Hepatitis B & C
Diagnosis & Treatment
Case Studies

Hepatitis: Preventing the Silent Epidemic in Kentucky
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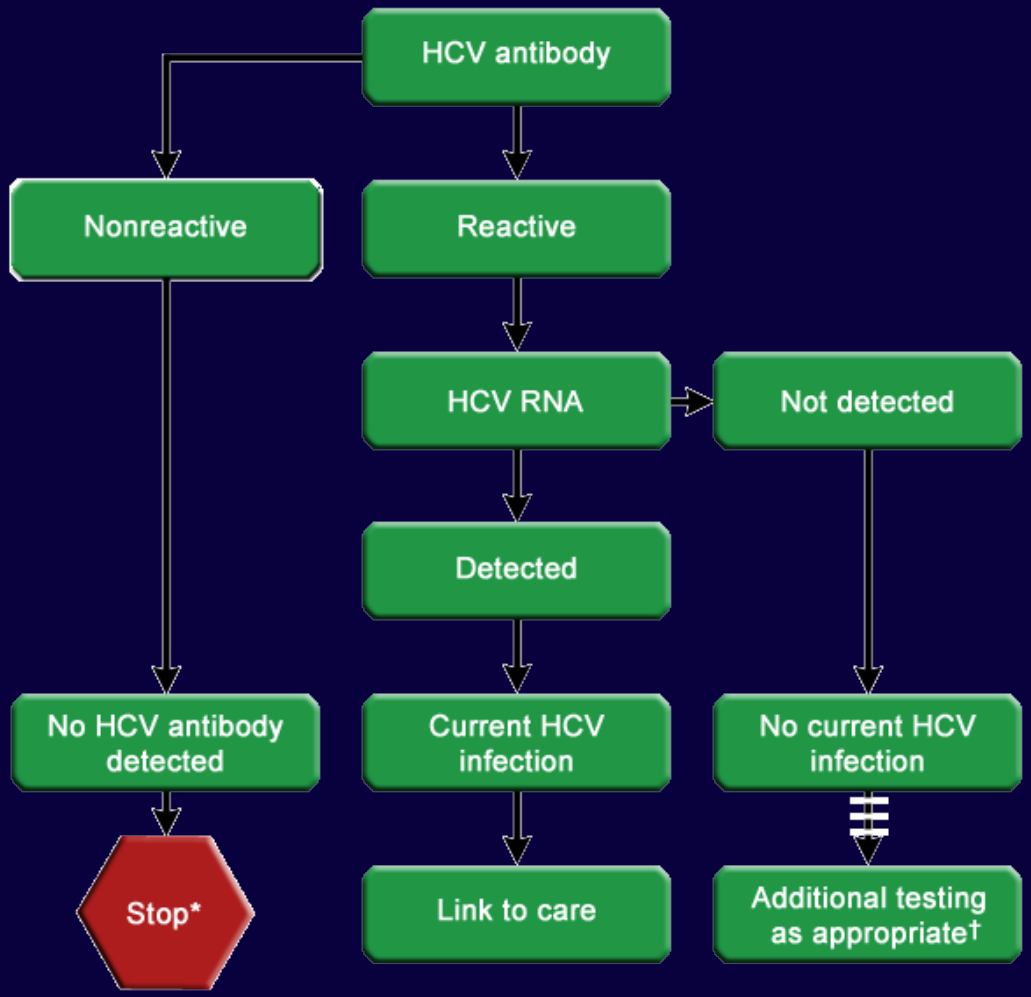
Disclosures

Jens Rosenau, MD, has disclosed that he has received consulting fees from Gilead.

The slides will discuss uses and dosages for therapeutic products that have not been approved by the United States Food and Drug Administration.

Hepatitis C

HCV Testing and Linkage to Care



CDC Recommendation

Evaluation by a practitioner who is prepared to provide comprehensive management, including consideration of antiviral therapy, is recommended for all persons with current (active) HCV infection.

AASLD/IDSA Guidelines
www.hcv-guidelines.org

HCV Case 1: GT 1b, Tx naïve, non-cirrhotic

- 32 yo Caucasian female
- Injection drug use from 2 years ago until 2 months ago, currently in drug rehab program on suboxone treatment, intranasal drug use from age 18 to 25, multiple tattoos from age 15 to 25
- Screening of asymptomatic patient with HCV risk factors reveals positive Anti-HCV antibody (8 weeks ago)

- ALT 330 IU/mL, AST 290 IU/mL, Bilirubin 0.8 mg/dL, INR 1.0, Platelets 280,000/mm3 (all 4 weeks ago)
- HCV RNA 25,000 IU/mL, Genotype 1b (all 4 weeks ago)

- Patient asks for HCV treatment options

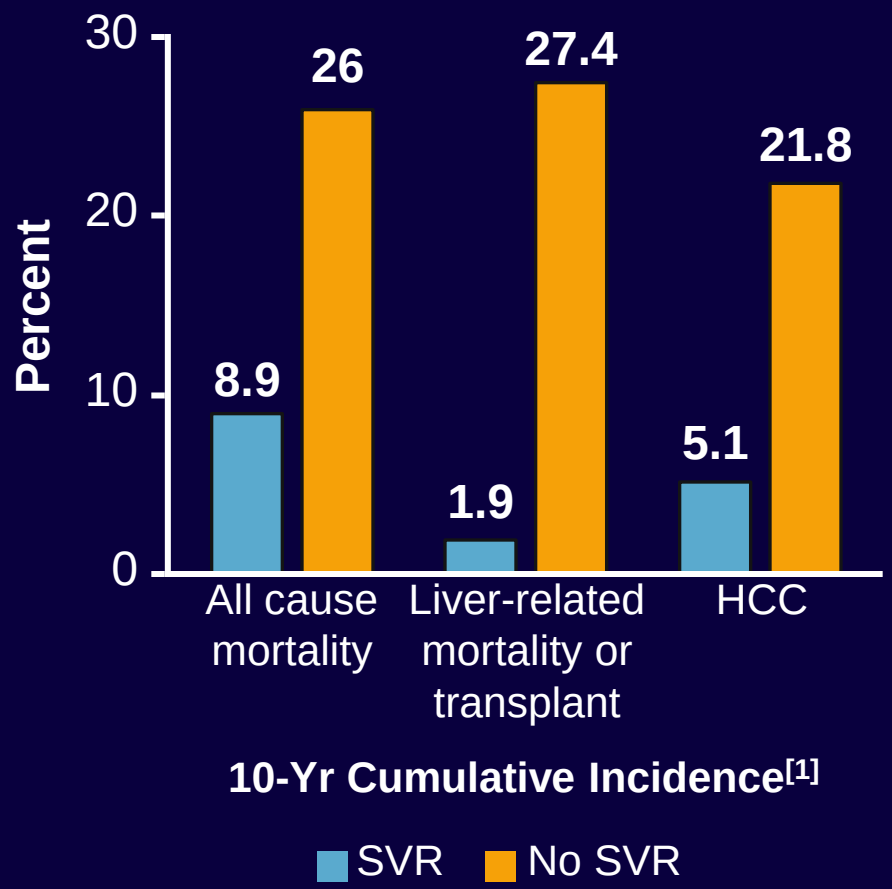
AASLD/IDSA: When and in Whom to Initiate HCV Therapy

- ALL pts are candidates for HCV therapy, regardless of disease stage
- In regions where limited resources preclude treatment of all pts, the following groups should be prioritized for therapy:
  - Highest Priority (based on highest risk for disease complications)
    - Advanced fibrosis (F3) or compensated cirrhosis (F4)
    - Organ transplant
    - Type 2 or 3 essential mixed cryoglobulinemia with end-organ manifestations
    - Proteinuria, nephrotic syndrome, or membranoproliferative glomerulonephritis
  - High Priority (based on high risk for disease complications)
    - HIV-1 coinfection
    - Fibrosis (Metavir F2)
    - HBV coinfection
    - Debilitating fatigue
    - Other coexistent liver disease (eg, NASH)
    - Type 2 DM (insulin resistant)
    - Porphyria cutanea tarda

AASLD/IDSA. HCV Management. http://www.hcvguidelines.org.

HCV Treatment Improves Health

- **Advanced fibrosis**
  - Multicenter study[1]
    - 5 hospitals (Europe, Canada)
  - 530 pts with HCV
    - IFN regimens 1990-2003
    - Advanced fibrosis or cirrhosis
    - Median follow-up: 8.4 yrs
- **Early-stage disease**
  - Extra-hepatic manifestations[2]
  - Health-related quality of life[3]



1. van der Meer AJ, et al. JAMA. 2012;308:2584-2593. 2. van der Meer AJ. Expert Rev Gastroenterol Hepatol. 2015;9:559-566. 3. Younossi Z, et al. Clin Gastroenterol Hepatol. 2014;12:1349-1359.

Key Data for HCV treatment decisions

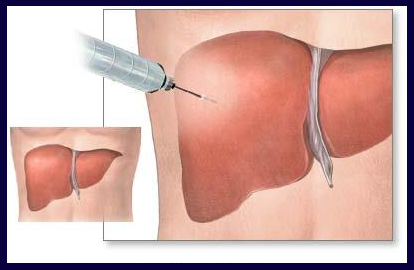
- HCV Genotype
- HCV treatment history
  - Interferon and ribavirin regimen?
  - Protease inhibitor? NS5a inhibitor? Sofosbuvir?
- Fibrosis stage?

