# Liver Logic: Case-Based Approaches for the Busy PCP

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## Disclosure

Advisory Board: Madrigal

Consultant: Alpha Insights; Antheneum Partners; Gerson Lehrman Group; Slingshot Insights

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# Learning Objectives

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At the completion of today's talk, learners will:

- Recognize common liver disease presentations in primary care
- Understand when to refer and how to manage common liver diseases in your practice
- Apply liver-related clinical guidelines to patient case scenarios

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# Case 1:
## 52-year-old Male Here for Follow-up Abnormal LFTs

PMH: hyperlipidemia and obesity (BMI 31)

Meds: rosuvastatin 20mg (new)

Denies alcohol use or IVDU

Married with 2 children

Prior available data:
- Hepatitis C Ab +, PCR neg
- Hepatitis B immune
- Iron studies normal
- Liver ultrasound with no fat

ALT in 40s-50s ("normal") for 5 years

| Labs | Today | 3 month ago | Normal |
|---|---|---|---|
| AST, IU/L | 300 | 305 | 10-55 |
| ALT, IU/L | 63 | 62 | 10-60 |
| ALP, IU/L | 116 | 110 | 40-120 |
| Total bilirubin, mg/dL | 0.5 | 0.3 | 0.2-1.3 |
| LDL-c, mg/dL | 99 | 170 | <100 |
| HDL-c, mg/dL | 50 | 42 | ≥50 |
| TC, mg/dL | 190 | 205 | <200 |
| TG, mg/dL | 220 | 287 | <150 |
| Platelets, $10^9$/L | 256 | 219 | 150-450 |
| Hemoglobin, g/dL | 14.5 | 14.0 | 13.5-16.5 |

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## Case 1: 52-year-old Male Here for Follow-up Abnormal LFTs

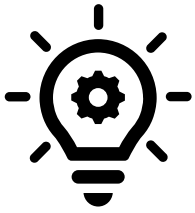
### What Is the Next Best Step to Address the Abnormal Liver Tests?

A. Repeat Hepatitis C Virus testing
B. Send alcohol level
C. Obtain CT scan abdomen
D. Calculate FIB-4
E. Obtain further history



## "LFTs" Do Not Measure Liver Function

Aspartate aminotransferase (AST)
Alanine aminotransferase (ALT) = "liver chemistries" or enzymes
Alkaline phosphatase (ALP)



# Categories of Liver Tests

| Category | Test |
|---|---|
| Inflammation | Aspartate aminotransferase (AST)<br>Alanine aminotransferase (ALT) |
| Cholestasis | Alkaline phosphatase (ALP)<br>Gamma glutamyl transferase<br>5' nucleotidase |
| Synthesis<br>Metabolism<br>**LFTs** | Serum albumin<br>Pro-thrombin (INR)<br>Factor 7<br>Bilirubin |
| Other | Platelet count<br>Serum creatinine |

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# Liver Tests

## Organs containing AST and ALT

| Organ | AST | ALT |
|---|---|---|
| Liver | YES | YES |
| Skeletal muscle | YES | Small amounts |
| Heart | YES | NO |
| Brain | YES | NO |
| Kidney | YES | NO |
| Hematologic<br>*RBCs & WBCs* | YES | NO |

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# Why Not Repeat Hepatitis C Testing?

## US Prevalence: 1.2% or 3.5 million with chronic HCV

## CDC Recommendations

- All adults age > 18 years should be screened at least once in their lifetime
- Pregnant women should be screened during each pregnancy
- Periodic testing **if** ongoing risk factors (e.g., IDU, anal sex, unregulated tattooing)

## HCV antibody test:

- 5-32% false-positive rate
- 20% of patients will spontaneously clear virus
- Takes up to 6 months to seroconvert

**Always check HCV RNA PCR if antibody screen positive or concern for acute infection with negative antibody screen**

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Patel PR et al. Am J Kidney Dis 2010
Moorman AC et al. J Clin Vir 2017
Armstrong GL et al. Ann Intern Med. 2006
Midgard H et al. J Hep 2016

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# Limitations of Imaging in Hepatocellular Injury

Cross-sectional imaging (CT/MRI) has a low diagnostic yield for evaluating hepatocellular injury

- 18% yield in mild elevations
- 31% yield in moderate-severe

If Budd-Chiari (hepatic venous outflow obstruction) is suspected, perform doppler US first

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# Case 1:
# 52-year-old Male with Abnormal Liver Enzymes

On further history…

- Working on weight loss and doing heavy weightlifting
- Lost 10% body weight over 6 months; BMI is 28.7 kg/m$^2$
- Denies herbals/supplements or other OTC medications
- You ask him to abstain from exercise for 72 hours before his next labs, which show:

| Labs | Today | 1m ago | 4m ago | Normal |
|---|---|---|---|---|
| AST, IU/L | 50 | 300 | 305 | 10-55 |
| ALT, IU/L | 61 | 63 | 62 | 10-60 |
| ALP, IU/L | 114 | 116 | 110 | 40-120 |
| Total bilirubin, mg/dL | 0.3 | 0.5 | 0.3 | 0.2-1.3 |
| LDL-c, mg/dL | 119 | 99 | 170 | <100 |
| HDL-c, mg/dL | 51 | 50 | 42 | ≥50 |
| TC, mg/dL | 199 | 190 | 205 | <200 |
| TG, mg/dL | 187 | 220 | 287 | <150 |
| Platelets, $10^9$/L | 206 | 256 | 219 | 150-450 |
| Hemoglobin, g/dL | 14.2 | 14.5 | 14.0 | 13.5-16.5 |



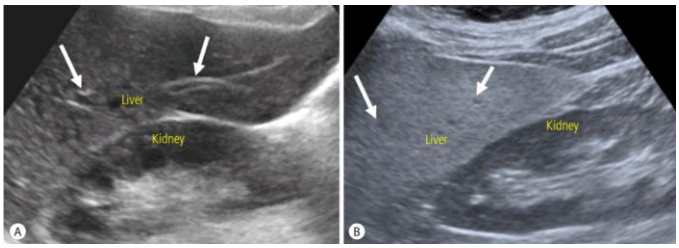


# Now, What Is the Next Best Step in Management?

A. Repeat liver ultrasound
B. Hepatitis A Virus testing
C. Stop Statin
D. Calculate FIB-4
E. Observation

# Limitations of Imaging for Steatosis

But his prior abdominal US showed no fat!

