Hepatitis B Virus and Latent Tuberculosis Co-Infection

Understanding Disease Prevalence and Outcomes

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SF Hep B Free - HBV-ECHO

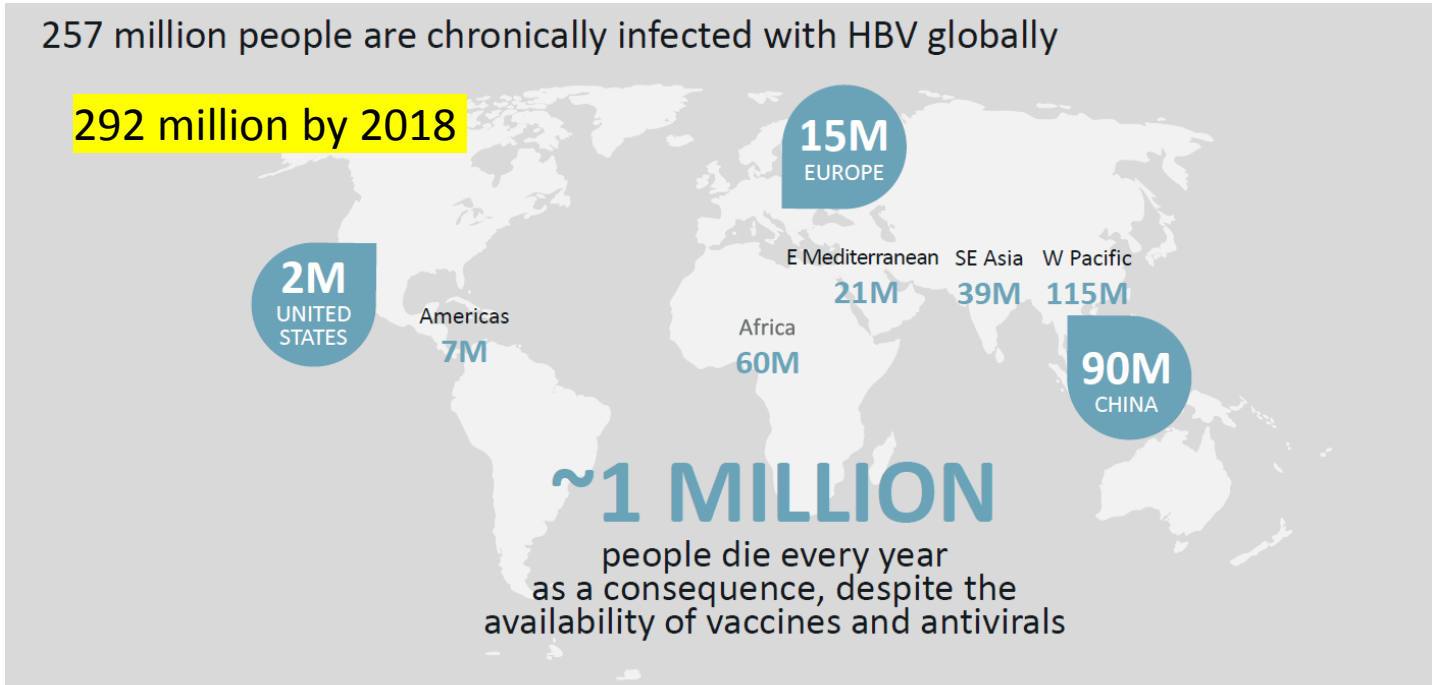
Disclosures

- No relevant disclosures

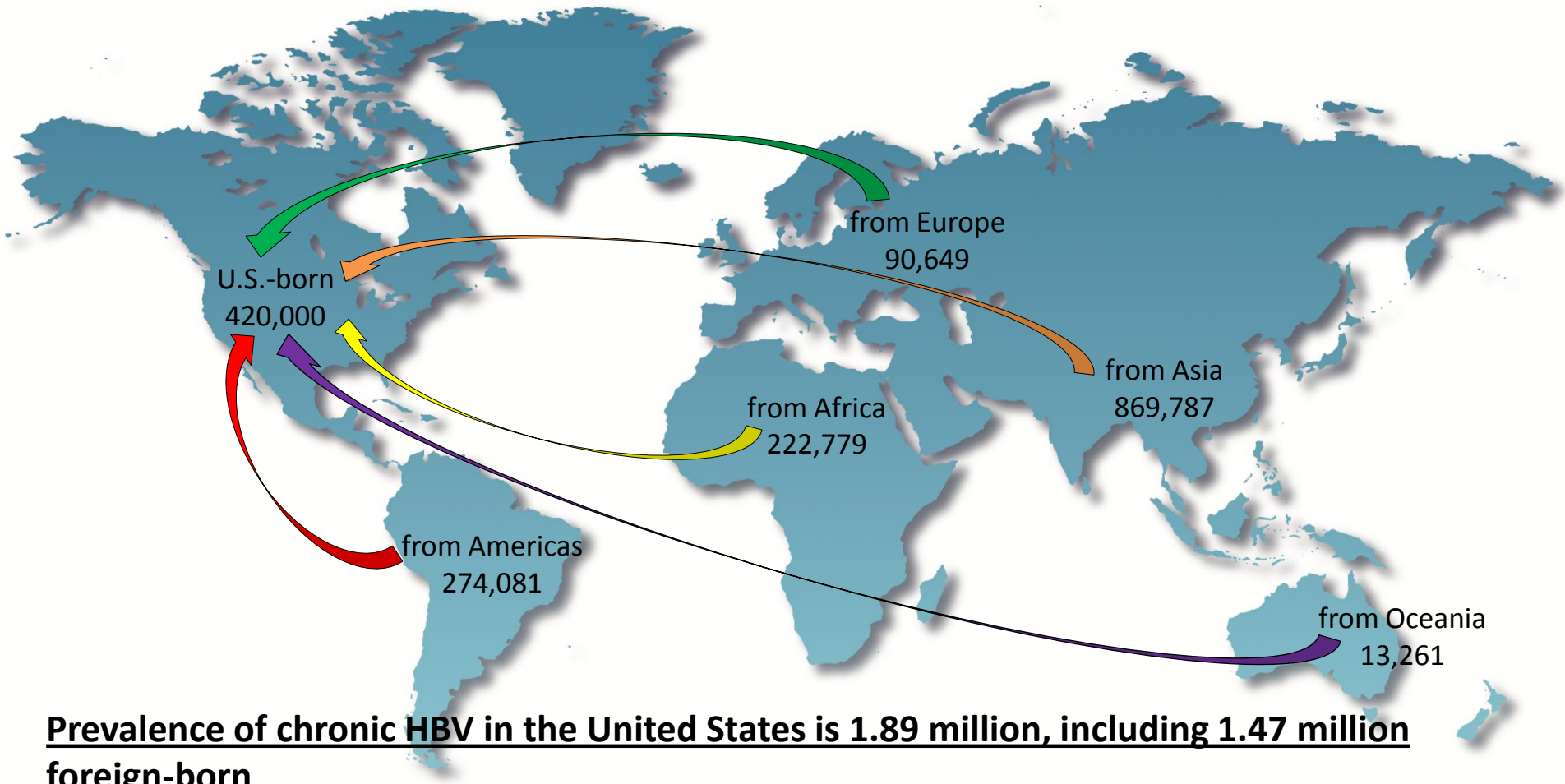
Objectives

- Understand prevalence of HBV-TB co-infection across world regions
- Identify existing gaps in our understanding of HBV-TB disease epidemiology
- Understand the clinical significance of timely and accurate identification of HBV-TB co-infection

Global Prevalence of HBV Infection



Hepatitis B. *WHO.* 2017. http://www.who.int/mediacentre/factsheets/fs204/en/; Porlaris Group. *Lancet Gastroenterol Hepatol*. 2018.



Prevalence of chronic HBV in the United States is 1.89 million, including 1.47 million foreign-born

