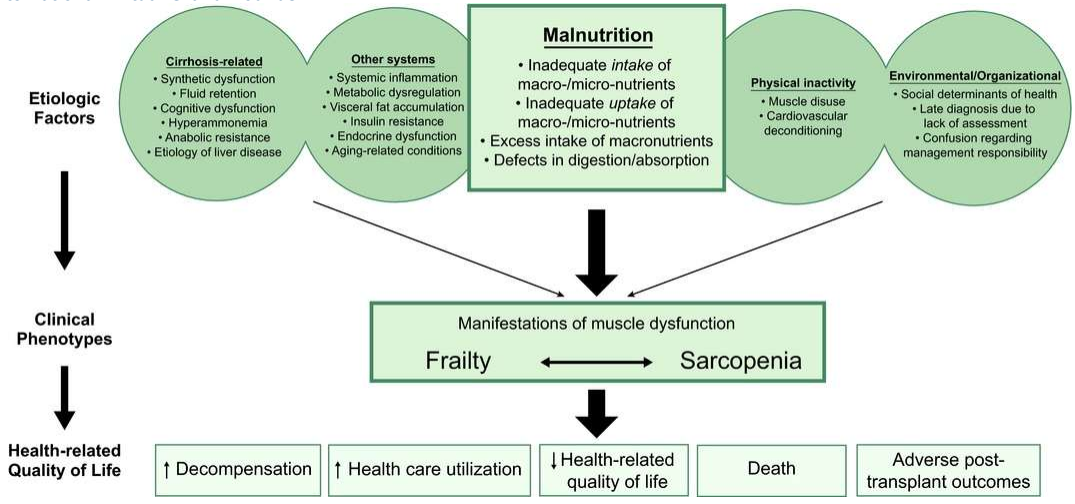
- Muller and others discovered increased energy consumption in 34% of patients with liver cirrhosis.
- This is related with increase pro-inflammatory cytokines and disorders of carbohydrate, protein and lipid metabolism.
- Modified carbohydrate metabolism leads to a decrease in glycogen synthesis in the liver, which leads to increased gluconeogenesis due to the breakdown of proteins and fats.
- Study patients with liver cirrhosis showed that during an overnight fast, 58% of energy came from fat oxidation, whereas healthy controls got 55% of their energy from carbohydrates.




.CaregaroL, et al. Am JClin Nutr 1996;63:602–9 EASLCPG nutrition in chronic liver disease. JHepatol2018;doi: 10.1016/j.jhep.2018.06.024

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Factors contributing to malnutrition, frailty, and sarcopenia and the relationship between these three constructs. These factors can also contribute directly to frailty and sarcopenia independently of malnutrition

AASLD practice guidelines. Hepatology 2021

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# Mechanism

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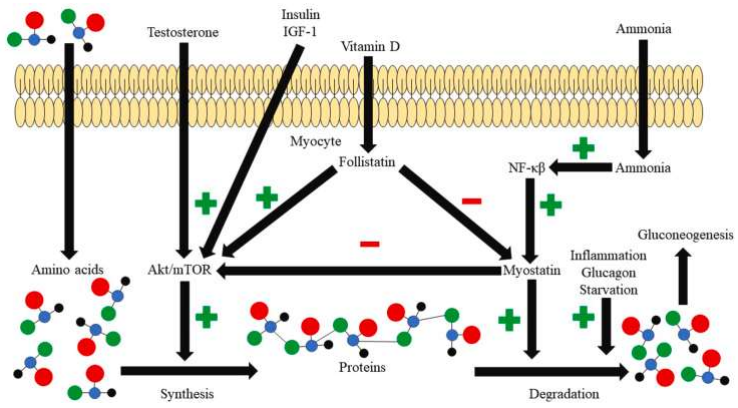
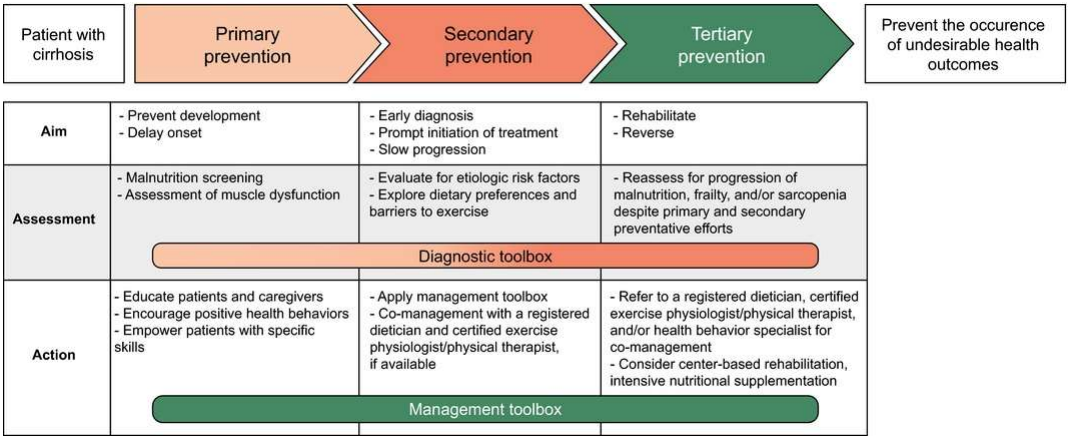



Illustration demonstrating stimuli promoting protein synthesis (testosterone, insulin, IGF-1, vitamin D, follistatin) via the Akt/mTOR pathway and protein breakdown (ammonia, myostatin glucagon, starvation, inflammation) mediated by the proteosome-ubiquitin pathway. IGF-1, insulin-like growth factor 1; mTOR, mammalian target of rapamycin; NF-κβ, nuclear factor κβ.