  All patients should be staged to determine if they are cirrhotic
  - Cirrhotics have somewhat reduced likelihood of SVR with some current therapies
  - Cirrhotics need screening for HCC and varices
- If cirrhosis, is it decompensated?

  Child Pugh B or C? → Transplant evaluation?

How Would You Assess Fibrosis ?

- **Liver Biopsy**
  - Few experts are performing biopsy on a regular basis
  - Reserved for when other methods provide insufficient information



- **Serum Panels**
  - APRI AST, platelets
  - FIB-4 age, AST, ALT, platelets
  - Fibrosure 3 proteins, Bilirubin, ALT, GGT
  - Direct markers of extracellular matrix turnover

- **Ultrasound-based shear wave elastography**
  - Vibration Controlled Transient Elastography (VCTE): Fibroscan
  - Acoustic Radiation Force Impulse (ARFI)
- **Magnetic Resonance Elastography (MRE)**

HCV Case 1: GT 1b, Tx naïve, non-cirrhotic

- 34 yo Caucasian female
- Injection drug use about 2 years ago for about 4 months, intranasal drug use from age 18 to 25, multiple tattoos from age 15 to 25
- Screening of asymptomatic patient due to risk factors reveals positive Anti-HCV antibody

- ALT 60 IU/mL, AST 45 IU/mL, Bilirubin 0.8 mg/dL, INR 1.0, Platelets 280,000/mm3
- HCV RNA 2,300,000 IU/mL, Genotype 1b
- FIB 4 score 1.05 (advanced fibrosis unlikely with score <1.45)
- Fibrosure score: 0.08 c/w low fibrosis

- Planning pregnancy, concerned about HCV transmission

Genotype 1 HCV Agents

Protease Inhibitors	Polymerase Inhibitors		NS5A Inhibitors	Other
	Nucleotide	Nonnucleoside		
Simeprevir	Sofosbuvir		Ledipasvir	Ribavirin
Paritaprevir/ ritonavir		Dasabuvir	Ombitasvir	
			Daclatasvir	

Genotype 1 HCV: AASLD/IDSA-Recommended Regimens

Regimen	Genotype 1	Regimen Features
Simeprevir + peginterferon + ribavirin	Not recommended	QD-QWK; multiple tablets + injection
Sofosbuvir + peginterferon + ribavirin	Not recommended	QD-QWK; multiple tablets + injection
Sofosbuvir + ribavirin	Not recommended	QD; multiple tablets
Ledipasvir/sofosbuvir	Recommended	QD; single-tablet regimen
Ombitasvir/paritaprevir/ritonavir, dasabuvir, ± ribavirin	Recommended	QD-BID; multiple tablets
Simeprevir + sofosbuvir ± ribavirin	Recommended	QD; multiple tablets

Genotype 1 HCV Treatment Naive

- AASLD-IDSA guidelines
  - 3 regimens recommended

	Ledipasvir/ Sofosbuvir*	Ombitasvir/ Paritaprevir/ Ritonavir + Dasabuvir	Simeprevir + Sofosbuvir
Genotype 1a, no cirrhosis	12 wks	12 wks + RBV	12 wks ± RBV
Genotype 1a, cirrhosis	12 wks	24 wks + RBV	24 wks ± RBV
Genotype 1b, no cirrhosis	12 wks	12 wks	12 wks
Genotype 1b, cirrhosis	12 wks	12 wks + RBV	24 wks

*Ledipasvir/sofosbuvir for 8 wks can be considered in naive, noncirrhotic pts with baseline HCV RNA < 6 million IU/mL.

http://www.hcvguidelines.org

Genotype 1 HCV Treatment Naive Noncirrhotic

Regimen	Wks	Study	SVR
Ledipasvir/sofosbuvir (HCV RNA < 6 M IU/mL)	8	ION-3[1,2]	119/123 (97%)
Ledipasvir/sofosbuvir	12	ION-3[1]	206/216 (95%)
Simeprevir + sofosbuvir*	8-12	OPTIMIST-1[3]	8 wks: 128/155 (83%) 12 wks: 150/155 (97%)
Ombitasvir/paritaprevir/ritonavir, dasabuvir (GT1b)	12	PEARL III[4]	207/209 (99%)
Ombitasvir/paritaprevir/ritonavir, dasabuvir, ribavirin (GT1a)	12	PEARL IV[4]	97/100 (97%)
Sofosbuvir + daclatasvir	12	AI444040[5]	41/41 (100%)

*GT1a + Q80K-8 wks: 36/49 (73%); GT1a + Q80K-12 wks: 44/46 (96%).

1. Kowdley K, et al. N Engl J Med. 2014;370:1879-1888. 2. Ledipasvir/sofosbuvir [package insert].
3. Kwo PY, et al. EASL 2015. Abstract LP14. 4. Ferenci P, et al. N Engl J Med. 2014;370:1983-1992.
5. Sulkowski M, et al. N Engl J Med. 2014;370:211-221.

HCV Case 2: GT 1a, Tx experienced, cirrhotic

- 54 yo Caucasian male
- H/o injection drug use in 1980s
- H/o chronic hepatitis C with HCV Tx with PegIFN plus Ribavirin in 2005, treatment was discontinued after 4 months due to insufficient response

- ALT 45 IU/mL, AST 55 IU/mL, ALP 130 IU/mL, Bilirubin 0.8 mg/dL, INR 1.0, Platelets 79,000/mm3, Creatinine 1.5 g/dL, eGFR 45, h/o CAD
- HCV RNA positive, Genotype 1a
- Fibrosure score: 0.85 c/w advanced fibrosis/cirrhosis

- U/S: Nodular appearance of the liver, mild splenomegaly, no ascites
- EGD: Esophageal varices grade 1

Genotype 1 HCV PegIFN/RBV Treatment Experienced

- AASLD-IDSA guidelines
  - 3 regimens recommended

	Ledipasvir/ Sofosbuvir	Ombitasvir/ Paritaprevir/ Ritonavir + Dasabuvir	Simeprevir + Sofosbuvir
Genotype 1a, no cirrhosis	12 wks	12 wks + RBV	12 wks
Genotype 1a, cirrhosis	24 wks 12 wks + RBV	24 wks + RBV	24 wks ± RBV if Q80K neg
Genotype 1b, no cirrhosis	12 wks	12 wks	12 wks
Genotype 1b, cirrhosis	24 wks 12 wks + RBV	12 wks + RBV	24 wks ± RBV

http://www.hcvguidelines.org

Newer Combination DAA-Experienced Pts Will Appear in Your Practice

- Sofosbuvir + simeprevir
- Ledipasvir/sofosbuvir
- Ombitasvir/paritaprevir/ritonavir + dasabuvir

- Failure of newer DAA regimens generally presents as relapse with RAVs to at least 1 class

DAAs: Barrier to Genetic Resistance

	Protease Inhibitors	Nucleos(t)ide Polymerase Inhibitors	Nonnucleoside Polymerase Inhibitors	NS5A Inhibitors
Barrier to resistance	Low (1a < 1b)	High (1a = 1b)	Very low (1a < 1b)	Low (1a < 1b)
Comments	2nd-generation PIs have higher barrier, pangenotypic	Single target Active site	Allosteric Many targets	Multiple antiviral MOA

- RAVs to 1 drug are generally cross-resistant to other drugs within a class, although this is not always the case
- Viral fitness of RAVs effects their persistence after d/c of tx
  - RAV viral fitness varies between drug classes
- Identification and characterization of full resistance profiles for newer DAAs is rapidly evolving
- Drug resistance needs to be considered for each pt needing retreatment after DAA failure

Schaefer EA, et al. Gastroenterology. 2012;142:1340-1350.

Persistence of RAVs Varies by Drug Class

- NS3/4 RAVs generally short-lived
  - Majority of pts had only WT NS3 at mean 4.23 yrs after end of treatment with telaprevir or boceprevir[1]
- NS5A RAVs demonstrate viral fitness and persist; may present barrier to future retreatment
  - 86% of pts who experienced failure of LDV-containing regimens without SOF harbored NS5A RAVs 96 wks after treatment discontinuation[2]
    - Number of RAVs per pt decreased over time