Wong, et al. Hepatology 2021

Global Incidence of TB

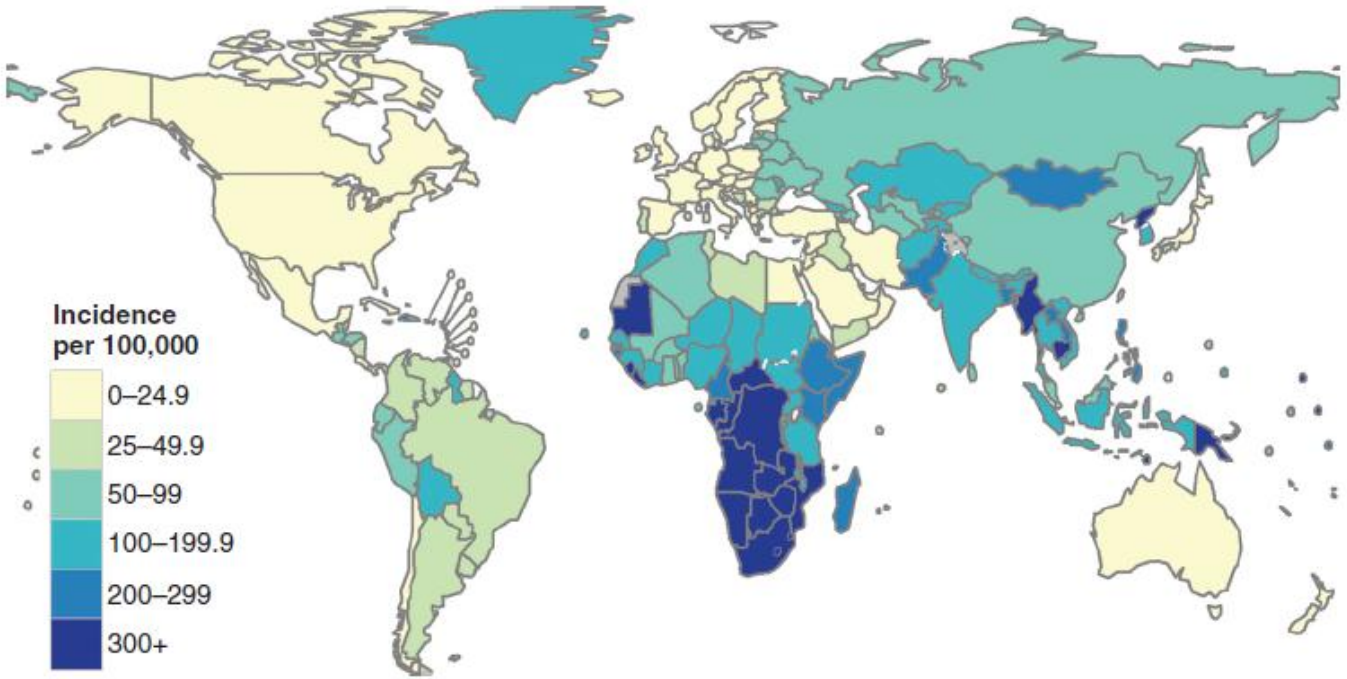
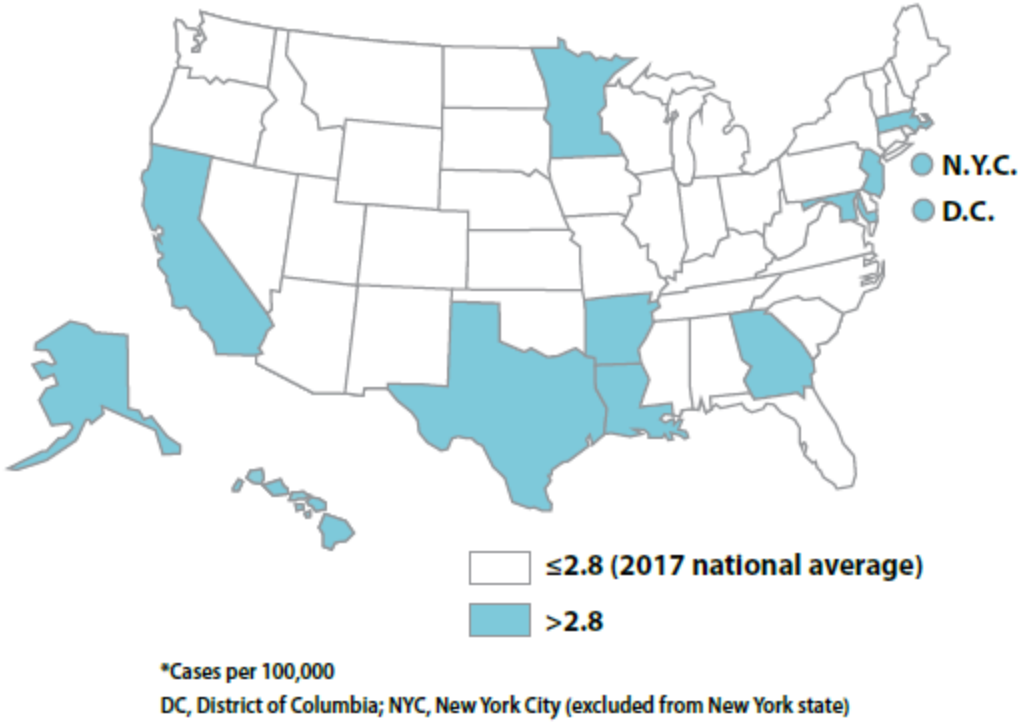
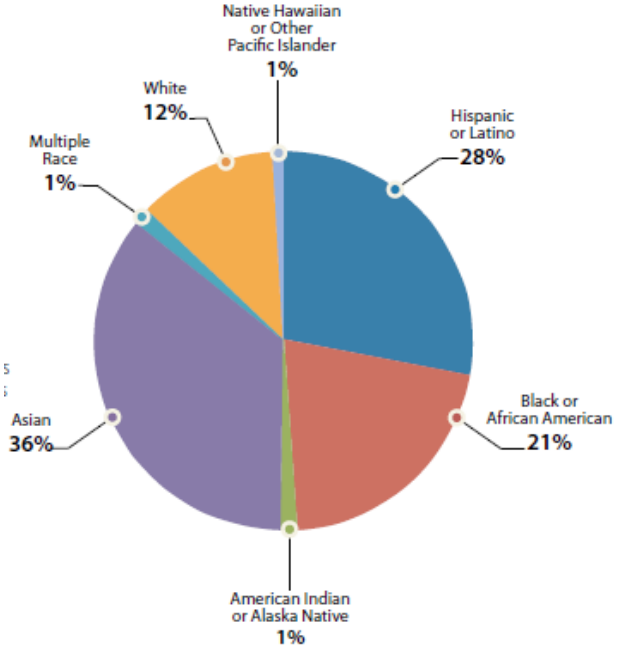


Figure 1. Estimated tuberculosis incidence rates per 100,000 population, 2012.