Warner &, Satapathy. Sarcopenia in the Cirrhotic Patient: Current Knowledge and Future Directions. J Clin Exp Hepatol. 2023

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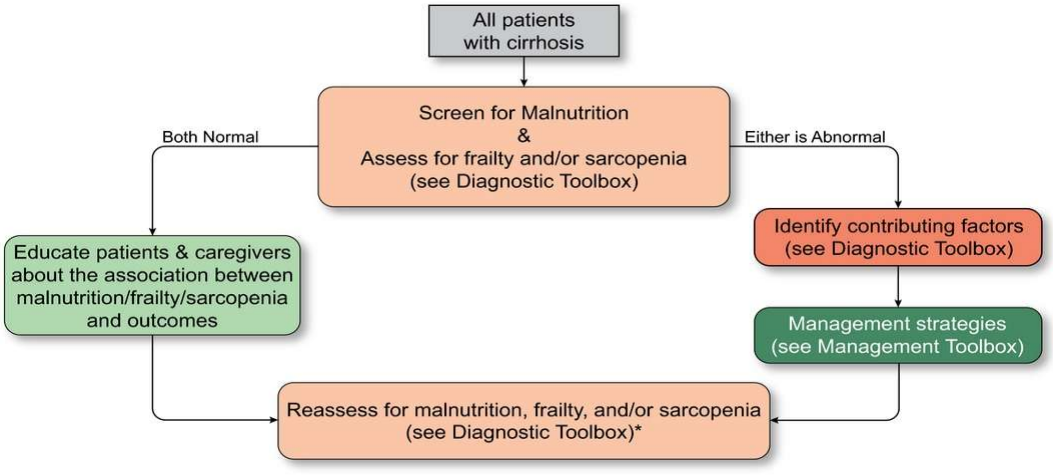



The three levels of disease prevention and health promotion as applied to management of malnutrition, frailty, and sarcopenia in patients with cirrhosis.

AASLD practice guidelines. Hepatology 2021

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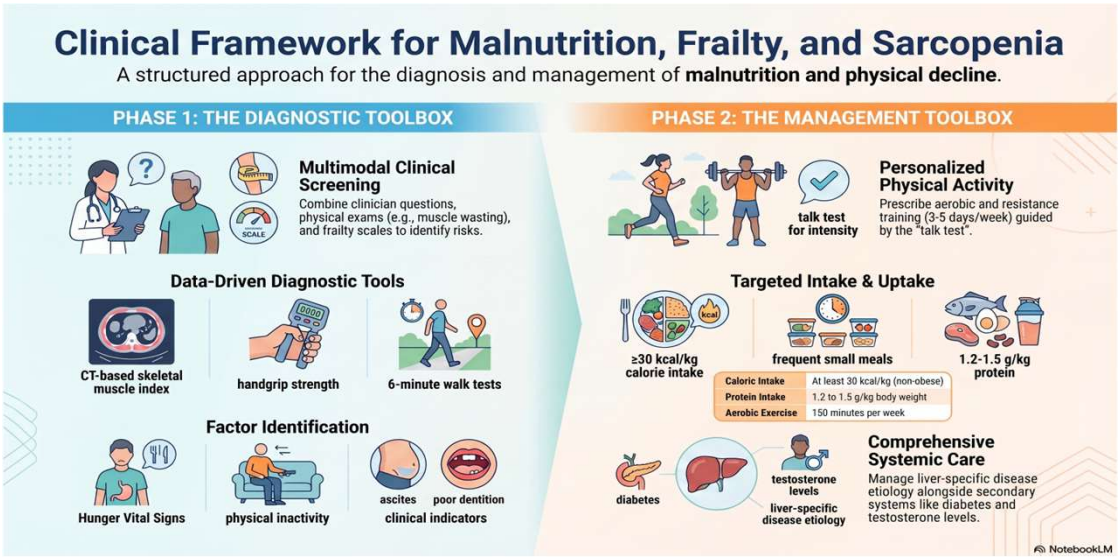





Algorithm for screening, assessment, and management of malnutrition, frailty, and sarcopenia in patients with cirrhosis.