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Ultrasound (and CT) only detects moderate-severe hepatic steatosis

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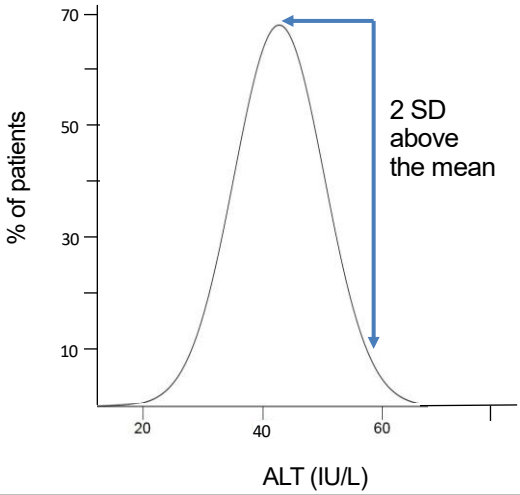
# What Is Normal …?

## Normal Distribution for ALT




- "Normal" distribution is defined by labs using 10,000 consecutive patients
- Between 1970-2000, mean ALT increased by 40-60%

Kwo PY et al. ACG Practice Guideline: Evaluation of Abnormal Liver Chemistries. AJG 2017

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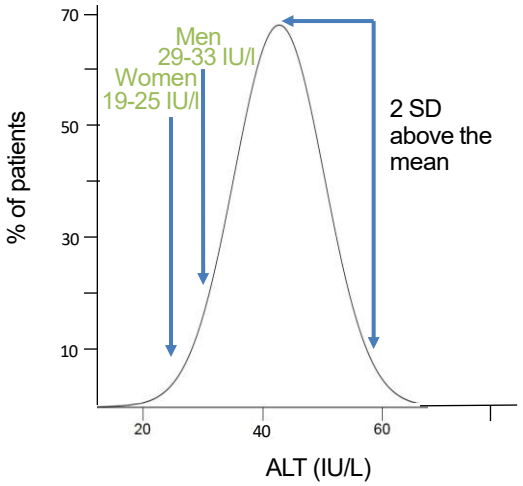
# What Is Normal …?

## Normal Distribution for ALT




Eliminate patients with:

- BMI>25
- Increased cholesterol
- Hypertension
- Heart disease
- Diabetes
- Any medications

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*"Clinicians may rely on local lab ULN ranges for alkaline phosphatase and bilirubin"*

Kwo PY et al. ACG Practice Guideline: Evaluation of Abnormal Liver Chemistries. AJG 2017

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# Case 1: 52-year-old Male with Persistent Elevation in ALT

| Labs | Today | 1m ago | 4m ago | Normal |
|---|---|---|---|---|
| AST, IU/L | 50 | 300 | 305 | 10-55 |
| ALT, IU/L | 61 | 63 | 62 | 10-[illegible] |
| ALP, IU/L | 114 | 116 | 110 | 40-120 |
| Total bilirubin, mg/dL | 0.3 | 0.5 | 0.3 | 0.2-1.3 |
| LDL-c, mg/dL | 119 | 99 | 170 | <100 |
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| TG, mg/dL | 187 | 220 | 287 | <150 |
| Platelets, $10^9$/L | 206 | 256 | 219 | 150-450 |
| Hemoglobin, g/dL | 14.2 | 14.5 | 14.0 | 13.5-16.5 |

**10-30**

"ALT in 40s-50s ("normal") for 5 years"

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# Statins and Liver Injury

- Acute liver injury relatively rare (<1%) given frequency of use
- Variable latency (days-years)
- Majority hepatocellular, but cholestatic also occurs
- Cases with autoimmune features, often in combo with ezetimibe
- Hold if ALT > 5x ULN (> 150 IU/mL)

Table. Relationship Between Dose of Statin and Incidence (%) of Persistent Elevation of ALT >3x ULN

| | Placebo | 10mg | 20mg | 40mg | 80mg |
|---|---|---|---|---|---|
| Lovastatin | 0.1 | | 0.1 | 0.9 | 2.3 |
| Simvastatin | | | 0.7 | 0.9 | 2.1 |
| Pravastatin | 1.3 | | | 1.4 | |
| Fluvastatin | 0.28 | | 0.2 | 1.5 | 2.7 |
| Atorvastatin | | 0.2 | 0.2 | 0.6 | 2.3 |
| Rosuvastatin | | 0 | 0 | 0.1 | |

Sung et al. BMC Gastroenterol. 2021 Mar 16
Yebyo et al. Am Heart J. 2019 Apr;210:18-28

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# Practice-Based Guidance for MASLD Risk Stratification

**Step 1: Identify patients at risk**

| 2 or more metabolic risk factors | Type 2 diabetes | Steatosis on imaging or elevated LFTs |
|---|---|---|

**Step 2: History and laboratory tests**
Assess alcohol intake and metabolic risk factors, obtain CBC and LFTs

| | Step 3: Non-invasive testing (NIT) for significant fibrosis (FIB4 is calculated based on age, AST, ALT & platelet count) | | |
|---|---|---|---|
| Age < 35 | FIB4 may not be accurate; consider referral to GI/hepatology and/or alternative fibrosis assessment (see Step 4) | | |
| Age 35-64 | FIB-4 < 1.3 | FIB-4 1.3 to 2.67 | FIB-4 > 2.67 |
| Age ≥ 65 | FIB-4 < 2.0 | FIB-4 2.0 to 2.67 | FIB-4 > 2.67 |