Glaziou, et al. Cold Spring Harb Perspect Med 2015;5:a017798

Epidemiology of TB in the U.S.





CDC data

Patients with HBV-TB co-infection are at higher risk of drug induced liver injury

Clinical Infectious Diseases

MAJOR ARTICLE

Antiviral Therapy for Hepatitis B Prevents Liver Injury in

Table 1. Baseline Clinical and Biochemical Characteristics of Patients With Tuberculosis–Hepatitis B Virus Coinfection at the Time of Tuberculosis Diagnosis

		Patients Not on Antiviral Therapy (n = 3210)				
Characteristic	Patients on Antiviral Therapy (n = 488)	All Patients Not on Antiviral Therapy (n = 3210)	*P* Value[a]	Patients Started Antiviral Therapy After Diagnosis of Tuberculosis (n = 446)	Untreated (n = 2764)	*P* Value[b]
Male	351 (73.7%)	2374 (74.0%)	.894	342 (77.0%)	2032 (73.5%)	.120
Age, y	52.9 ± 14.2	56.1 ± 16.9	<.001	55.1 ± 16.7	56.2 ± 16.9	.195
Presence of other liver disease[c]	21 (4.3%)	69 (2.1%)	.004	5 (1.1%)	64 (2.3%)	.107
Positive hepatitis B e antigen[d]	58 (20.3%)	277 (15.6%)	.045	69 (25.1%)	208 (13.8%)	<.001
Hepatitis B virus DNA (log IU/mL)[e]	2.18 (1.00, 5.68)	3.76 (2.20, 5.94)	<.001	5.47 (3.08, 7.07)	3.14 (1.98, 4.90)	<.001
Alanine transaminase (U/L)	27 (17, 44)	26 (16, 43)	.170	32 (20, 64)	25 (16, 41)	<.001
Total bilirubin (μmol/L)	10 (6, 16)	10 (7, 14)	.518	11 (7, 16)	10 (7, 14)	.005
Albumin (g/L)	34 ± 8	32 ± 7	<.001	33 ± 8	33 ± 7	.723
Platelet ($\times 10^9$/L)	19 (132, 268)	254 (190, 336)	<.001	220 (162, 297)	258 (196, 341)	<.001
Creatinine (μmol/L)	78 (62, 96)	75 (63, 91)	.162	74 (61, 89)	76 (63, 92)	.017