1. Susser S, et al. J Clin Virol. 2011;52:321-327. 2. Wyles D, et al. EASL 2015. Abstract O059.

HCV Case 3: GT1a, Tx experienced SOF/LDV, advanced fibrosis

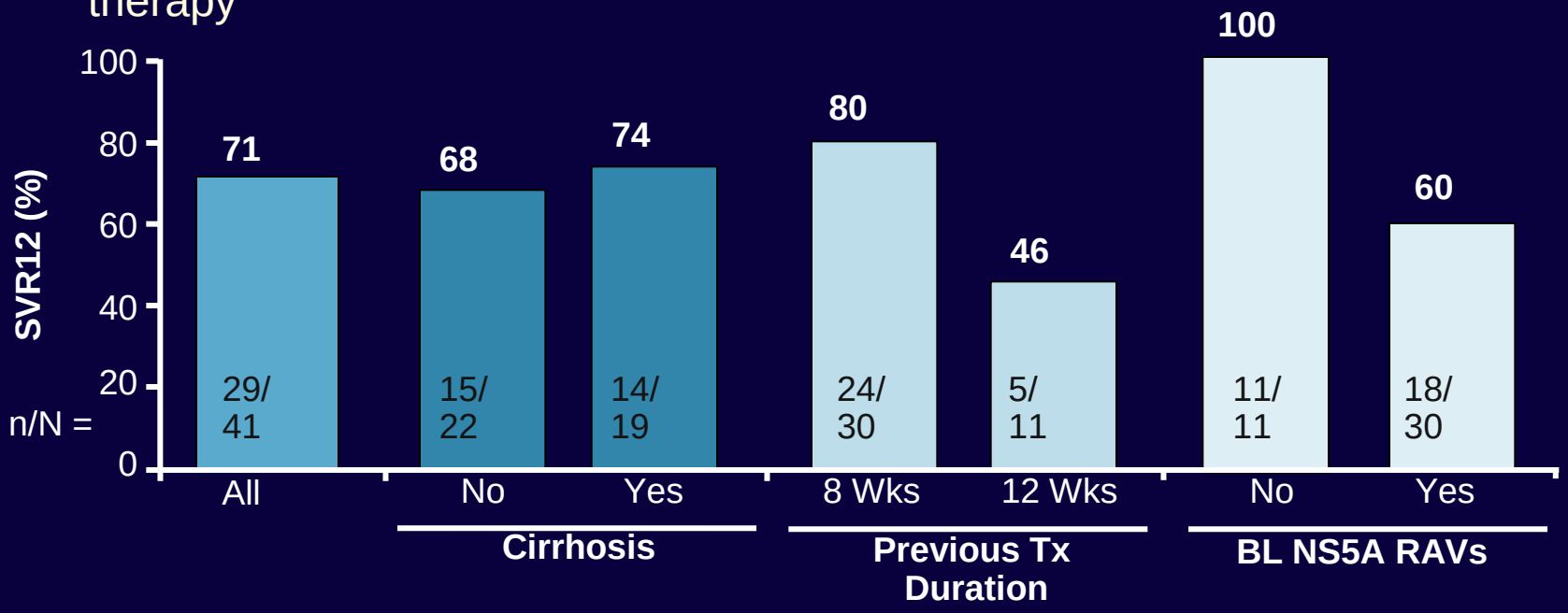
- 45 yo Caucasian male
- H/o intranasal drug use (cocaine) in 1990s, multiple nonprofessional tattoos, h/o heavy alcohol use
- Liver biopsy in 8/2014 showed Metavir stage 3 fibrosis
- Relapse after 8 weeks of HCV treatment with Harvoni (sofosbuvir plus ledipasvir)

- ALT 45 IU/mL, AST 42 IU/mL, Bilirubin 0.8 mg/dL, INR 1.0, Platelets 152,000/mm3
- HCV RNA 3,350,000 IU/mL, Genotype 1a

- U/S 3/2015: Coarse echotexture of the liver, spleen 14 cm, no ascites

24-Wk LDV/SOF After Failure of 8-12 Wks of LDV/SOF-Based Therapy in GT1 Pts

- Results from single arm of prospective phase II trial evaluating LDV/SOF for 24 wks in 41 pts with GT1 HCV infection previously treated with LDV/SOF-based therapy



- NS5B variants emerged during retreatment in 33% of pts (4/12) with VF
  - S282T: n = 2; L159F: n = 1; S282T + L159F: n = 1

Lawitz E, et al. EASL 2015. Abstract O005.

HCV Case 4: GT3, Tx experienced, compensated cirrhosis

- 54 yo Caucasian male
- H/o injection drug use in 1980s
- H/o HCV treatment x 3:
  1. Standard IFN plus RBV in 2000, relapse
  2. PegIFN plus RBV for 48 weeks in 2005, relapse
  3. PegIFN plus higher dose RBV for 72 weeks in 2012, relapse

- ALT 45 IU/mL, AST 55 IU/mL, ALP 130 IU/mL, Bilirubin 0.8 mg/dL, INR 1.0, Platelets 79,000/mm3
- HCV RNA 8,350,000 IU/mL, Genotype 3

- Liver biopsy in 2005 showed Metavir stage 4 fibrosis (cirrhosis)
- U/S: Nodular appearance of the liver, mild splenomegaly, no ascites
- EGD: No signs of portal hypertension.

Genotypes 2 and 3

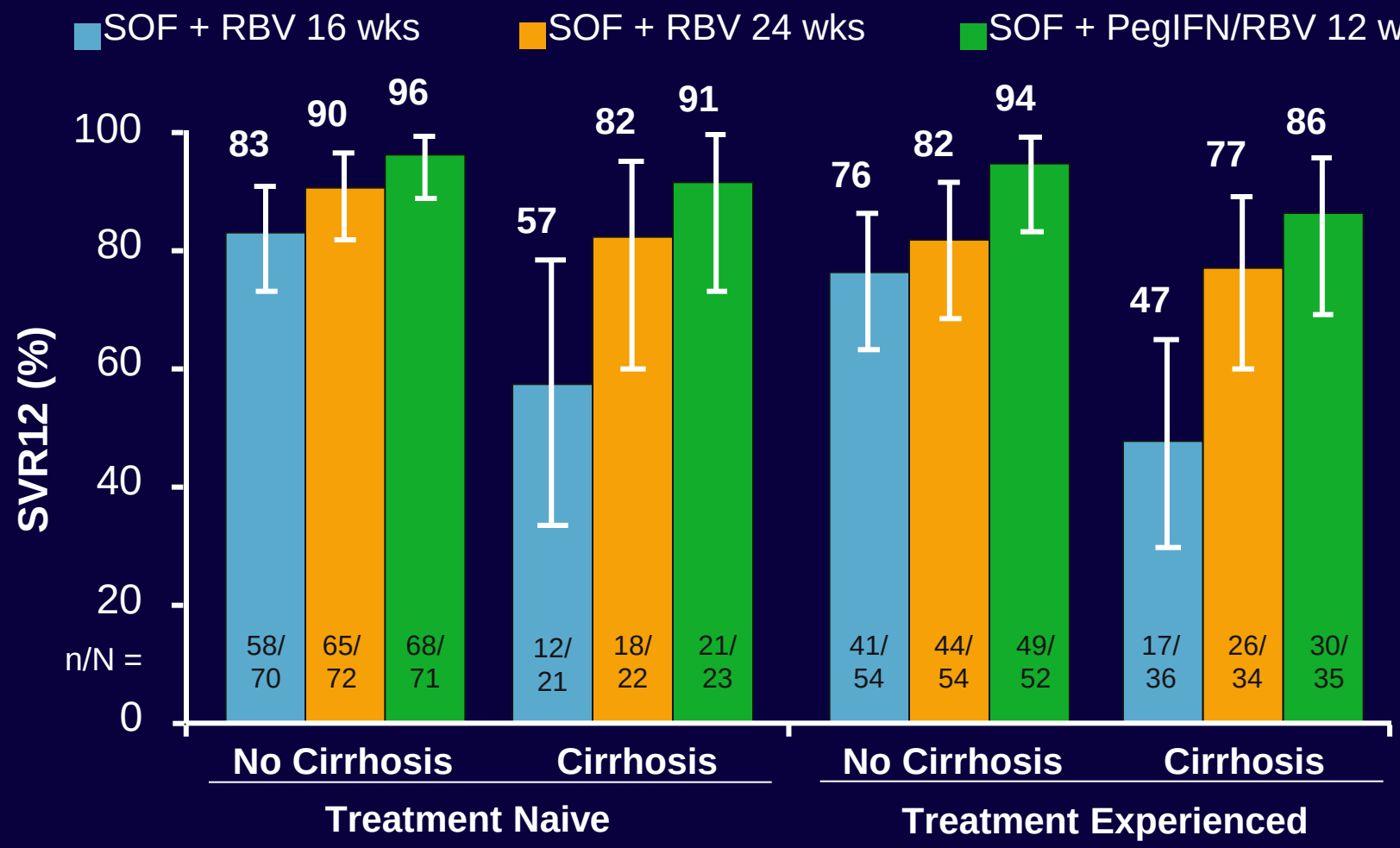
- AASLD-IDSA guidelines

Genotype 2	Sofosbuvir + Ribavirin	Peginterferon-α, Ribavirin + Sofosbuvir
Treatment naive	12 wks (16 wks for cirrhosis)	None
PegIFN/RBV nonresponders	12-16 wks	12 wks (alternative)

Genotype 3	Peginterferon-α, Ribavirin + Sofosbuvir	Sofosbuvir + Ribavirin
Treatment naive	12 wks	24 wks (alternative)
PegIFN/RBV nonresponders	12 wks	24 wks (alternative)

http://www.hcvguidelines.org

BOSON: SVR12 With SOF-Based Regimens in GT3 by Tx History and Cirrhosis Status

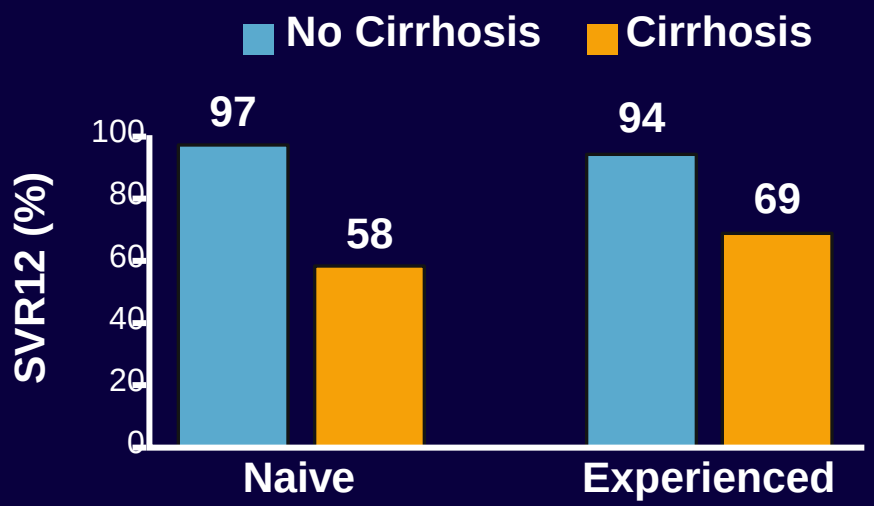


Foster GR, et al. EASL 2015. Abstract LO5.