Adapted from Kanwal et al. *Gastroenterology* Nov 2021 and Rinella et al. *Hepatology* 2023

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# Primary Risk Assessment – FIB-4

$$\text{FIB-4} = \frac{\text{Age (years)} \times \text{AST Level (U/L)}}{\text{Platelet Count } (10^9/L) \times \sqrt{\text{ALT (U/L)}}} = 1.62$$

AST Level (U/L): 50
ALT (U/L): 61

| | | | |
|---|---|---|---|
| Age < 35 | FIB4 may not be accurate; consider referral to GI/hepatology and/or alternative fibrosis assessment (see Step 4) | | |
| Age 35-64 | FIB-4 < 1.3 | FIB-4 1.3 to 2.67 | FIB-4 > 2.67 |
| Age ≥ 65 | FIB-4 < 2.0 | FIB-4 2.0 to 2.67 | FIB-4 > 2.67 |
| | **LOW RISK** Repeat NIT in 1-3 years based on metabolic risk** | **INDETERMINATE RISK** | **HIGH RISK** Refer to GI/hepatologist |

**1-2 years if T2DM or 2 or more met risk factors; 2-3 years if no T2DM and <2 met risk factors

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## Case 1: 52-year-old Male with Persistent Elevation in ALT

**Now, What Is the Next Best Step in Management?**

A. Obtain liver stiffness measurement (e.g., fibroscan)
B. Send enhanced liver fibrosis (ELF) test
C. Refer to GI/Hepatology
D. (A) or (B)
E. (A), (B) or (C)

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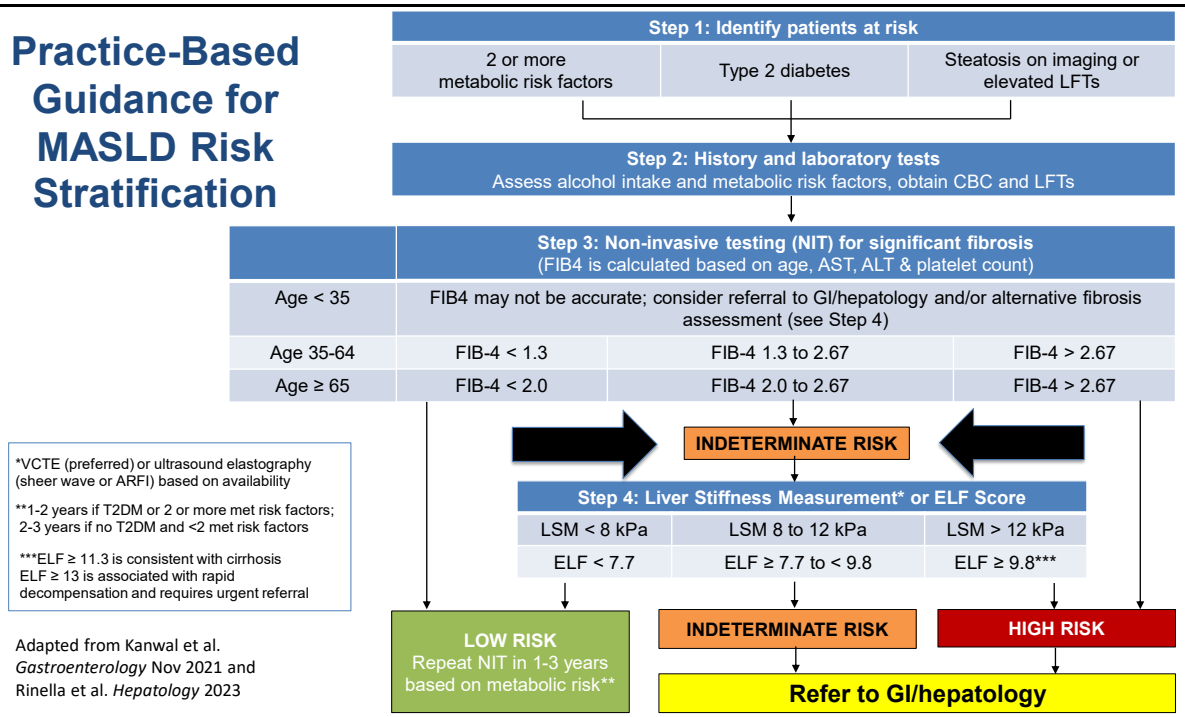
## Practice-Based Guidance for MASLD Risk Stratification

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## Case 1: 52-year-old Male with Persistent Elevation in ALT

**Unfortunately, There Is 4 Month Wait for a GI Appointment. What Additional Testing Is Indicated for Further Evaluation of His Persistent ALT Elevation?**

A. Alpha 1 antitrypsin phenotype
B. Antinuclear antibody (ANA)
C. Anti-smooth muscle antibody
D. Gamma globulin level
E. All of the above