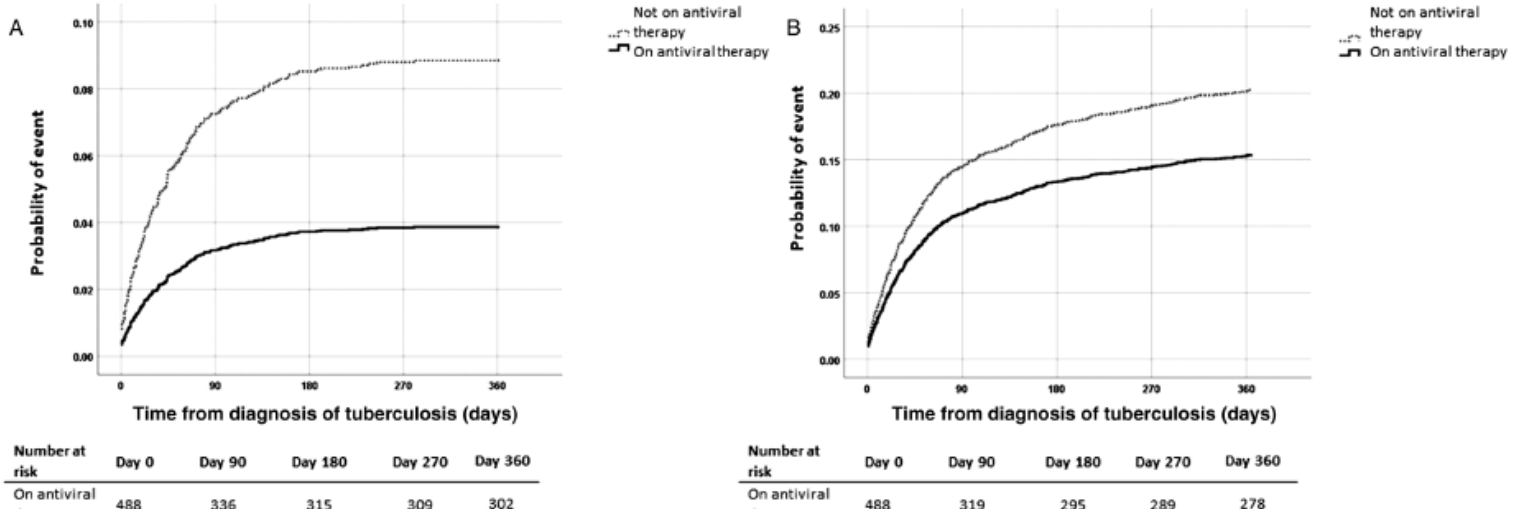


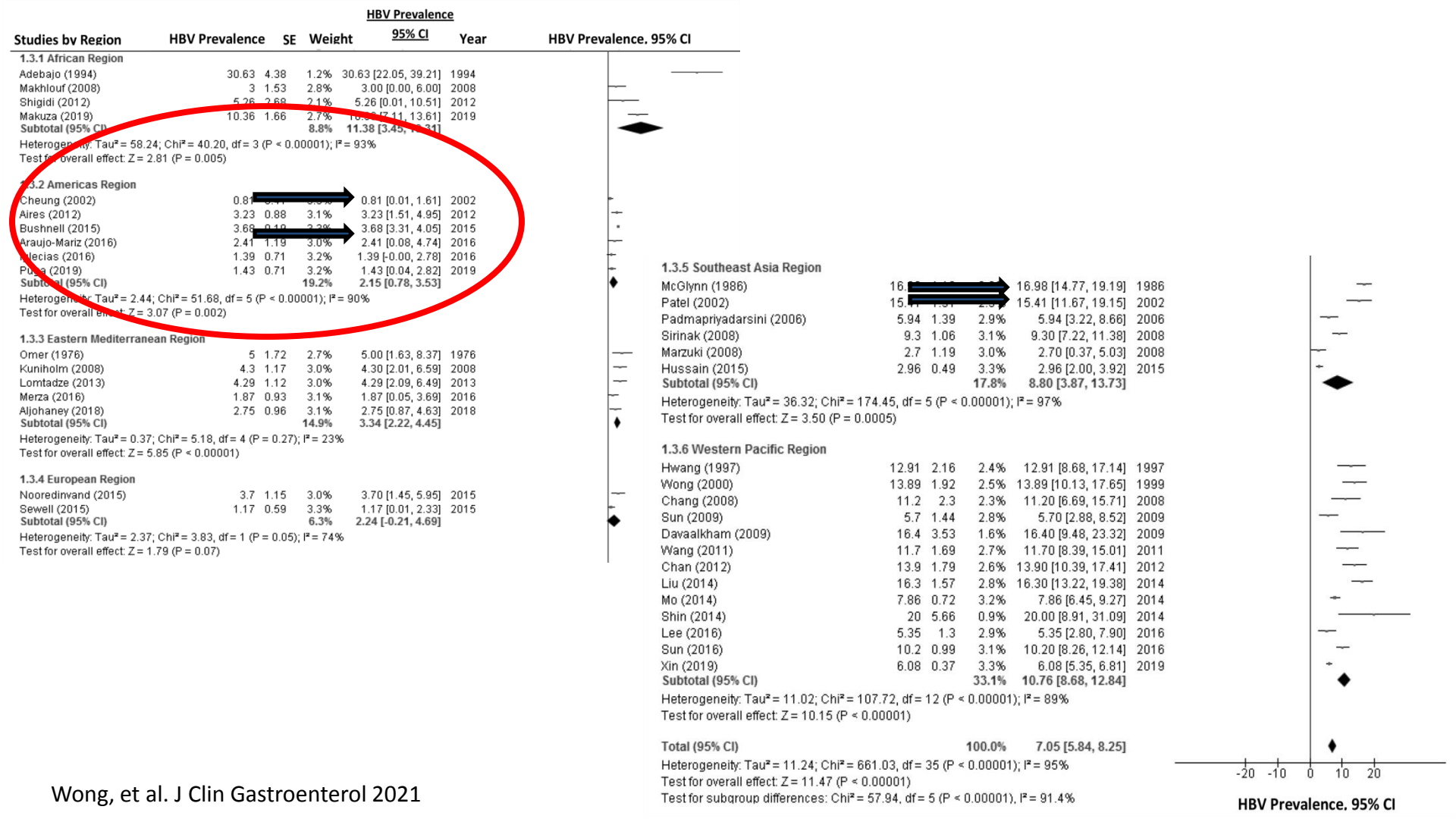
Table 2. Primary and Secondary Outcomes in Patients on Antiviral Therapy and Patients Not on Antiviral Therapy at the Time of Tuberculosis Diagnosis