Daclastavir + Sofosbuvir in Tx-Naive and Tx-Exp'd Pts With Genotype 3 HCV

ALLY-3[1]

- Pts:
  - Treatment naive and experienced
    - Prior sofosbuvir and alisporivir included
    - Prior NS5A inhibitors excluded
  - Cirrhosis: 21%
- Design
  - 2 open-label cohorts
  - Phase III
- Regimen
  - Daclatasvir + sofosbuvir once daily for 12 wks

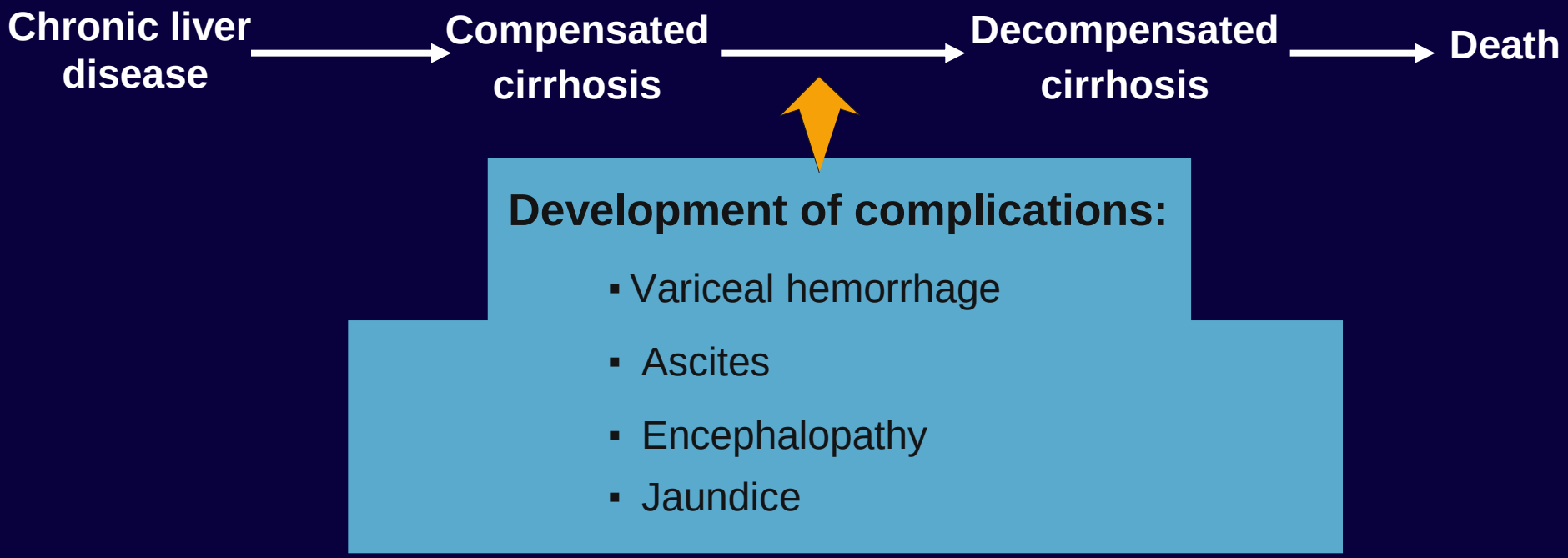


- EASL recommendations for DCV + SOF in GT3[2]
  - No cirrhosis: DCV + SOF for 12 wks
  - Compensated cirrhosis: DCV + SOF + RBV for 24 wks

1. Nelson DR, et al. Hepatology. 2015;61:1127-1135. 2. EASL HCV Guidelines. April 2015.

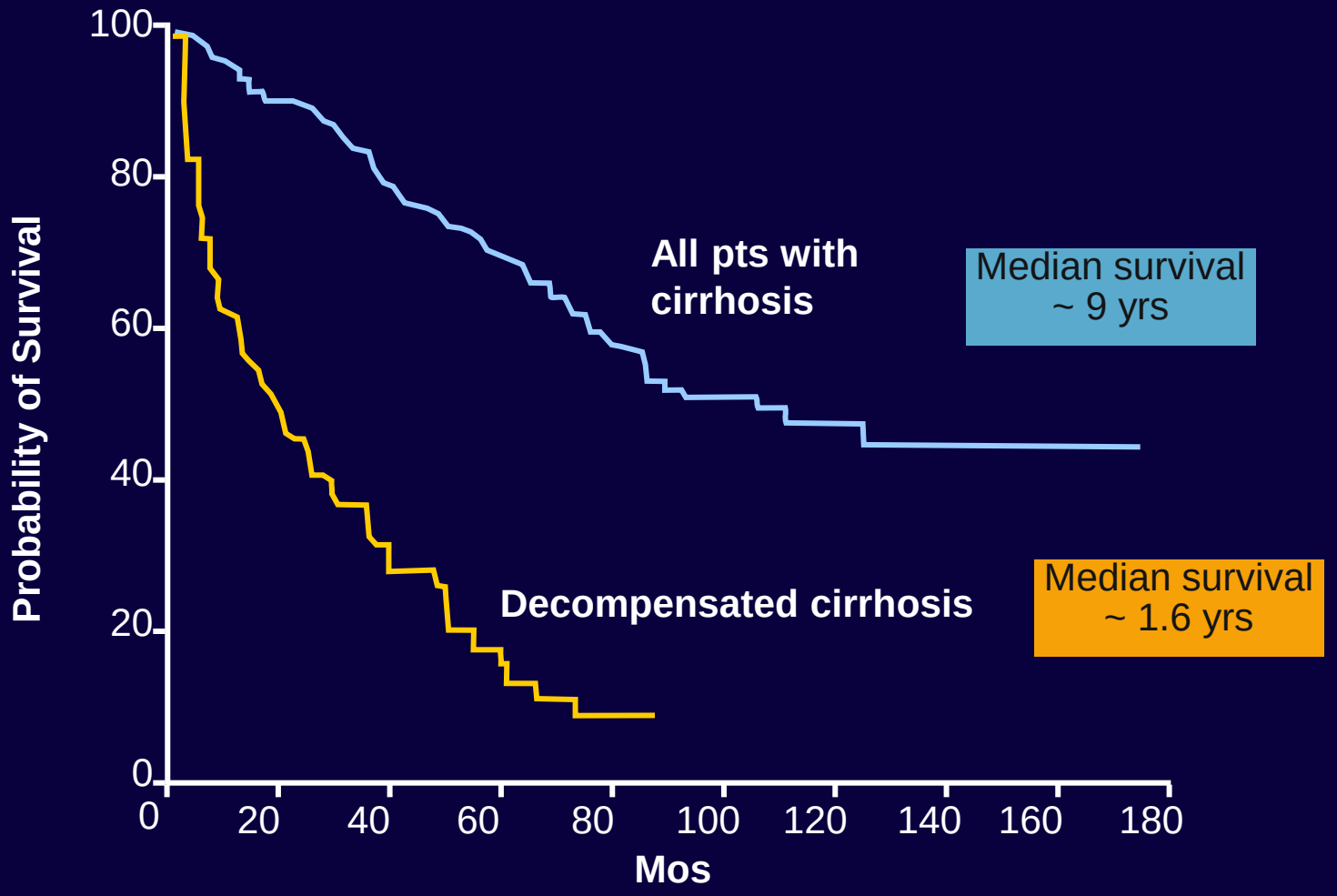
Special Populations

Decompensated Liver Cirrhosis: Natural History of Chronic Liver Disease



American Liver Foundation. The Progression of Liver Disease. http://www.liverfoundation.org/abouttheliver/info/progression/

Decompensation Shortens Survival



Ginés P, et al. Hepatology. 1987;7:122-128.

Assessing Cirrhosis Severity: Child-Pugh Score

Variable Points	1	2	3
Encephalopathy grade	None	1-2	3-4
Ascites	Absent	Slight	Moderate
Serum albumin (g/dL)	> 3.5	2.8-3.5	< 2.8
Prothrombin time (sec prolonged)	< 4	4-6	> 6
Serum bilirubin (mg/dL)	< 2	2-3	> 3

- Child-Pugh A: 5-6 points
- Child-Pugh B: 7-9 points
- Child-Pugh C: ≥ 10 points

- Subjective component relies on clinical judgment

Pugh RN, et al. Br J Surg. 1973;60:646-649.