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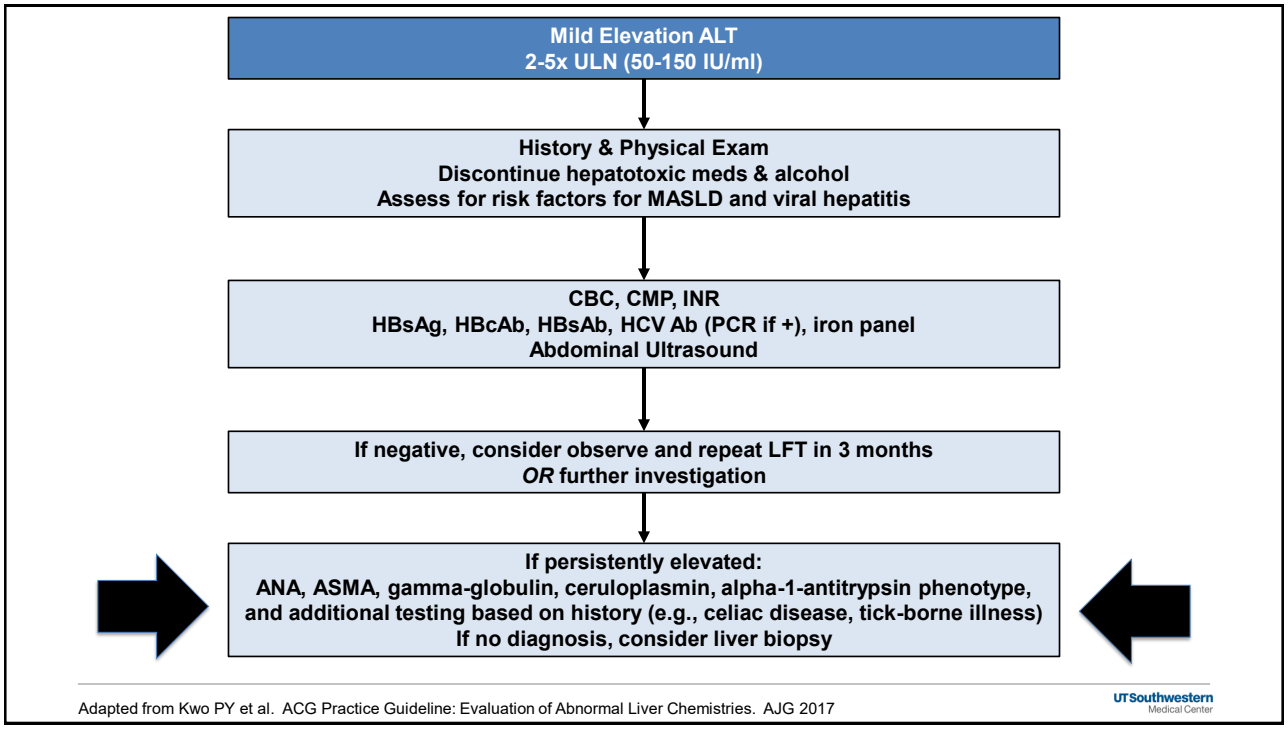


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# Case 2: 39-year-old Female with New-onset Jaundice

**History:**
Obesity with sleeve gastrectomy 3 years ago
Drinks 2 glasses of wine a night, no recent travel or new medications/supplements

**Meds:** 2 extra strength Tylenol 1-2x daily for past few days for abdominal pain

**Exam:** Temp 100.1, HR 100, BP 140/82, 100% RA
- Alert/oriented, scleral icterus noted,
- Mild abdominal distention and RUQ discomfort, but no rebound or guarding

**Labs:**
ALT 125, AST 250, Alk Phos 220, T. Bili 5.5 (direct 3.6), INR 1.8
WBC 15 (80% PMNs), HgB 10.1 (MCV 106), platelets 130
Creatinine 1.0, Sodium 130, Potassium 3.3, Bicarb 19

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## Case 2: 39-year-old Female with New-onset Jaundice

### What Is the Most Likely Cause of Her Jaundice?

A. Acute cholecystitis
B. Hemolysis
C. Autoimmune hepatitis
D. Alcohol-associated hepatitis
E. Acetaminophen toxicity



## Differential Diagnosis of Acute Jaundice

| Pre-Hepatic (Hemolytic) | Hepatic (Hepatocellular) | Post-Hepatic (Cholestatic/Obstructive) |
|---|---|---|
| Hemolysis<br>Hemoglobinopathies (e.g., sickle cell)<br>Ineffective erythropoiesis (e.g., thalassemia) | Infectious<br>- Hepatitis A–E, EBV, CMV<br>Toxic/Drug-induced<br>- APAP, antibiotics, alcohol<br>Autoimmune hepatitis<br>Metabolic<br>- Wilson's disease, hemochromatosis | Gallstones<br>Malignancy (pancreatic, cholangiocarcinoma)<br>Primary sclerosing cholangitis<br>Primary biliary cholangitis<br>Drug-induced cholestasis |

**Helpful Labs & Imaging:**
ALT, AST, Alk Phos, Bilirubin (direct vs. indirect)
Hepatitis panel, autoimmune markers
Abdominal ultrasound, CT or MRCP if obstructive concern

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https://livertox.nih.gov/

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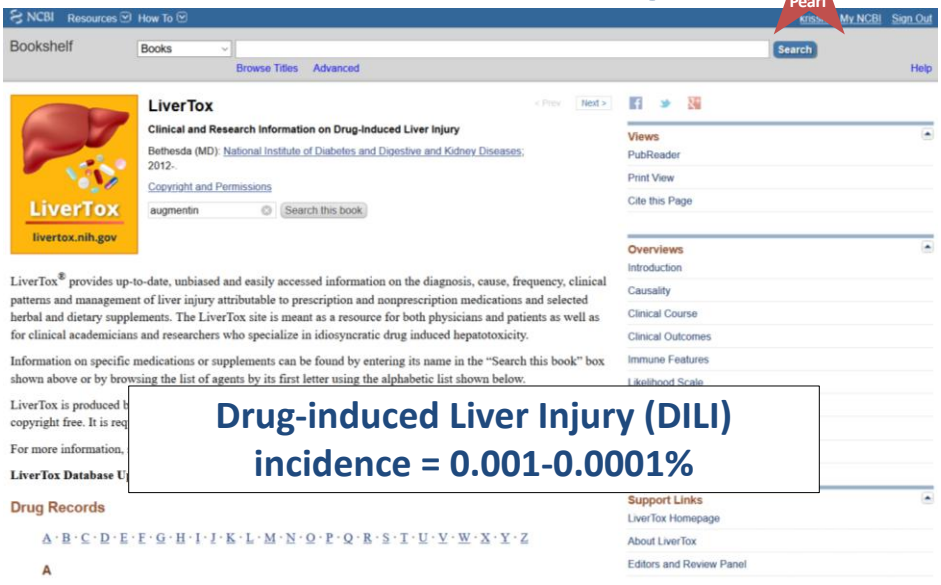