AASLD practice guidelines. Hepatology 2021

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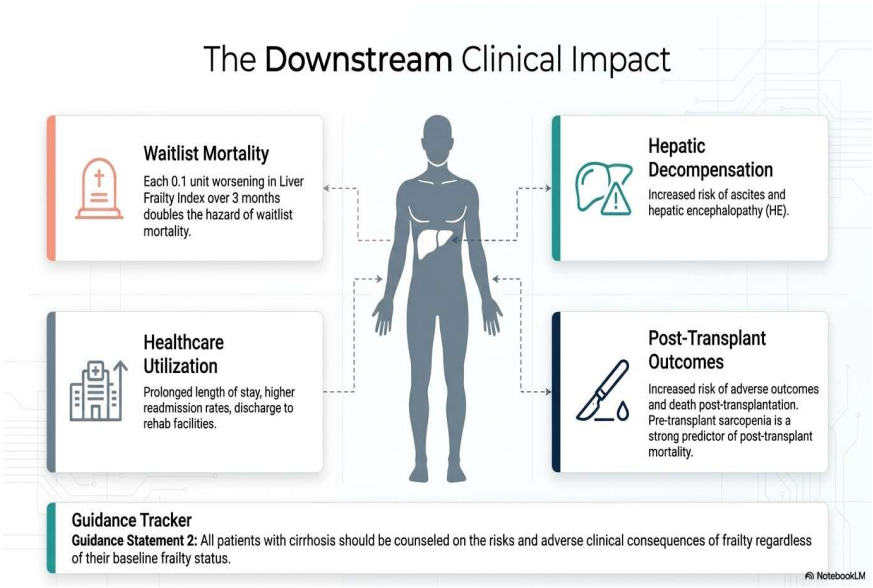



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Importance?

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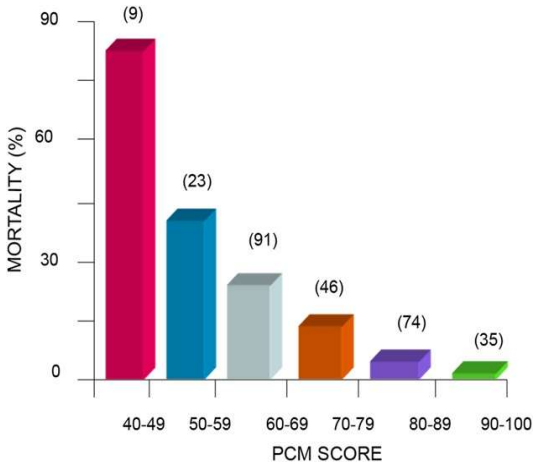

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# INFLUENCE ON PROGNOSIS

Malnutrition can have a major impact on the prognosis of patients with liver disease.
Malnutrition may influence both complications of liver disease and overall mortality.

**Key concept**
The presence of malnutrition in hospitalized patients with cirrhosis is associated with a higher risk of mortality (in-hospital, on the waiting list, and after transplantation), length of hospital stay, complications, and infections compared with patients without malnutrition.



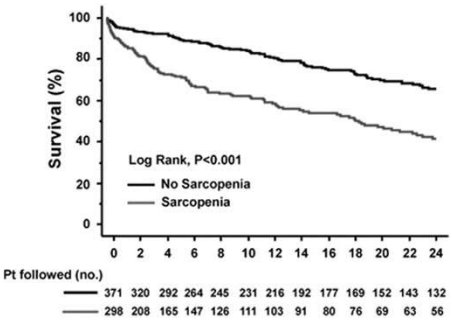

Grade protein- caloric malnutrition (PCM) shows that protein-caloric insufficiency is associated with mortality (ideal score is 100). Numbers in brackets indicate the number of patients in each group.

The American Journal of Gastroenterology 120(5):p 950-972, May 2025. | DOI: 10.14309/ajg.0000000000003379

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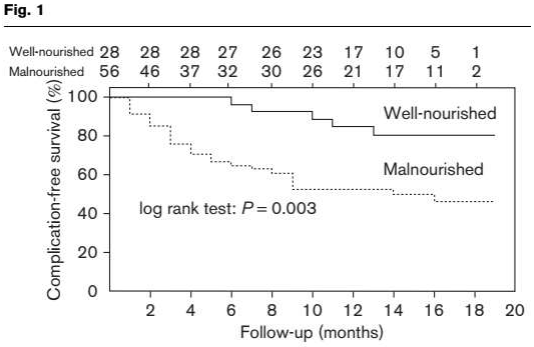
## Survival and complications of cirrhosis after loss of muscle mass (sarcopenia)

3 months probability of survival compiled at sarcopenia 80% and 93% without sarcopenia




Montano-LozaAJ, Duarte-RojoA, Meza-Junco J, et al. Inclusion of sarcopeniawithin MELD (MELDSarcopenia) and the prediction of mortality in patients with cirrhosis.Clin Transl Gastroenterol. 2015;6:e102.