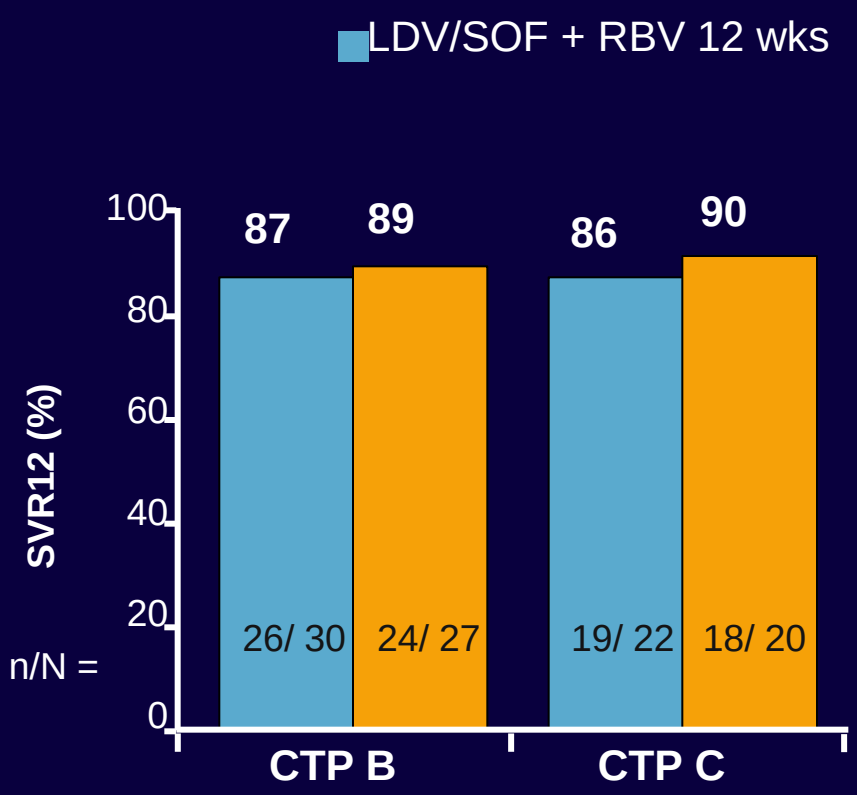
HCV Case 5: Genotype 1a, treatment naive, decompensated cirrhosis

- 60 yo Caucasian female
- H/o injection drug use in 1980s, h/o heavy alcohol use for about 10 years, quit in 11/2014
- H/o decompensation with large ascites in 11/2014, currently controlled on treatment with 25 mg spironolactone daily
- Hepatic encecphalopathy: Sleep disturbances, forgetfullness, denies hospitalizations

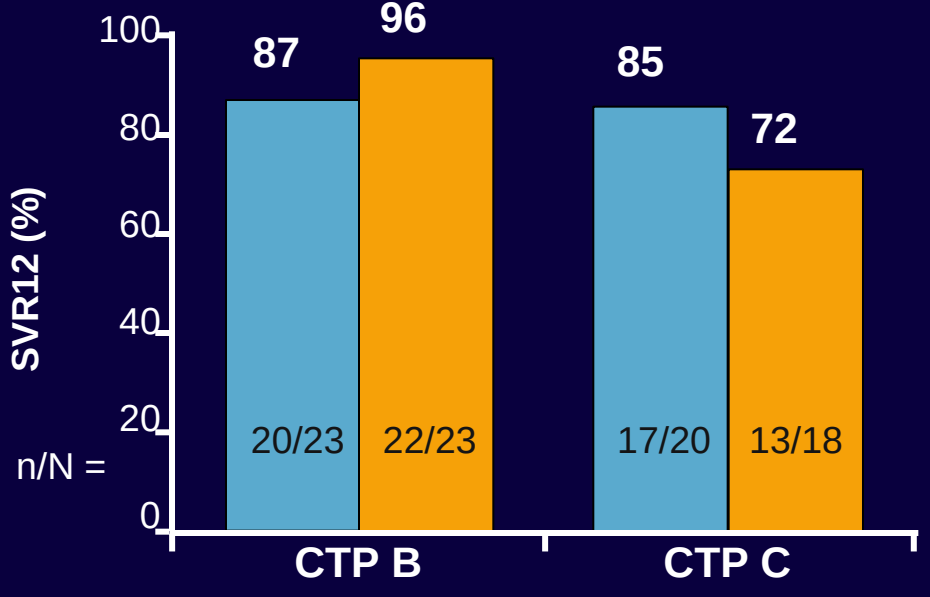
- ALT 32 IU/mL, AST 45 IU/mL, Bilirubin 2.3 mg/dL, INR 1.2, Platelets 54,000/mm3, Albumin 3.1 g/dL: MELD score 12; CPT score 9, Child class B
- HCV RNA positive, Genotype 1a

- U/S: Nodular appearance of the liver, splenomegaly, trace ascites
- EGD: Esophageal varices grade 2, no h/o variceal bleeding, on primary bleeding prophylaxis with nadolol 20 mg daily

SOLAR: SVR12 in GT1 or 4 With Decompensated Cirrhosis



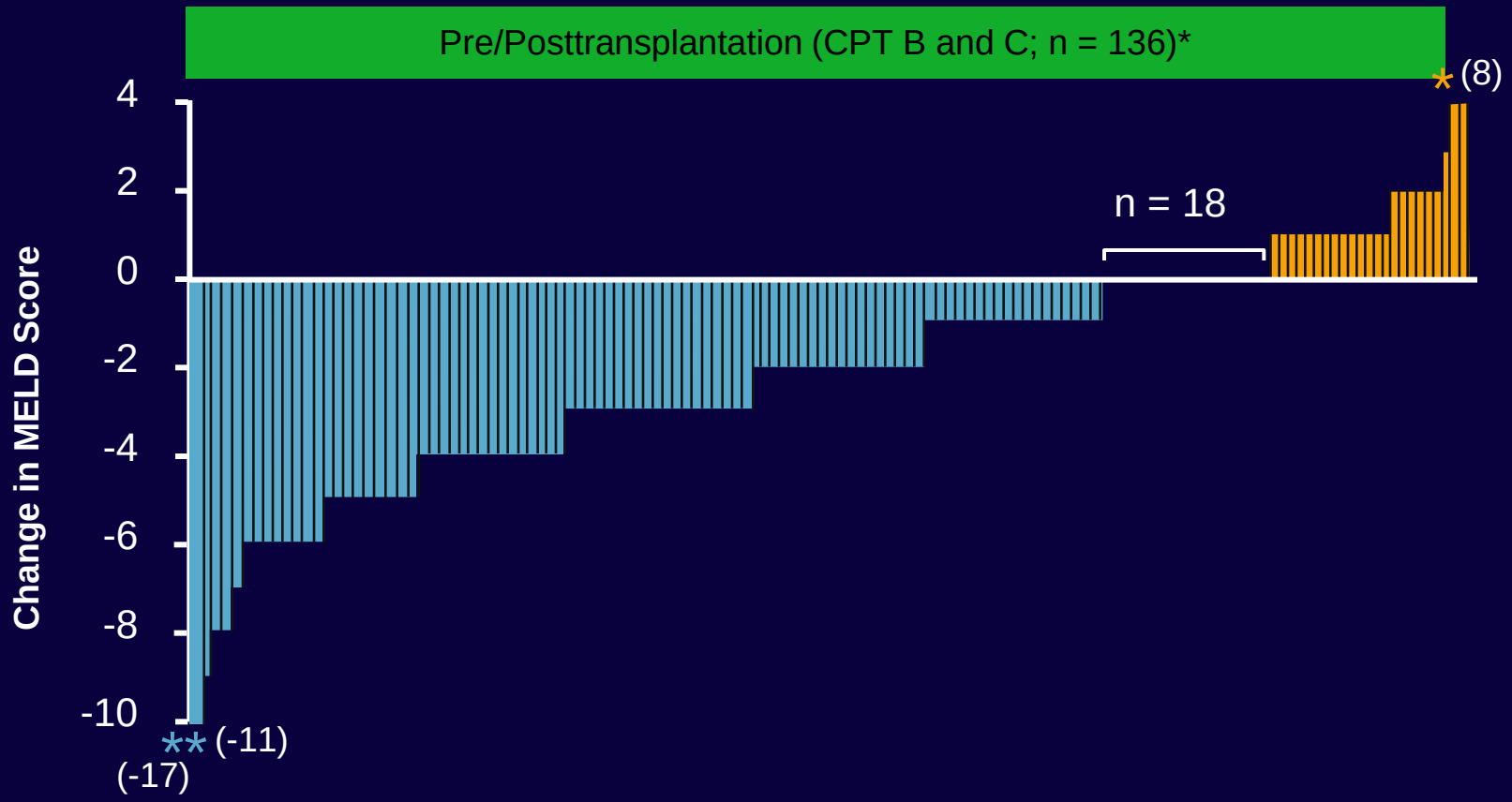
SOLAR-1: GT 1 and 4[1]



SOLAR-2: GT 1[2]

1. Flamm SL, et al. AASLD 2014. Abstract 239. 2. Manns M, et al. EASL 2015. Abstract G02.

SOLAR-2: Change in MELD Score From BL to FU Wk 4 in CPT B or C Disease



*Missing FU-4: n = 24.

Manns M, et al. EASL 2015. Abstract G02.