**Drug-induced Liver Injury (DILI) incidence = 0.001-0.0001%**

https://livertox.nih.gov/, Accessed 6/2/23

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# Diagnosis of Alcohol Hepatitis (AlcHep)

- Clinical syndrome: rapid onset of jaundice, liver failure + heavy alcohol use→ BUT ITS NOT ACUTE LIVER FAILURE (ALF)
- AST elevated (typically not more than 300-400 IU/mL)
- AST:ALT ratio 2:1
- Total bilirubin 5.0 mg/dL or greater
- Elevated INR
- Neutrophilia
- Low grade fever common and often tender hepatomegaly
- Ascites often present (not required for diagnosis)
- History of heavy alcohol use

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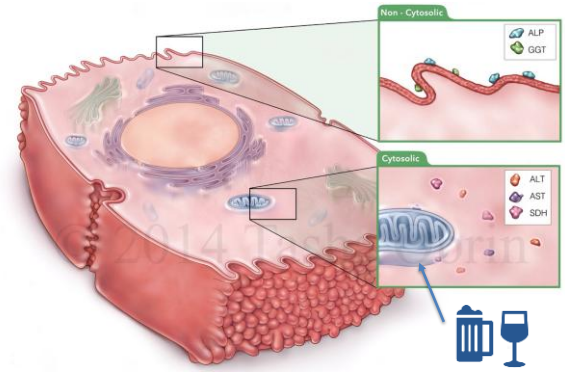
# Alcohol Liver Disease and AST:ALT Ratio

**Why is AST/ALT ratio >2:1 in ALD?**




- In ALD, both AST and ALT are elevated but *rarely exceed* 300 IU/L (never above 500)
  - If AST > 300, think non-liver source or acetaminophen

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Botros M and Sikaris KA. Clin Biochem Rev. 2013 Nov;34(3):117–130

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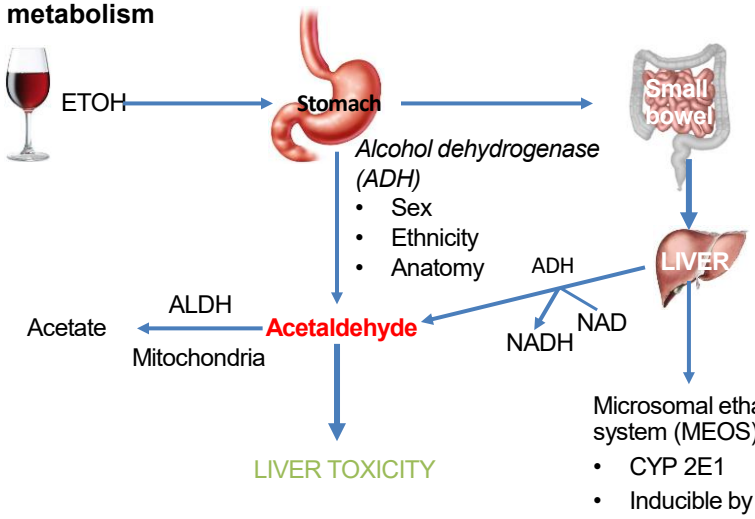
# Alcohol Hepatitis

**Alcohol metabolism**

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# Alcohol Hepatitis: Prognosis

- Maddrey's Discriminant Function:
  [4.6 x (patient's prothrombin time – control PT time (sec)) + bilirubin (mg/dL)]
  If > 32 = severe, poorer survival (indication for steroids)
- MELD score: 21 or higher = poorer prognosis
- Lille score: dynamic score based on response of bilirubin to 7-day (or 4-day) course of steroid therapy
  If >0.45 after 7 days = BAD (survival 25% at 6 months vs 85% for score <0.45)

Our patient:
Maddrey DI = 15
MELD = 21

Cariethers, *Ann Int Med* 1985; [2]Dunn et al *Hepatology* 2005; Louvet A, et al *Hepatology* 2007;45(6). [3]Garcia-Saenz-de-Sicilia M, et al *Am J Gastro* 2017;112(2).

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# Alcohol Hepatitis: Management

Basic Inpatient Management Principles

- Treat portal HTN complications (HE, ascites, salt restriction)
- ALWAYS perform para to look for SBP
- Rule out infections
- Daily enteral nutrition with protein 1.5 g/kg body weight, 1600-2000 kcal/day or more
- Monitor for alcohol withdrawal, DTs
- Give thiamine and other vitamins prn
- Watch for bleeding and hepatorenal syndrome/AKI

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# AlcHep: Therapies You Can Use Now

CORTICOSTEROIDS

ABSTINENCE

LIVER TRANSPLANT

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# Case 2: 39-year-old Female with New-onset Jaundice

You sent her to the ED for admission and she is now here for post-discharge visit.