Development of complications of cirrhosis with insufficient protein intake




**Protein energy malnutrition predicts complications in liver cirrhosis**
Ellen J. Huisman, Evelien J. Trip, Peter D. Siersema, Bart van Hoek and Karel J. van Erpecum

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## Indicators of Muscle Integrity

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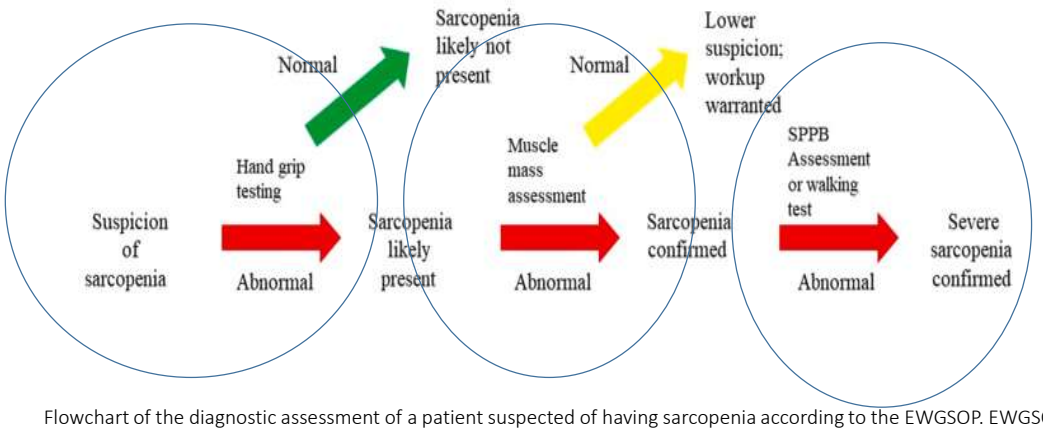
# Divided in 3 categories

- Strength
- Quantity/Mass
- Function

Cruz-Jentoft AJ, Bahat G, Bauer J, et al. Sarcopenia: revised European consensus on definition and diagnosis. Age Ageing. 2019;

57






Flowchart of the diagnostic assessment of a patient suspected of having sarcopenia according to the EWGSOP. EWGSOP, European Working Group on Sarcopenia in Older People; SPPB, Short Performance Physical Battery

Warner &, Satapathy. Sarcopenia in the Cirrhotic Patient: Current Knowledge and Future Directions. J Clin Exp Hepatol. 2023

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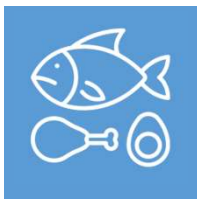
# Management

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## ACTIONABLE TIPS

For optimizing nutritional status in patients with chronic liver disease



PROTEIN



TIMING OF CALORIES



SUGAR & SALT



SUPPLEMENTS

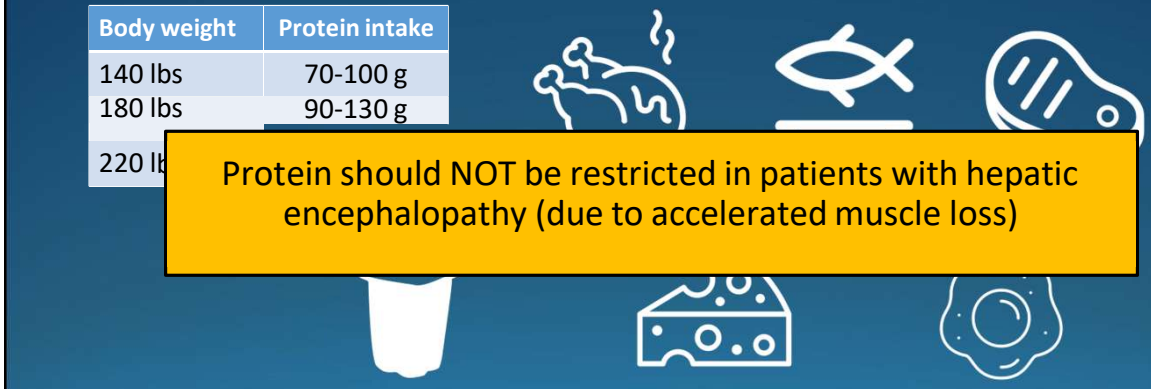
60

# PROTEIN

Recommended protein intake: 0.5-0.7 g / *pound* / day

| Body weight | Protein intake |
|---|---|
| 140 lbs | 70-100 g |
| 180 lbs | 90-130 g |
| 220 lb | |

Protein should NOT be restricted in patients with hepatic encephalopathy (due to accelerated muscle loss)



15-20 grams | 7-10 grams | 6 grams

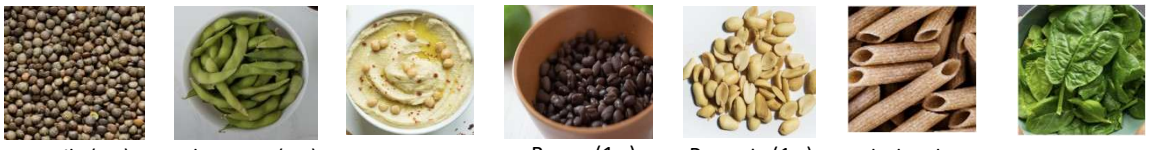
ACG 2025
October 24-29, Phoenix, AZ

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# PLANT-BASED PROTEIN (preferred)