Dosing Considerations for Pts With Renal Impairment

- **OBV/PTV/RTV + DSV**: no dose adjustment required with mild, moderate, or severe renal impairment (CrCl: ≥ 15 mL/min)[1,2]
- **LDV/SOF and SMV + SOF**: no dose adjustment required with mild or moderate renal impairment (CrCl ≥ 30 mL/min)[3,4]
  - Safety and efficacy not established in severe renal impairment or hemodialysis
  - TARGET data demonstrate feasibility of SOF-containing regimens but renal and urinary AEs increased across decreasing eGFR strata[5]
- **DCV**: no dose adjustment required with any degree of renal impairment (studied in subjects with CrCl: ≥ 15 mL/min)[6]
- **RBV**: dose adjustment required for CrCl < 50 mL/min[7]

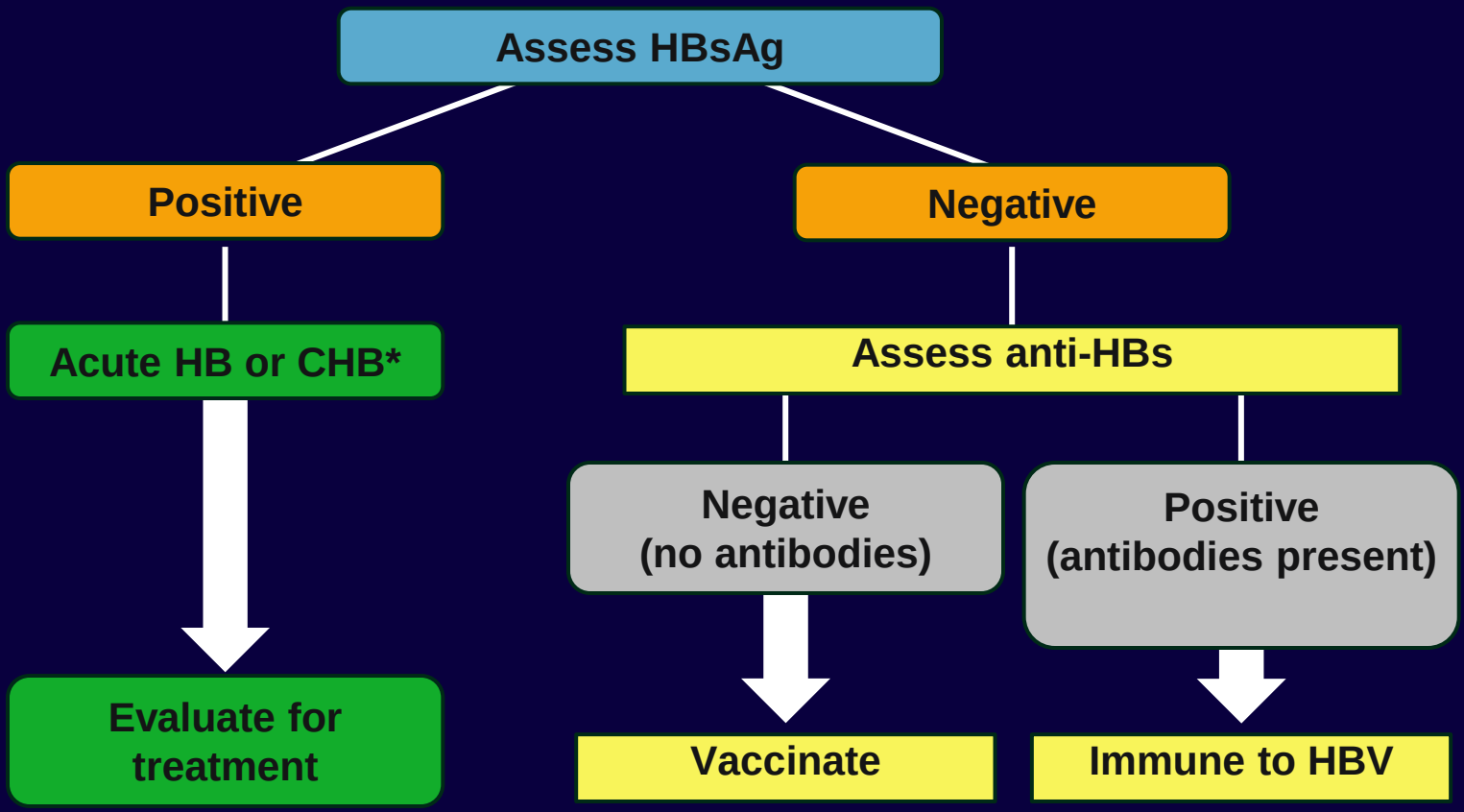
CrCl	RBV Dose
30-50 mL/min	Alternating 200 mg and 400 mg every other day
< 30 mL/min	200 mg/day
Hemodialysis	200 mg/day

1. OBV/PTV/RTV + DSV [package insert]. 2. Pockros PJ, et al. EASL 2015. Abstract L01. 3. LDV/SOF [package insert]. 4. AASLD/IDSA. HCV Management. http://www.hcvguidelines.org. 5. Saxena V, et al. EASL 2015. Abstract LP08. 6. DCV [European package insert]. 7. RBV [package insert].

Hepatitis B

Initial Evaluation and Tests to Diagnose HBV

HBV Screening Algorithm



*Time from positive HBsAg test to diagnosis of CHB is 6 mos.

Keeffe EB, et al. Clin Gastroenterol Hepatol. 2008;6:1315-1341.

Hepatitis B Serology: First Phase Testing

- Total anti-HBc can be used as alternative; those testing positive should be tested for HBsAg and anti-HBs
  - Appears at the onset of symptoms in acute hepatitis and persists for life
  - Presence indicates EXPOSURE (previous or ongoing infection with HBV)

Lok AS, et al. Hepatology. 2009;50:661-662.

Hepatitis B Serology: IgM anti-HBc

- IgM anti-HBc (IgM antibody to hepatitis B core antigen)[1]
  - Presence indicates acute infection (negative in chronic infection)
    - Positivity indicates recent infection with HBV (≤ 6 mos)
  - Occurs in the presence of acute exacerbation of *chronic* HBV disease

1. CDC. Hepatitis B FAQs for health professionals. Available at: http://www.cdc.gov/hepatitis/HBV/HBVfaq.htm. 2. Colloredo MG, et al. Arch Virol Suppl. 1993;8:203-211.

Interpretation of Serologic Results

HBsAg	Total Anti-HBc	IgM Anti-HBc	Anti-HBs	Interpretation
Negative	Negative	NA	Negative	Susceptible; offer vaccination
Negative	Positive	NA	Positive	Immune due to natural infection
Negative	Negative	NA	Positive	Immune due to hepatitis B vaccination
Positive	Positive	Negative	Negative	Chronic HBV infection
Positive	Positive	Positive	Negative	Acute HBV infection/ Reactivation of Chronic HBV Infection
Negative	Positive	NA	Negative	Unclear; could be any one of the following: 1. Resolved infection (most common) 2. False-positive anti-HBc; susceptible 3. “Low-level” chronic infection 4. Resolving acute infection

CDC. Hepatitis B FAQs for health professionals. Available at: http://www.cdc.gov/hepatitis/HBV/HBVfaq.htm.

Case 1: Acute Hepatitis B, non-severe

- 54 yo Caucasian female
- RUQ pain, nausea, fatigue
- Multiple sexual partners
- ALT 1,520 IU/mL, AST 1,230 IU/mL, ALP 220 IU/mL, Bilirubin 3.2 mg/dL, INR 1.0, Platelets 265,000/mm3
- HBsAg +, Anti-HBs -, Anti-HBc IgM +, Anti-HCV -
- HBeAg +, HBV DNA 365,000 IU/mL
- U/S: Hepatomegaly, no splenomegaly, no ascites, thickened GB wall, normal bile ducts

Case 1: Acute Hepatitis B, severe

- 54 yo Caucasian female
- RUQ pain, nausea, fatigue, has noticed worsening jaundice 1 week ago
- Multiple sexual partners
- ALT 1,520 IU/mL, AST 1,230 IU/mL, ALP 220 IU/mL, Bilirubin 17.2 mg/dL, INR 1.8, Platelets 265,000/mm3
- HBsAg +, Anti-HBs -, Anti-HBc IgM +, Anti-HCV -
- HBeAg +, HBV DNA 365,000 IU/mL
- U/S: Hepatomegaly, no splenomegaly, no ascites, thickened GB wall, normal bile ducts

Acute Hepatitis B

Treat only if severe, prevent acute liver failure

Severe:

- significant coagulopathy (INR > 1.5)
- prolonged high bilirubin (>4 weeks >10)

Definition of acute liver failure:

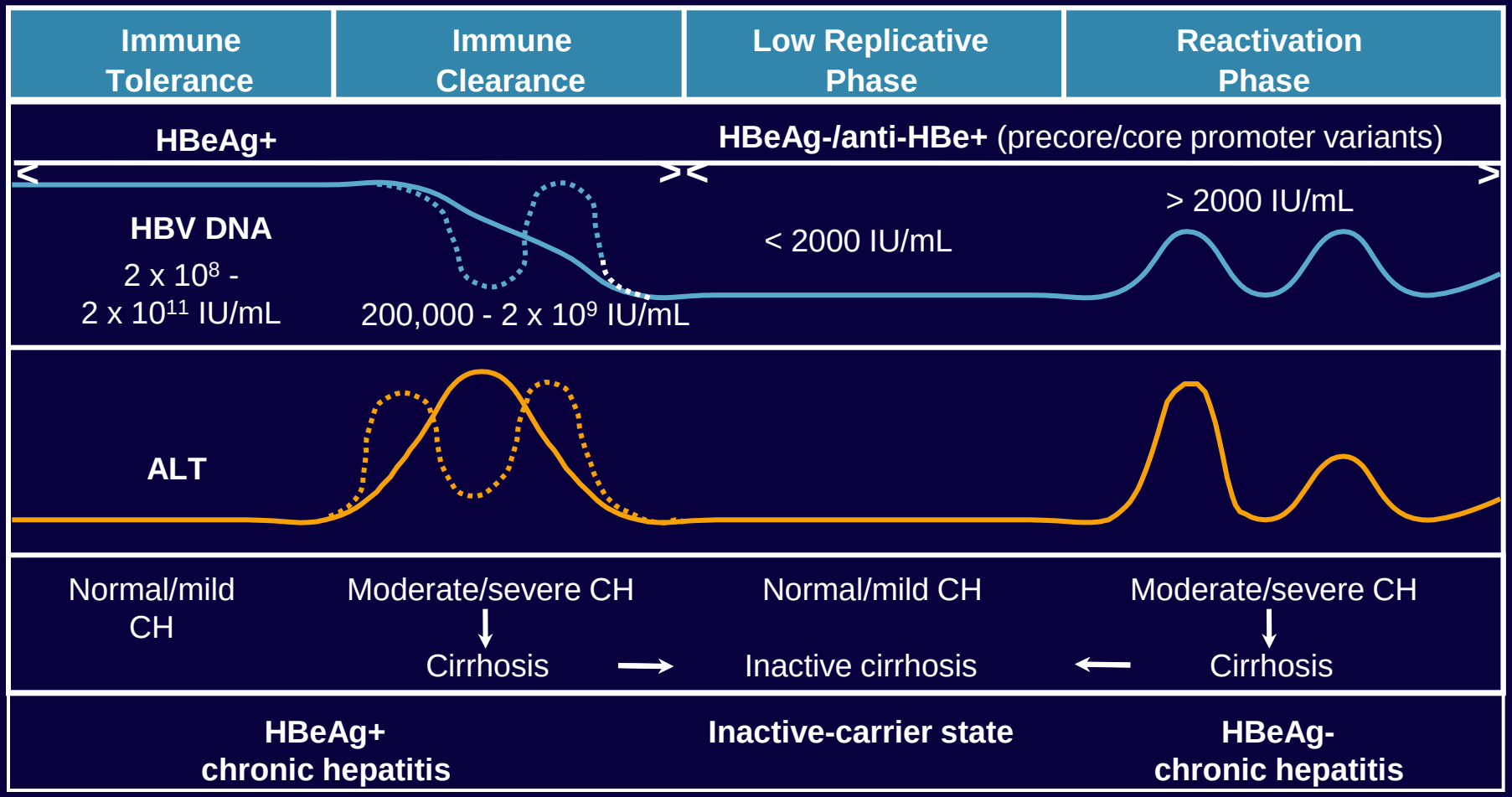
Acute severe impairment of liver function with icterus and coagulopathy

No underlying chronic liver disease

Hepatic Encephalopathy

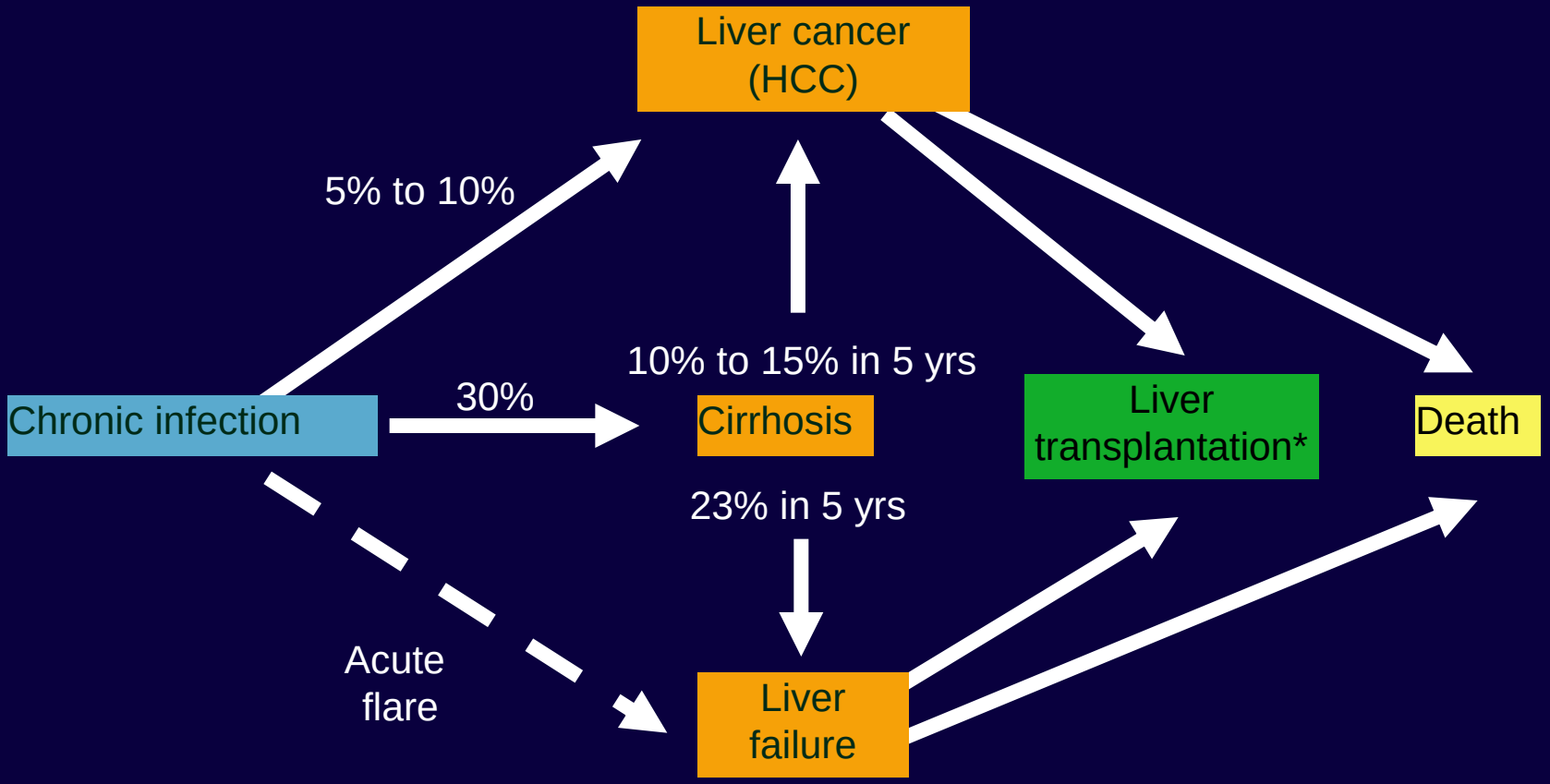
Assessing Patients with chronic hepatitis B for Treatment Candidacy: To Treat or Not to Treat?

Phases of Chronic HBV Infection



Slide courtesy of A. S. F. Lok, MD.

Natural History of HBV: Directly Related to HBV DNA Level



*HBV is the 6th leading cause of liver transplantation in the United States.

Fattovich G, et al. Gastroenterology. 2004;127:S35-S50. Seeff LB, et al. Hepatology. 2001;33:455-463. Torresi J, et al. Gastroenterology. 2000;118:S83-S103. Fattovich G, et al. Hepatology. 1995;21:77-82.

Who Should Be Treated?

- Not a question of who to treat, but when: treat now or monitor and treat later when indicated
- All HBV carriers are potential treatment candidates
- A patient who is not a treatment candidate now can be a treatment candidate in the future
  - Changes in HBV replication status and/or activity/stage of liver disease
  - Availability of new or improved treatments

Determining Treatment Candidacy for Chronic Hepatitis B: Guidelines

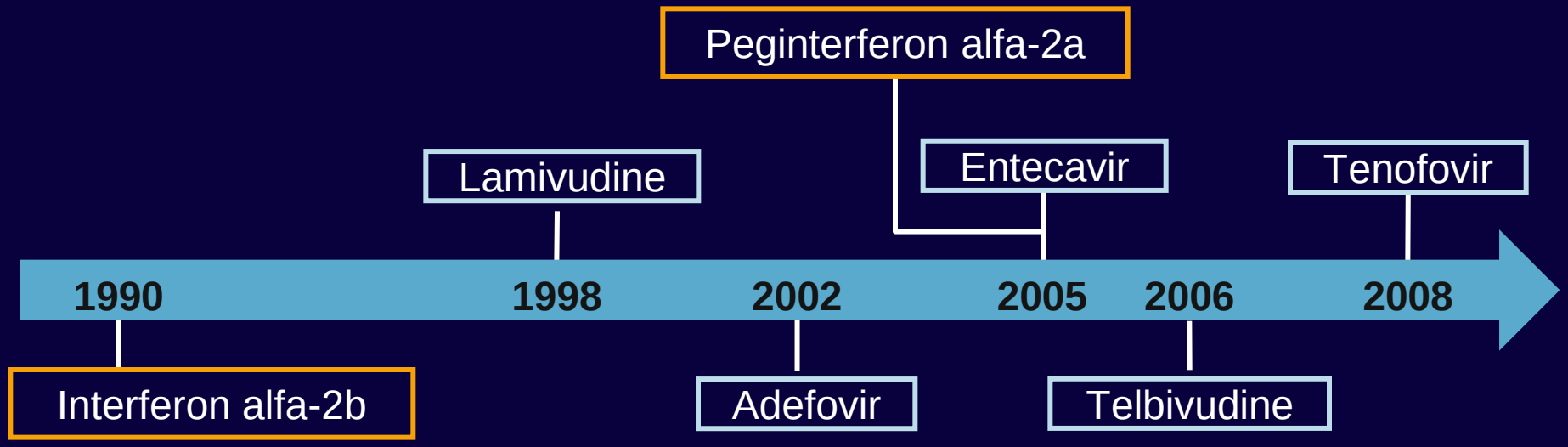
Guidelines	HBeAg Positive		HBeAg Negative	
	HBV DNA, IU/mL	ALT	HBV DNA, IU/mL	ALT
AASLD 2009[1]	> 20,000	> 2 x ULN or positive biopsy*	≥ 20,000	≥ 2 x ULN or positive biopsy*
EASL 2009[2]	> 2000	> ULN	> 2000	> ULN
APASL 2008[3]	≥ 20,000	> 2 x ULN	≥ 2000	> 2 x ULN
NIH Consensus Conference 2009[4]	> 20,000	> 2 x ULN or positive biopsy*	≥ 20,000	≥ 2 x ULN or positive biopsy*

*Moderate/severe inflammation or significant fibrosis.