	Patients on Antiviral Therapy (n = 488)	Patients Not on Antiviral Therapy (n = 3210)	Bivariable Cox Proportional Hazards Model			Multivariable Cox Proportional Hazards Model[a]		
Outcome	No. (%)	No. (%)	HR	95% CI	*P* Value	Adjusted HR	95% CI	*P* Value
Hospitalization due to drug-induced liver injury	18 (3.7)	222 (6.9)	0.53	.33–.86	.01	0.44	.26–.72	.001
Hospitalization due to drug-induced liver injury or alanine transaminase greater than 3 times the upper limit of normal	74 (15.2)	487 (15.2)	1.02	.80–1.30	.88	0.76	.58–.99	.038
Liver-related death	6 (1.2)	30 (0.9)	1.36	.57–3.27	.49	0.94	.36–2.44	.892
Tuberculosis-related deaths	3 (0.6)	53 (1.7)	0.38	.12–1.21	.1	0.48	.15–1.57	.226

Estimating Global Prevalence of HBV-TB Co-Infection

- Systematic review and meta-analyses
- Pubmed from inception to September 1, 2019
- Aim: To evaluate the prevalence of chronic HBV among adults with latent or active TB infection

Wong, et al. J Clin Gastroenterol 2021



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Estimating HBV-TB Co-Infection - NHANES

- U.S. NHANES data
- Retrospective cross sectional study
- TB testing data collected 1999-2000 and 2011-2012
- TB testing included both TST and TB-QTF data
- Aim: Prevalence of HBsAg and anti-HBc among patients with positive TST/TB-QTF testing

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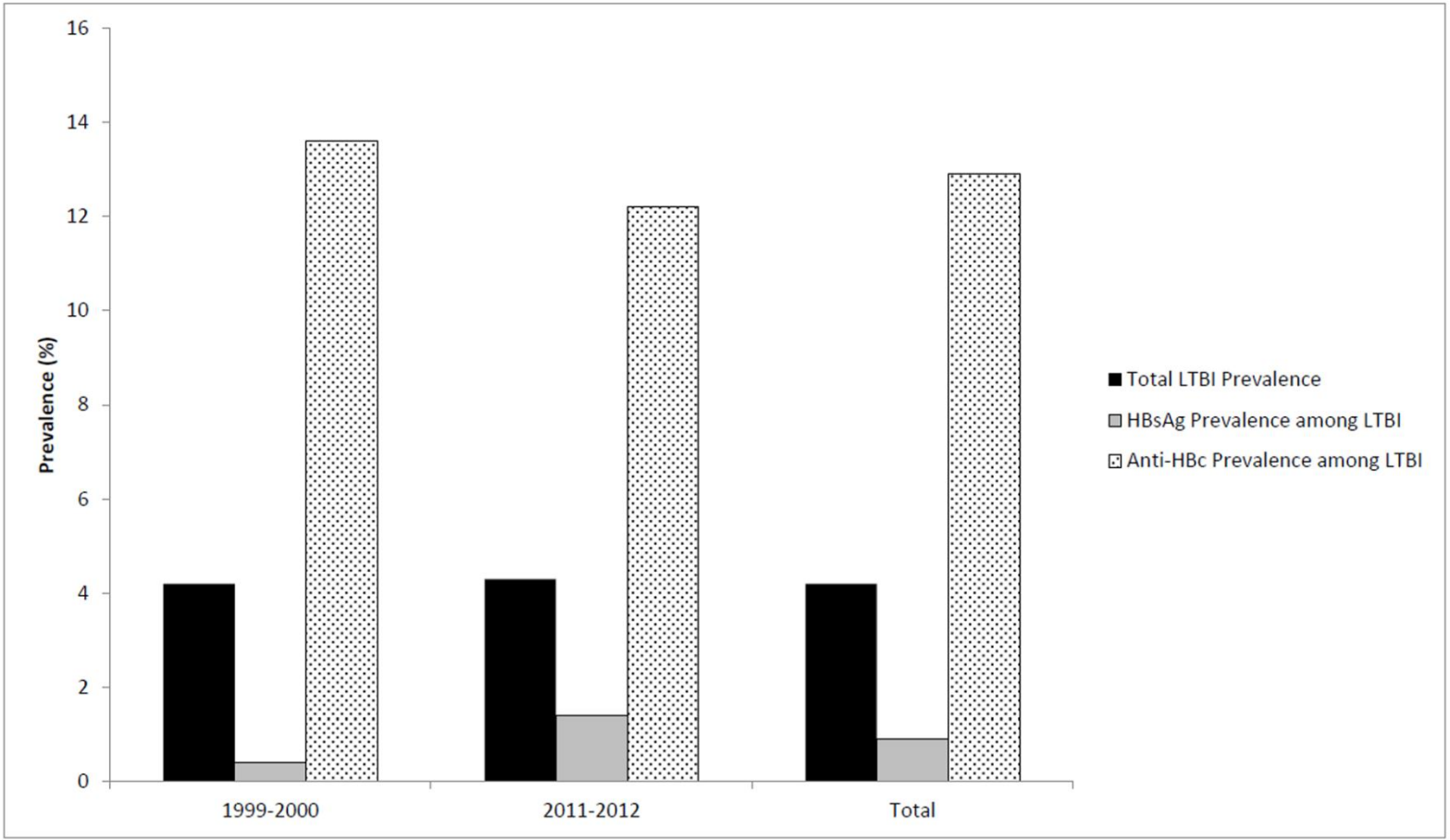
Figure 1. Prevalence of HBsAg Positive and Anti-HBc Among Individuals with LTBI