**Hospital course (5 day admission):**

- No infection or alcohol withdrawal
- No steroids given
- Other serologic workup for liver diseases negative
- Liver US: hepatomegaly, splenomegaly, mild ascites and a nodular liver

She denies alcohol use since prior to her hospitalization 1 month ago

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## Case 2: 39-year-old Female with New-onset Jaundice

**Which of the Following Is the Best Test for Quantifying Her Alcohol Consumption within the Last Month?**

A. Urine Ethyl Glucuronide
B. Blood Phosphatidylethanol (PEth)
C. Serum Ethanol level
D. AUDIT-C test



## Assessment of Alcohol Consumption

- AUDIT-C

| Score | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| How often do you have a drink containing alcohol? | Never | Monthly or less | 2-4 times per month | 2-3 times per week | 4+ times per week |
| How many units of alcohol do you drink on a typical day when you are drinking? | 1-2 | 3-4 | 5-6 | 7-9 | 10+ |
| How often have you had 6 or more units if female, or 8 or more if male, on a single occasion in last year? | Never | Less than monthly | Monthly | Weekly | Daily or almost daily |

Using cut-off of 3 of 12 points
- Sensitivity 96%
- Specificity 60% (40% false +)

- Ethanol Level: blood up to 12 hours, breath 12-24 hours
- Ethyl Glucuronide: Urine 2-4 days, Hair 90 days
- Phosphatidylethanol (PEth): Blood up to 4 weeks in daily drinkers
  - Sensitivity > 94%
  - Specificity 100%

| PETH Proposed Cutoffs | |
|---|---|
| | **< 20:** light/no consumption |
| | **20-200**: significant consumption (2-4 drinks/day) |
| | **> 200**: heavy consumption (>=4 drinks/day) |

Stewart 2014, Fleming 2017, Nguyen 2018, Ulwelling, W and Smith, K 2018
DiMartini A, et al., Psychosom Med. 2023 Apr 17.

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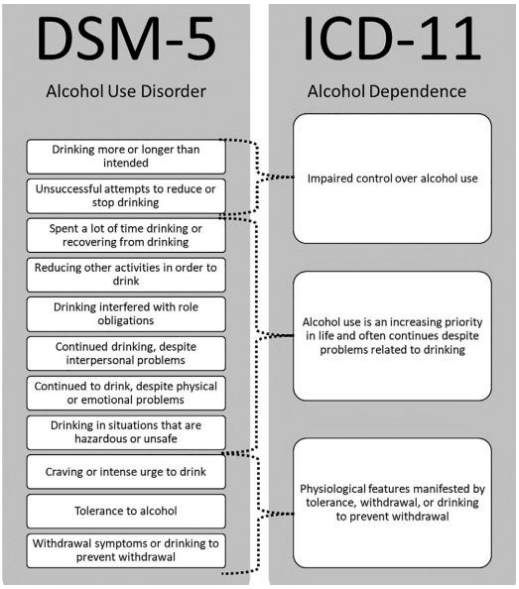
## What Is Alcohol Use Disorder?

*Note: *No Dose of Alcohol Implicated*




Witkiewicz K, et al *Clinics in Liver Disease* 2024; DSM V, 2005

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## AUD Treatment: What Is Out There?

- SBIRT: Screening, Brief Intervention, Referral to Treatment
- Behavioral therapy (e.g, cognitive behavioral therapy, 12-step facilitation)
- Community support groups (e.g. AA, SMART Recovery, Refuge, Celebrate)
- Medications

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# Pharmacotherapy Options for AUD Treatment

| Drug | Dose | Mechanism | SUD Indication | Metabolism | Excretion | Use in end-stage disease |
|---|---|---|---|---|---|---|
| Disulfiram | 250–500 mg daily | Acetaldehyde dehydrogenase inhibitor | Alcohol[a], cocaine[b] | Hepatic | Hepatic | Not recommended in liver dz; rare cases of liver failure |
| Naltrexone | 50 mg daily oral; 380 mg IM monthly | Mu receptor antagonist | Alcohol[a], opioids[a] | Hepatic | Renal | Elevated transaminases documented; rarely hepatotoxic |
| Acamprosate | 666 mg three times daily | NMDA receptor antagonist | Alcohol[a] | Minimal | Renal | Reduce dose in kidney dz |
| Gabapentin | 900–1800 mg three times daily | GABA transmission modulator | Alcohol[b], marijuana[b] | Minimal | Renal | Reduce dose in kidney dz and dialysis |
| Topiramate | 300 mg daily | enhances GABA-A activity, glutamate receptor antagonist | Alcohol[b], cocaine[b] | Minimal | Renal | Reduce dose in kidney dz and dialysis |
| Baclofen | 10–20 mg three times daily | GABA-B receptor agonist | Alcohol[b] | Hepatic | Renal | Only AUD treatment studied in cirrhosis |

Hepatotoxic- Avoid in liver disease

FDA approved

Non-FDA approved

AUD, alcohol use disorder; LT, liver transplantation; SUD, substance use disorder.
Winder GS, et al. Best Practice & Research Clinical Gastroenterology. 2020 Jun 1;46:101685.

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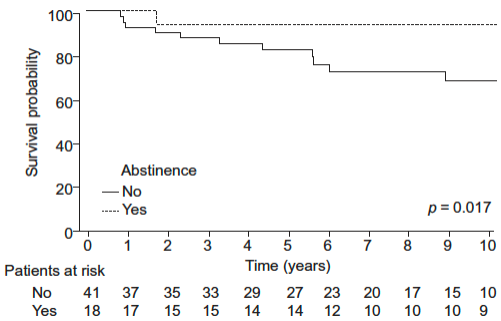
# Abstinence Is CRITICAL for Survival

## Importance of Abstinence in Recovery from Alcohol-Associated Liver Disease

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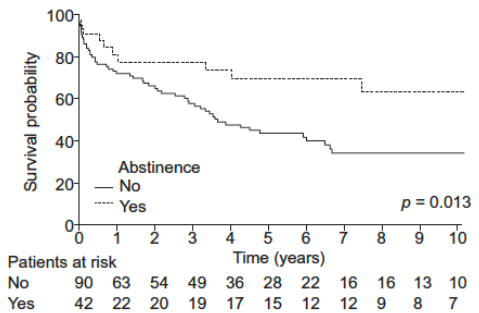


Decompensated

Lackner C, et al. J. Hepatology 2017; 66:610-618

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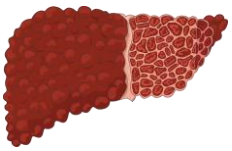
# Case 3: 58-year-old Male with HCV Cirrhosis