- Expert guidelines also published with recommendations specific for HBV management in US[5] and more recently for Asian Americans[6]
  - Some key differences between these guidelines

1. Lok AS, et al. Hepatology. 2009;50:661-662. 2. EASL. J Hepatol. 2009;50:227-242. 3. Liaw YF, et al. Hepatol Int. 2008;3:263-283. 4. Degerekin B, et al. Hepatology. 2009;S129-S137. 5. Keeffe EB, et al. Clin Gastroenterol Hepatol. 2008;6:1315-1341. 6. Tong MJ, et al. Dig Dis Sci. 2011;56:3143-3162.

HBV Treatment Landscape in 2015



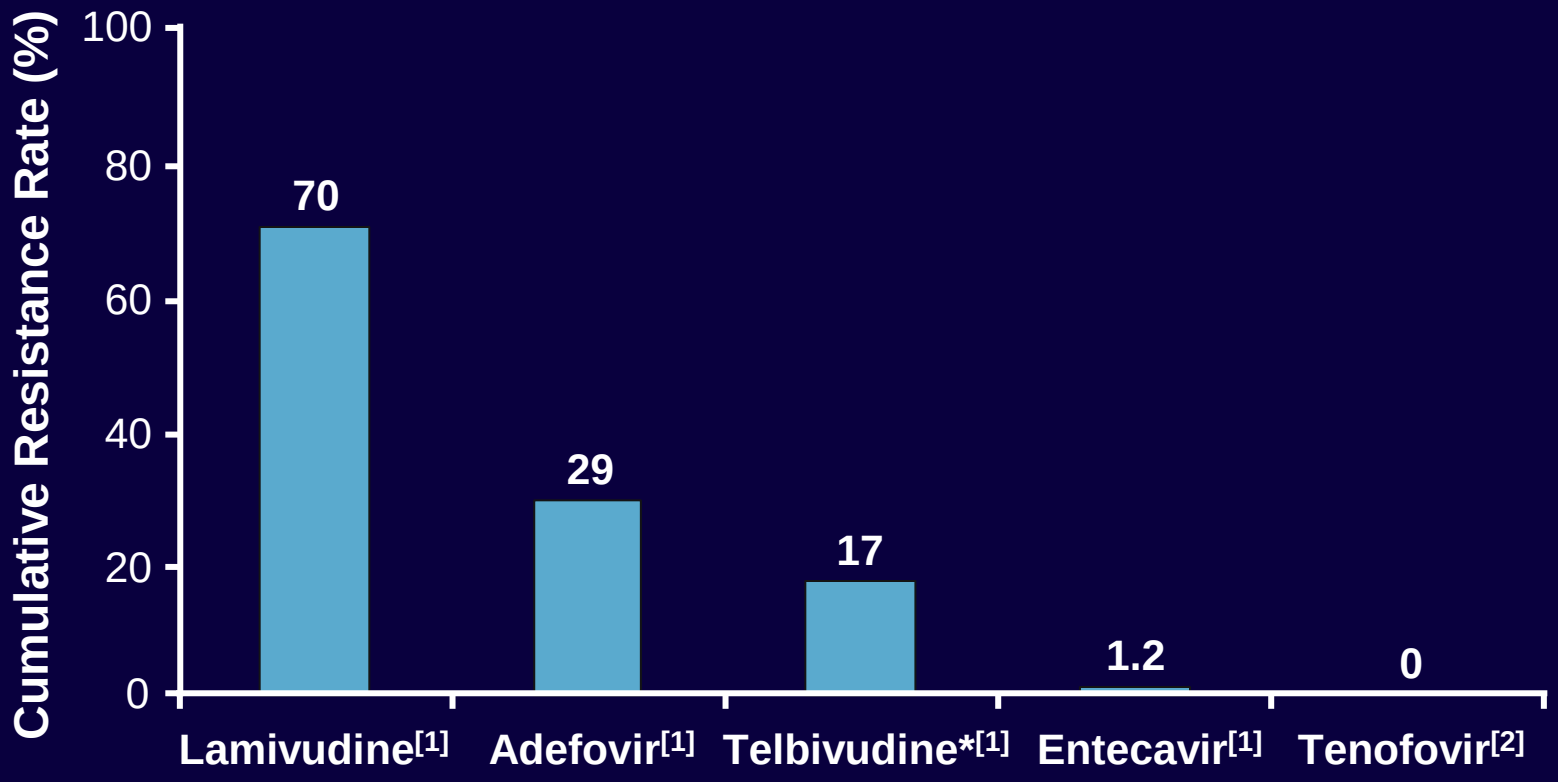
Current Guideline Recommendations for First-line Therapy

- Peginterferon alfa-2a

- Entecavir
- Tenofovir

EASL. J Hepatol. 2009;50:227-242. Liaw YF, et al. Hepatol Int. 2008;2:263-283.
Lok AS, et al. Hepatology. 2009;50:661-662.

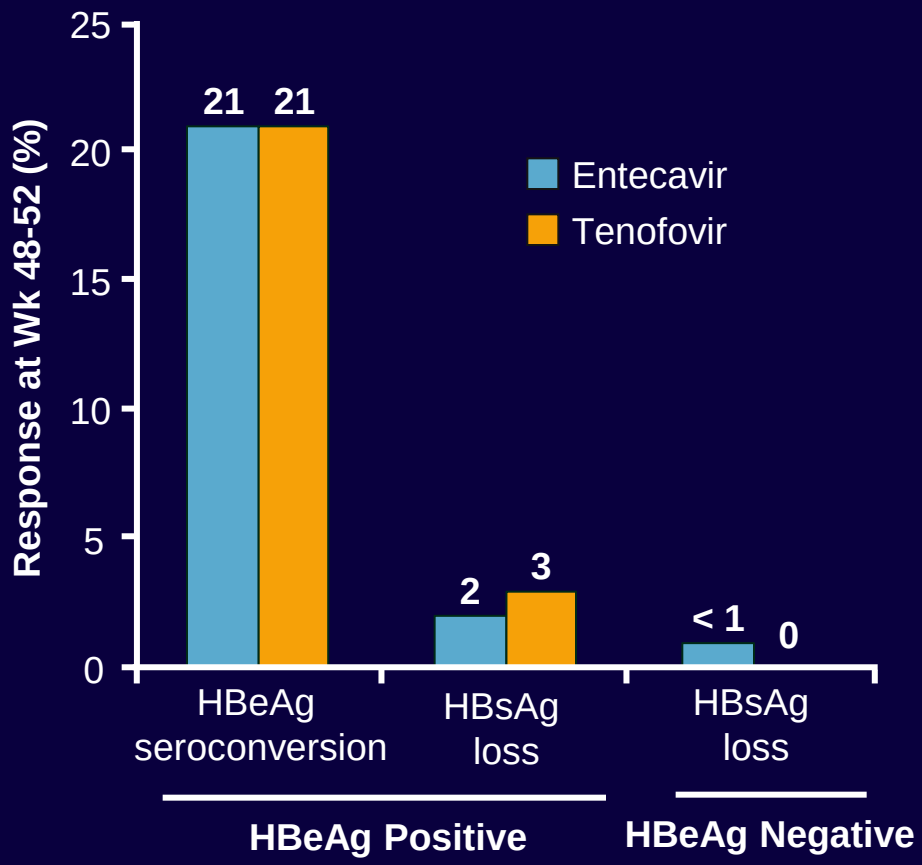
5-Yr Rates of Resistance With Oral Agents in Nucleos(t)ide-Naive Patients



*Telbivudine rate determined at Yr 2.

1. EASL. J Hepatol. 2009;50:227-242. 2. Marcellin P, et al. AASLD 2011. Abstract 1375.

Selection of Entecavir vs Tenofovir: Either Is an Excellent Choice for Most Patients



Parameter	Entecavir	Tenofovir
Log HBV DNA ↓ at Wk 48-52		
▪ HBeAg positive	6.9	6.2
▪ HBeAg negative	5.0	4.6
Genotypic resistance, %		
▪ NA naive	1.2 (Yr 5)	0 (Yr 3)
▪ Lamivudine experienced	51 (Yr 5)	NR
Pregnancy rating	Class C	Class B
AEs	None	Renal toxicity; ↓ BMD

Lok AS. Hepatology. 2010;52:743-747.