Hubbard, et al. Eur J Gastroenterol Hepatol 2021.

Preliminary Data – Single Center Safety-Net

- Highland Hospital
- Retrospective observational study
- Sept 2016 – May 2019
- Aim: Evaluate prevalence of HBV among patients with positive TB-QTF testing among adults

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Results

- 453 adults with positive QFT (12 with active TB and 441 with latent TB)
- 56.5% were female, 43.5% male
- Mean age was 53.6 +/- 14.8 years
- Race/Ethnicity: 40.7% Hispanic, 29.3% African American, 16.6% Asian, 1.6% white, and 11.8% identified as “Other” race/ethnicity

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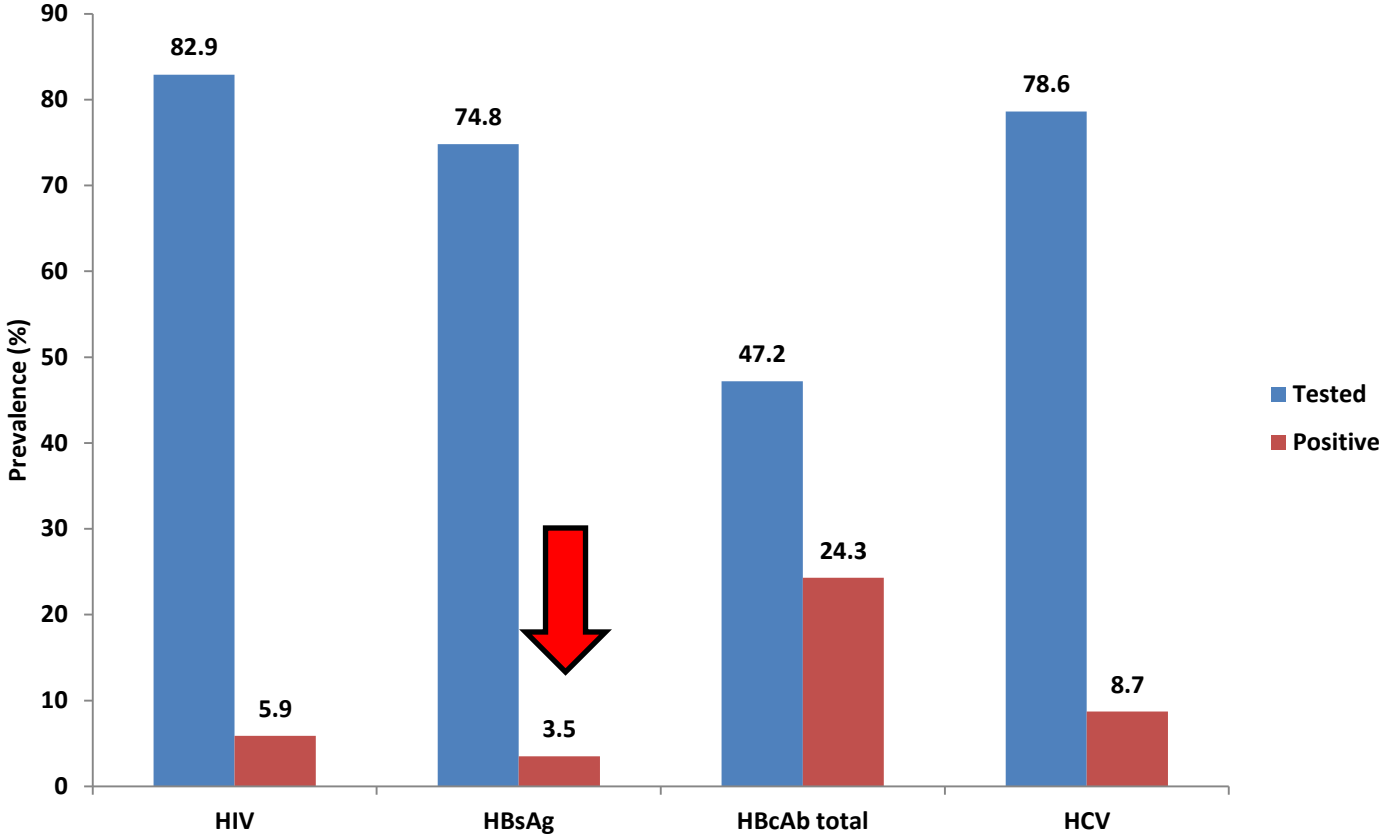
Testing and Prevalence Among TB-QTF Positive Patients