- Encourage a diet enriched with vegetarian sources of protein
  - Some studies suggest improved nitrogen balance and better performance on cognitive testing



Lentils (1 c) 20 grams | Edamame (1 c) 20 grams | Hummus (1c) 20 grams | Beans (1 c) 15 grams | Peanuts (1 c) 7 grams | Whole wheat pasta (1 c) 7 grams | Spinach (1 c) 5 grams

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## PROTEIN : BRANCHED-CHAIN AMINO ACIDS (BCAAs)

- Leucine, isoleucine, valine are essential amino acids (cannot be synthesized by the body)
- Patients with cirrhosis have reduced levels of BCAA (relative to aromatic acids)
- BCAA supplementation in patients with cirrhosis improves HE
  - May reduce protein breakdown and improve muscle mass
- BCAA supplementation improves physical function

8. We recommend the use of branched chain amino acids (when available) in addition to standard-of-care treatment in patients with cirrhosis and HE (strong recommendation, moderate quality of evidence).

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## CALORIC INTAKE (INPATIENTS)

1. We suggest early administration of oral or enteral nutrition (EN) supplementation therapy in hospitalized patients with cirrhosis (conditional recommendation, low quality of evidence).



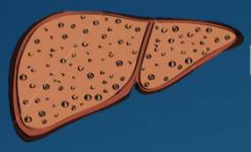
10 kcal / *pound* body weight per day

>22 kcal/kg body weight per day
In hospitalized patients with cirrhosis

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Optimal timing of energy intake

## LATE EVENING SNACK / NOCTURNAL FEEDS



↓gluconeo-genesis → ↑breakdown of skeletal muscle to meet amino acid needs → protein-energy malnutrition

Metabolic profile of a *patient with cirrhosis* after an **overnight fast** = Metabolic profile of a *healthy person* after **3 days starvation**

**Give before bedtime to "break the fast"**

Owen OE, J Clin Invest 1981.

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LATE EVENING SNACK:

## OPTIMAL COMPOSITION

**≥210 kcal Late Evening Snack**

Glucose solution

Rice Ball

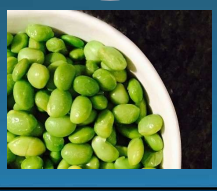
Regular food

BCAA-enriched supplement

Supplemental shake

*Snack ideas:*







Owen OE, J Clin Invest 1981. Chen J Gastro Hep 2019.

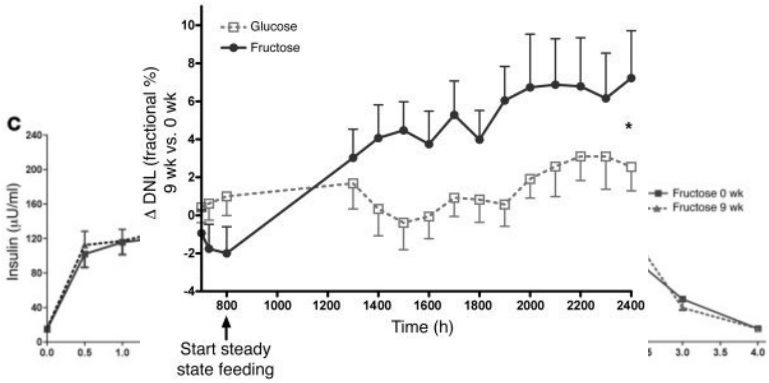
66

# 3 KEY CONCEPTS : FRUCTOSE & LIVER DISEASE

**Key concept #1**

High-fructose diets are potent inducers of hepatic *de novo* lipogenesis and insulin resistance

RCT of health volunteers
→ Given 25% extra calories through glucose vs fructose-sweetened beverages




Stanhope KL, *et al*. JCI 2009.

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# 3 KEY CONCEPTS : FRUCTOSE & LIVER DISEASE

**Key concept #1**

High-fructose diets are potent inducers of hepatic *de novo* lipogenesis and insulin resistance

**Key concept #2**

High fructose/sucrose containing diets are associated with chronic liver disease in a dose-dependent manner

**Key concept #3**

Low-fructose diets are recommended in all patients with chronic liver disease across the entire spectrum of liver disease severity.

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# HIGH-YIELD TIPS FOR REDUCING FRUCTOSE

| | % Daily Value* |
|---|---|
| **Total Fat** 8g | **10%** |
| Saturated Fat 1g | **5%** |
| *Trans* Fat 0g | |
| **Cholesterol** 0mg | **0%** |
| **Sodium** 160mg | **7%** |
| **Total Carbohydrate** 37g | **13%** |
| Dietary Fiber 4g | **14%** |
| Total Sugars 12g | |
| Includes 10g Added Sugars | **20%** |
| **Protein** 3g | |

Examples of high fructose foods








* CDC recommendation: Goal should be <10% of total calories (~50 grams per 2000 calorie diet)

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# DIETARY SODIUM RESTRICTION FOR ASCITES

Improved ascites control.




- Low palatability, low adherence
- May not be better when using diuretics
- Higher nutritional risk
- Accelerated muscle loss

5. In patients with cirrhosis and ascites who are managed with diuretic therapies, we cannot recommend for or against strict sodium restricted diets (Insufficient evidence, no recommendation).