- **Patient:** 58-year-old male with known cirrhosis (HCV-related), previously treated with sustained viral response (SVR) in 2021 here to establish care after moving to your area from out-of-state
- **History:**
  - Hypertension
  - No encephalopathy or ascites
- **Medications:** multivitamin, lisinopril 20mg daily
- Last encounter with the healthcare system was 3 years ago



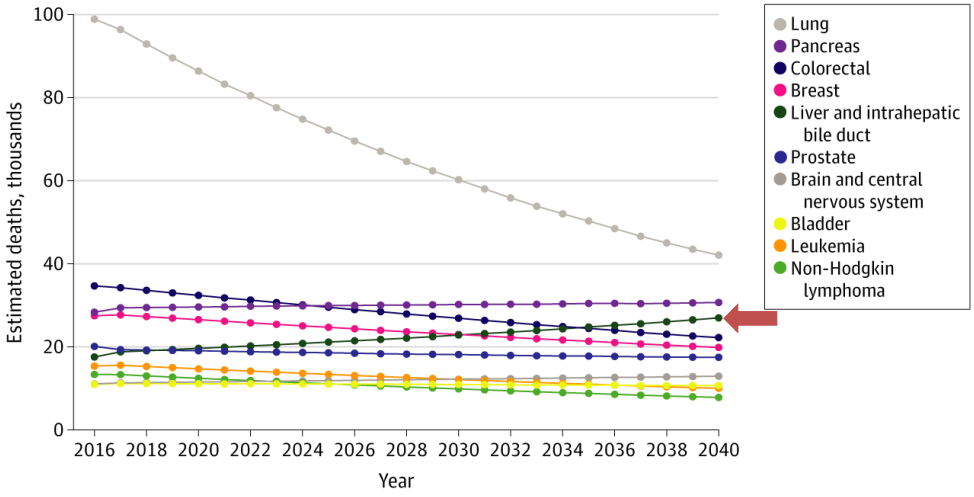


## Case 3: 58-year-old Male with HCV Cirrhosis

# Which of the Following Is Indicated at Today's Visit?

A. Liver Ultrasound
B. Alpha-Fetoprotein (AFP) level
C. Vaccination for Hepatitis C
D. Referral for Liver Transplant Evaluation
E. (A) and (B)

# HCC Projected to Be 3rd Leading Cause of Death in US by 2035




Rahib et al, JAMA Network Open 2021

Slide courtesy of A.Singal

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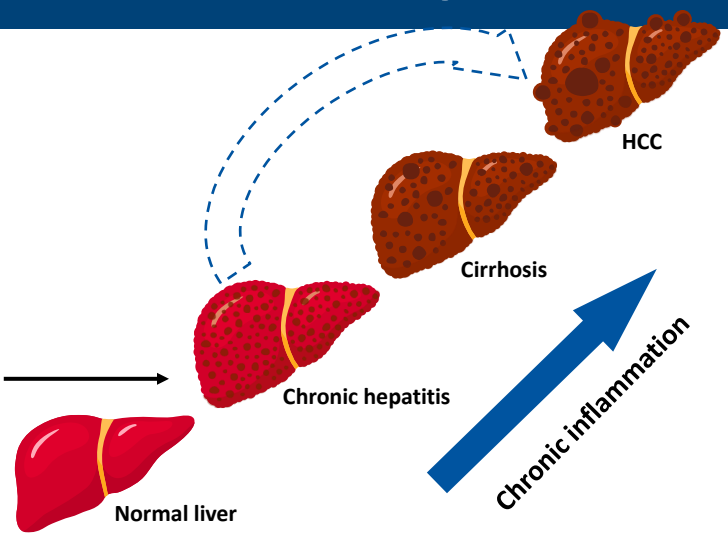
# Most HCC Occur in the Setting of Cirrhosis

Hepatitis B viral infection
Hepatitis C viral infection
Alcohol-associated liver disease
MASLD/MASH




Slide courtesy of A.Singal

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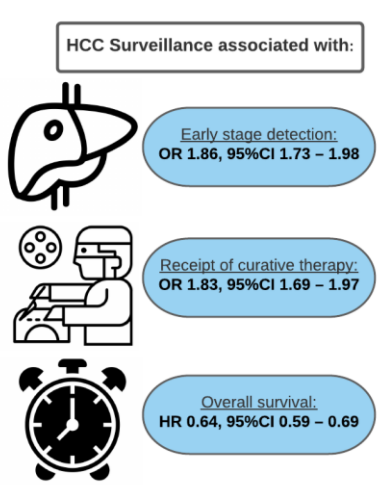
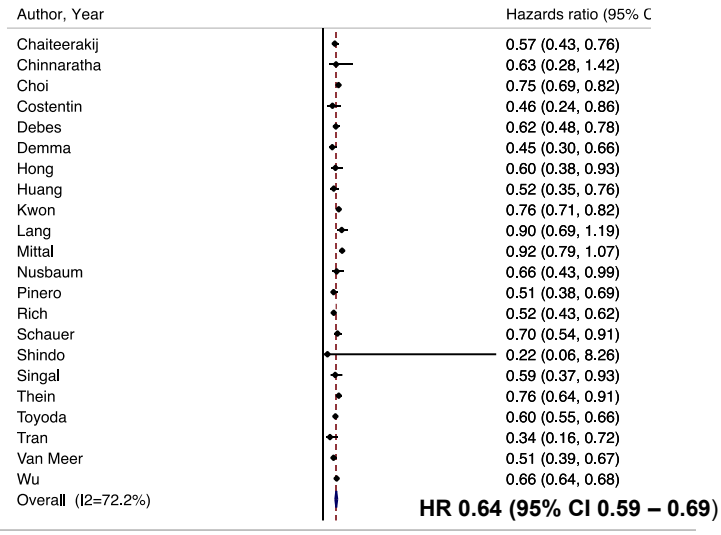
# HCC Surveillance Associated with Improved Survival in Cirrhosis