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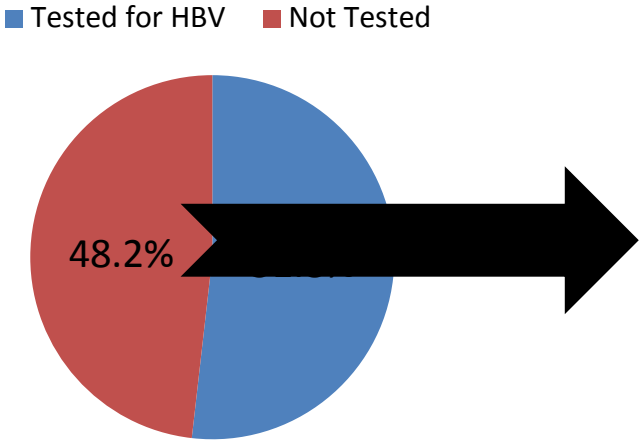
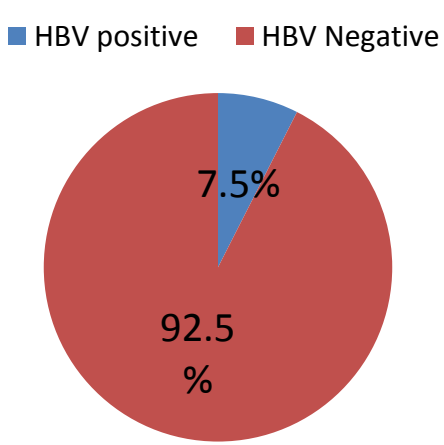
Estimating HBV-TB Co-Infection Prevalence in the U.S.

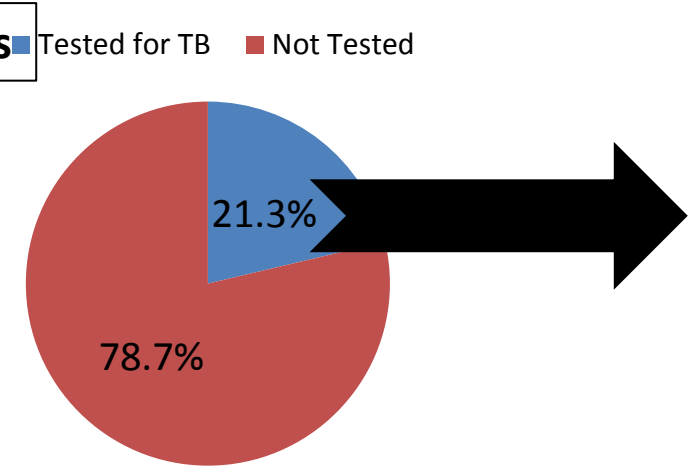
- Preliminary data using U.S. national laboratory data from 2015 – 2020
- Chronic HBV defined as any 2 positive HBV tests (HBsAg, HBV DNA, HBeAg pos) at least 6 months apart
- TB identified by any positive of Quantiferon, T-Spot, positive Mycobacteria culture

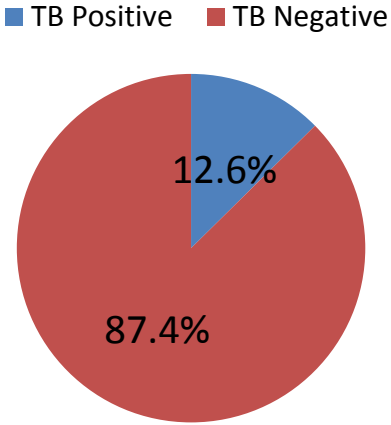
442,646 TB patients





117,684 chronic HBV patients





Take Home Points

- Patients with TB have higher prevalence of HBV than general population
- Sub-optimal screening for HBV-TB co-infection
- Patients with underlying chronic HBV have higher risk of anti-TB medication related drug induced liver injury
- Early identification of HBV-TB co-infection may guide changes in TB and HBV management to reduce risk of drug induced liver injury
- Need to improve awareness of HBV-TB co-infection and improve screening especially given that populations most affected are ethnic minorities and underserved, vulnerable populations.

Thank You