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# SUPPLEMENTS

As recommended by the ACG

**Vitamin D**

1000 IU/d

"...supplementation may offer bone-related and liver-related health benefits"

**Vitamin E**

800 IU daily

"In patients with MASH without cirrhosis, we suggest treatment with natural vitamin E"

**Coffee**

≥2 cups per day

"...to reduce risk of hepatic fibrosis progression or HCC development"

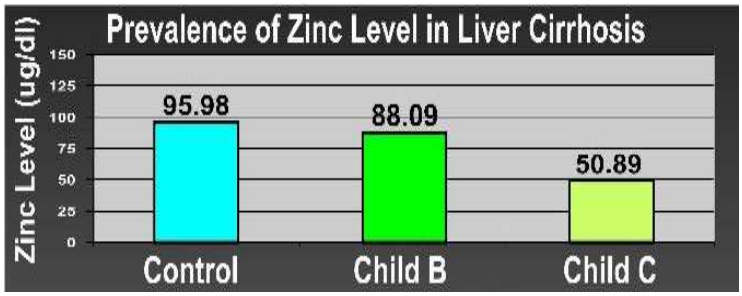
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Zinc level assessment in patients having Viral Cirrhosis

Lubna Kamani and Hafeezullah Shaikh

Pak J Med Sci. 2018 Mar-Apr; 34(2): 478–481




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# ACTIONABLE TIPS

For optimizing nutritional status in patients with chronic liver disease



## PROTEIN

- 0.5-0.7 g/pound body weight/day
- Plant-based protein preferred
- Consider BCAA



## TIMING OF CALORIES

- 10 kcal/pound body weight/day in inpatients
- ~210 kcal late evening snack



## SUGAR & SALT

- Reduce sugar, not necessarily salt



## SUPPLEMENTS

- Consider:

1) Vitamin D 1000 IU/d if deficient
2) Trial Vitamin E 800 IU/d for pts with MASH
3) ≥2 cup coffee per day for all

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https://doi.org/10.29309/TPMJ/2025.32.04.8919

The Professional Medical Journal
www.theprofesional.com
2025, Volume, 32 Issue, 04

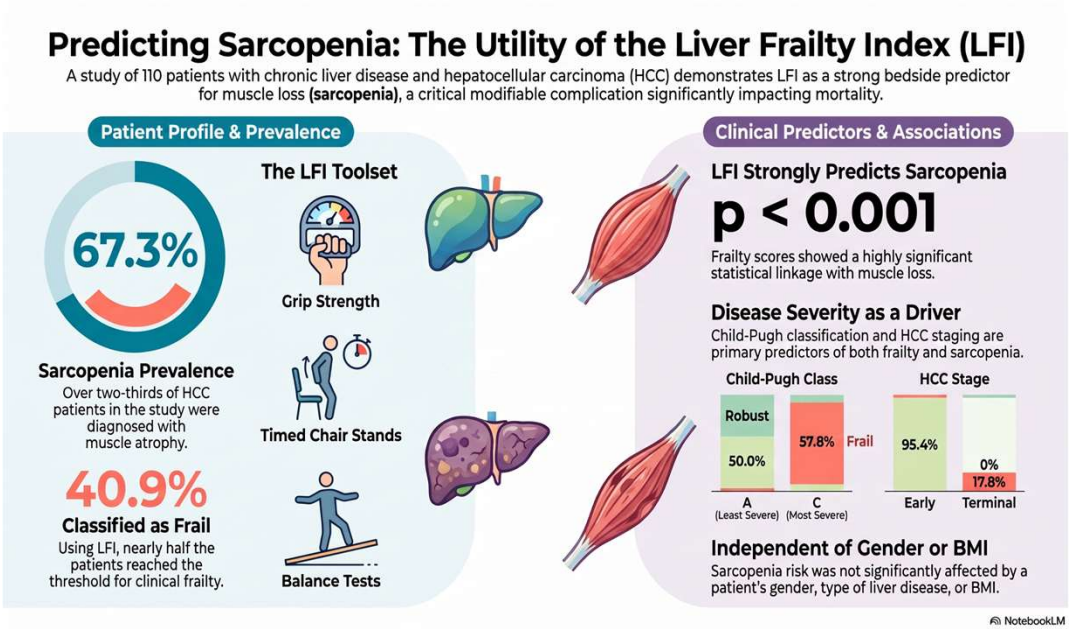
ORIGINAL ARTICLE

## Clinical utility of the liver frailty index for predicting sarcopenia in chronic liver disease patients with hepatocellular carcinoma.