Singal et al. J Hepatology 2022

Slide courtesy of A.Singal

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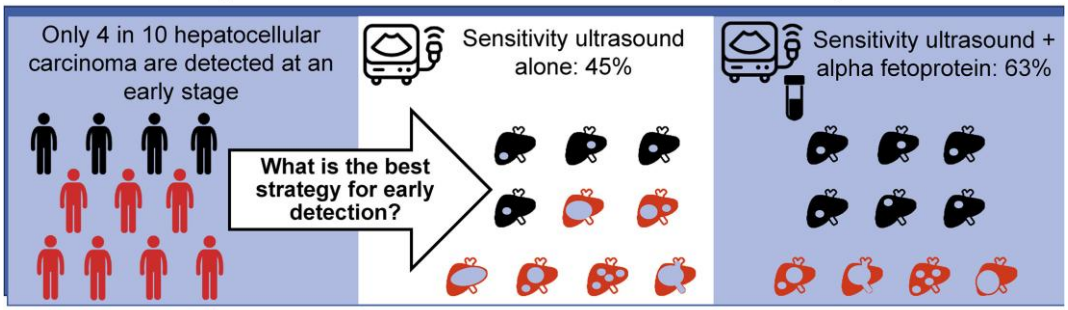
# HCC Surveillance in 2025: US + AFP q6m

**Surveillance Imaging and Alpha Fetoprotein for Early Detection of Hepatocellular Carcinoma in Cirrhosis: A Meta Analysis**




**Authors:** Tzartzeva, Obi, Rich, Parikh, Marrero, Yopp, Waljee, Singal

Gastroenterology

Clinical Pearl

**HCC surveillance should be performed using ultrasound and AFP at semiannual (approximately every 6 months) intervals.**

Tzartzeva K, Obi J, Rich NE, Parikh ND, Marrero JA, Yopp A, Waljee AK, Singal AG. Surveillance Imaging and Alpha Fetoprotein for Early Detection of Hepatocellular Carcinoma in Patients With Cirrhosis: A Meta-analysis. Gastroenterology. 2018 May;154(6):1706-1718.e1

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# Who in Your Practice Needs HCC Surveillance?

| Population Group | Incidence of HCC |
|---|---|
| Child-Pugh A-B Cirrhosis, any etiology<br>Hepatitis B<br>Hepatitis C (viremic or post-SVR)<br>Alcohol associated<br>MASH<br>Other etiologies | ≥ 1.0% per year |
| Child-Pugh C cirrhosis, transplant candidate | ≥ 1.0% per year |
| Non-cirrhotic chronic hepatitis B<br>Man from endemic country[a], age > 40 y<br>Woman from endemic country[a], age > 50 y<br>Person from Africa at earlier age[b]<br>Family history of HCC | ≥ 0.2% per year |

[a]Endemic country as defined by AASLD hepatitis B virus guidance.
[b]Surveillance can be initiated as early as third decade of life given median age 46 years at HCC diagnosis

Singal et al. AASLD Practice Guidance on prevention, diagnosis, and treatment of HCC. Hepatology Dec 2023

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# Clinical Pearls of Cirrhosis Management for PCPs

- **Screen for Esophageal Varices**
  - Refer for EGD consideration at diagnosis
- **Vaccinations**
  - Ensure HAV, HBV, pneumococcal, influenza, and COVID vaccinations are up to date. Consider shingles, RSV and Tdap based on age and history.
- **Avoid Hepatotoxic Medications**
  - NO NSAIDs and adjust dosages of renally cleared drugs.
  - Use APAP cautiously (≤2g/day)
- **Nutrition Counseling**
  - Recommend high-protein (1.5g/kg per day) diet
  - Avoid alcohol completely
  - Monitor for sarcopenia and vitamin deficiencies (esp. D, B12, folate)
  - Small frequent meals including bedtime snack
  - Avoid raw meat, fish and shellfish

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# Clinical Pearls of Cirrhosis Management for PCPs

- **Monitor for Decompensation**
  - Ask about ascites, encephalopathy, GI bleeding at each visit
  - Check MELD-3.0* score regularly to assess severity and transplant need
- **Encephalopathy Awareness**
  - Educate patients/families on early signs: confusion, sleep reversal, asterixis
- **Diuretics for Ascites (if present)**
  - Low sodium (<2g) diet
  - Use spironolactone ± furosemide (2:1). Monitor electrolytes and renal function closely
- **Refer for Transplant Evaluation If**
  - MELD-3.0* >15
  - Any decompensation (ascites, variceal bleed, encephalopathy)
  - New liver lesion on contrast-enhanced cross-sectional imaging
  - Declining functional status

*MELD-3.0 = creatinine, INR, bilirubin, sodium, albumin
Kim WR et al. Gastroenterology 2021 Dec: 161(6): 1887-1895

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# Key Take-Aways: Cases in Hepatology

At the completion of today's talk, learners will:

Normal ALT = 30

Liver enzymes are in organs other than the liver

Ultrasound/CT misses early steatosis

Screen for fibrosis using FIB-4 score

Alcohol hepatitis = rapid onset of jaundice and liver failure

Abstinence (treatment of AUD) drives outcomes in alcohol liver diseases

HCC incidence is rising; most cases occur in cirrhosis and surveillance saves lives

Surveillance: AFP + US every 6 months in high-risk patients

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# Helpful Resources



| | | |
|---|---|---|
| Alcohol liver disease | Hepatitis B virus | PBC/PSC |
| MASLD/MASH | Hepatitis C virus | Liver cancer, liver lesions |
| Autoimmune hepatitis | Hemochromatosis | Cirrhosis and portal HTN |

https://www.aasld.org/publications/practice-guidelines

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