Lubna Kamani[1], Attique Rahman[2], Muhammad Ali[3], Mehreen Akmal[4]

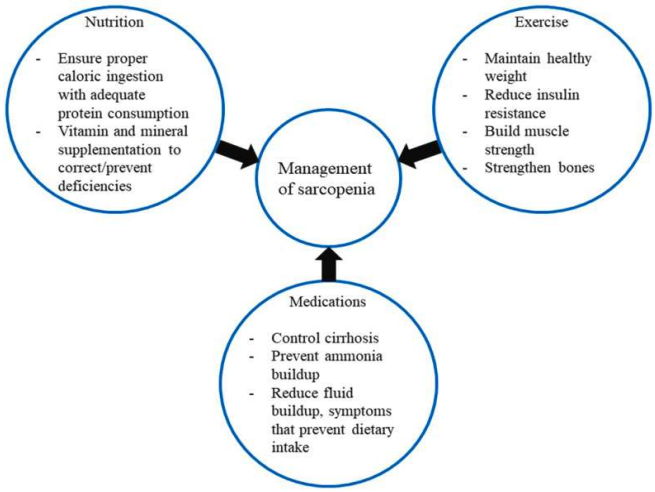
**Article Citation:** Kamani L, Rahman A, Ali M, Akmal M. Clinical utility of the liver frailty index forpredicting sarcopenia in chronic liver disease patients with hepatocellular carcinoma. Professional Med J 2025; 32(04):423-428. https://doi.org/10.29309/TPMJ/2025.32.04.8919

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Nutritional, exercise, and pharmacological approach to management of sarcopenia in cirrhosis.

Warner &, Satapathy. Sarcopenia in the Cirrhotic Patient: Current Knowledge and Future Directions. J Clin Exp Hepatol. 2023

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## Oral LPCN 1148 improves sarcopenia and hepatic encephalopathy in male patients with cirrhosis: A randomized, placebo-controlled phase 2 trial

**Study population**

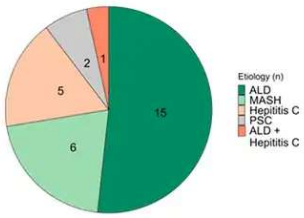
- Men with sarcopenia and cirrhosis awaiting liver transplant were treated with LPCN 1148 (androgen receptor agonist) or placebo for 24 weeks

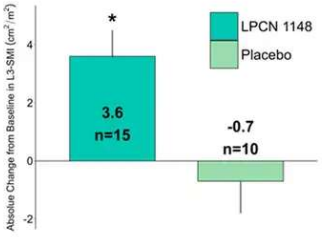
**Primary endpoint**

- L3 skeletal muscle index was improved with 24 weeks of LPCN 1148 therapy

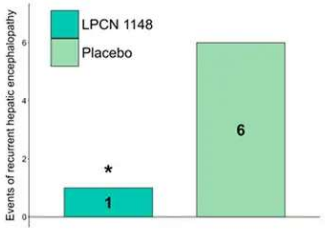
**Secondary endpoint**

- Recurrent events of hepatic encephalopathy were reduced with LPCN 1148




Data are mean± SE. *p < 0.05 compared to placebo




Data are events. * p < 0.05 compared to placebo

AASLD Bruno, et al | HEPATOLOGY. 2024 HEPATOLOGY

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AJG The American Journal of GASTROENTEROLOGY

CLINICAL GUIDELINES

## ACG Clinical Guideline: Malnutrition and Nutritional Recommendations in Liver Disease

Singal, Ashwani K. MD, MS, FACG[1,*]; Wong, Robert J. MD, MS, FACG[2,*]; Dasarathy, Srinivasan MD[3,4]; Abdelmalek, Manal F. MD, MPH, FACG[5]; Neuschwander-Tetri, Brent A. MD, FACG, FAASLD, AGAF, FACP[6]; Limketkai, Berkeley N. MD, PhD, FACG[7]; Petrey, Jessica MSLS[8]; McClain, Craig J. MD, FACG[9]

HEPATOLOGY AASLD
AASLD GUIDANCE | HEPATOLOGY, VOL. 74, NO. 3, 2021

## Malnutrition, Frailty, and Sarcopenia in Patients With Cirrhosis: 2021 Practice Guidance by the American Association for the Study of Liver Diseases

Jennifer C. Lai ,[1*] Puneeta Tandon,[2*] William Bernal,[3] Elliot B. Tapper ,[4] Udeme Ekong ,[5] Srinivasan Dasarathy,[6] and Elizabeth J. Carey[7]

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# Future directions:

- Standardized, feasible assessment of frailty and sarcopenia in diverse populations of patients with cirrhosis with respect to sex/gender, race/ethnicity, and clinical acuity.
- Longitudinal assessment of frailty and sarcopenia. This includes evaluation of the natural progression as well as predictors of accelerated decline.
- Development of therapeutics and multimodal strategies targeting frailty and sarcopenia.
- Collaboration across many disciplines, including hepatology, surgery, nutrition, physiotherapy, academia pharmaceutical and biotechnology firms.

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# Thank you



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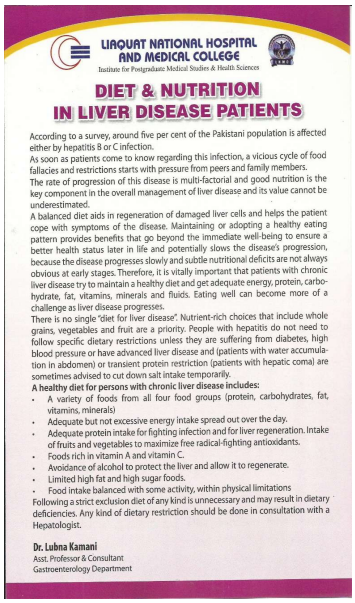
جگر کی بیماری کے مریضوں میں
خوراک کی اہمیت

جگر ہمارے جسم کا ایک اہم عضو ہے جو کہ ہمارے کھانے میں غذائی اجزاء کو کنٹرول کرتا ہے۔ اچھی غذائیت جگر کی بیماریوں کے مریضوں میں اہم کردار ادا کرتی ہے۔ اندازہ لگایا گیا ہے کہ تقریباً ۵ سے ۸ فی صد پاکستانی عوام جگر کی بیماریوں میں مبتلا ہیں۔ یہ بھی اندازہ لگایا گیا ہے کہ خوراک کی کمی جگر کے مریضوں کی شرح اموات میں اضافہ کرتی ہے اور خوراک کی اہمیت کو کوئی بھی نظر انداز نہیں کر سکتا۔ غذائیت کی کمی کی بھی وجہ سے ہو جگر کو مزید نقصان پہنچاتی ہے اور اس سے قوت مدافعت بھی متاثر ہوتی ہے۔ یہ اندازہ لگایا گیا ہے کہ جگر کے مریضوں میں ۱۵ اقسام کی غذا دینا بہت ضروری ہے ان میں پختانی ہماری توانائی کا ایک بڑا ذریعہ ہے۔ یہ ہماری غذائیت کا ۱۵ فیصد حصہ مہیا کرتی ہے۔ وٹامنز اور نمکیات بھی ہماری خوراک کا ایک اہم حصہ مہیا کرتی ہے زنک کی کمی جگر کے مریضوں میں خودکی ایک وجہ ہے

جگر کے مریضوں میں ایک متوازن غذا: مثلاً: چاول، سبزیاں، گوشت، انڈہ اور تیل کا استعمال ضروری ہے ان مریضوں میں ضروری نہیں کہ وہ پانی کا استعمال کم کریں صرف غذاء میں نمک کا استعمال کم کرنا ہے۔ اسی وجہ سے بازاری کھانے منع کیے جاتے ہیں۔

جگر کے مریضوں کو روزانہ ملٹی وٹامنز اور کیلشیم دینا چاہیئے ان مریضوں میں کوئی بھی ملے شدہ خوراک نہیں دی جاتی بلکہ ایک متوازن غذا دینی چاہیئے۔

ڈاکٹر لبنیٰ کمانی — اسسٹنٹ پروفیسر، گیسٹرو انٹرولوجی
ڈاکٹر حفیظ اللہ شیخ — سینئر رجسٹرار، گیسٹرو انٹرولوجی
ڈاکٹر ریاض حسین — ریزیڈنٹ گیسٹرو انٹرولوجی
سلیمان سیموئیل — انچارج لیبارٹری اسسٹنٹ



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DIET & NUTRITION
IN LIVER DISEASE PATIENTS

According to a survey, around five per cent of the Pakistani population is affected either by hepatitis B or C infection.
As soon as patients come to know regarding this infection, a vicious cycle of food fallacies and restrictions starts with pressure from peers and family members.
The rate of progression of this disease is multi-factorial and good nutrition is the key component in the overall management of liver disease and its value cannot be underestimated.
A balanced diet aids in regeneration of damaged liver cells and helps the patient cope with symptoms of the disease. Maintaining or adopting a healthy eating pattern provides benefits that go beyond the immediate well-being to ensure a better health status later in life and potentially slows the disease's progression, because the disease progresses slowly and subtle nutritional deficits are not always obvious at early stages. Therefore, it is vitally important that patients with chronic liver disease try to maintain a healthy diet and get adequate energy, protein, carbohydrate, fat, vitamins, minerals and fluids. Eating well can become more of a challenge as liver disease progresses.
There is no single 'diet for liver disease'. Nutrient-rich choices that include whole grains, vegetables and fruit are a priority. People with hepatitis do not need to follow specific dietary restrictions unless they are suffering from diabetes, high blood pressure or have advanced liver disease and (patients with water accumulation in abdomen) or transient protein restriction (patients with hepatic coma) are sometimes advised to cut down salt intake temporarily.
**A healthy diet for persons with chronic liver disease includes:**

- A variety of foods from all four food groups (protein, carbohydrates, fat, vitamins, minerals)
- Adequate but not excessive energy intake spread out over the day.
- Adequate protein intake for fighting infection and for liver regeneration. Intake of fruits and vegetables to maximize free radical-fighting antioxidants.
- Foods rich in vitamin A and vitamin C.
- Avoidance of alcohol to protect the liver and allow it to regenerate.
- Limited high fat and high sugar foods.
- Food intake balanced with some activity, within physical limitations

Following a strict exclusion diet of any kind is unnecessary and may result in dietary deficiencies. Any kind of dietary restriction should be done in consultation with a Hepatologist.

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# Questions



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