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GLOBAL HEALTH IS LOCAL HEALTH

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OBJECTIVES

LATENT TUBERCULOSIS

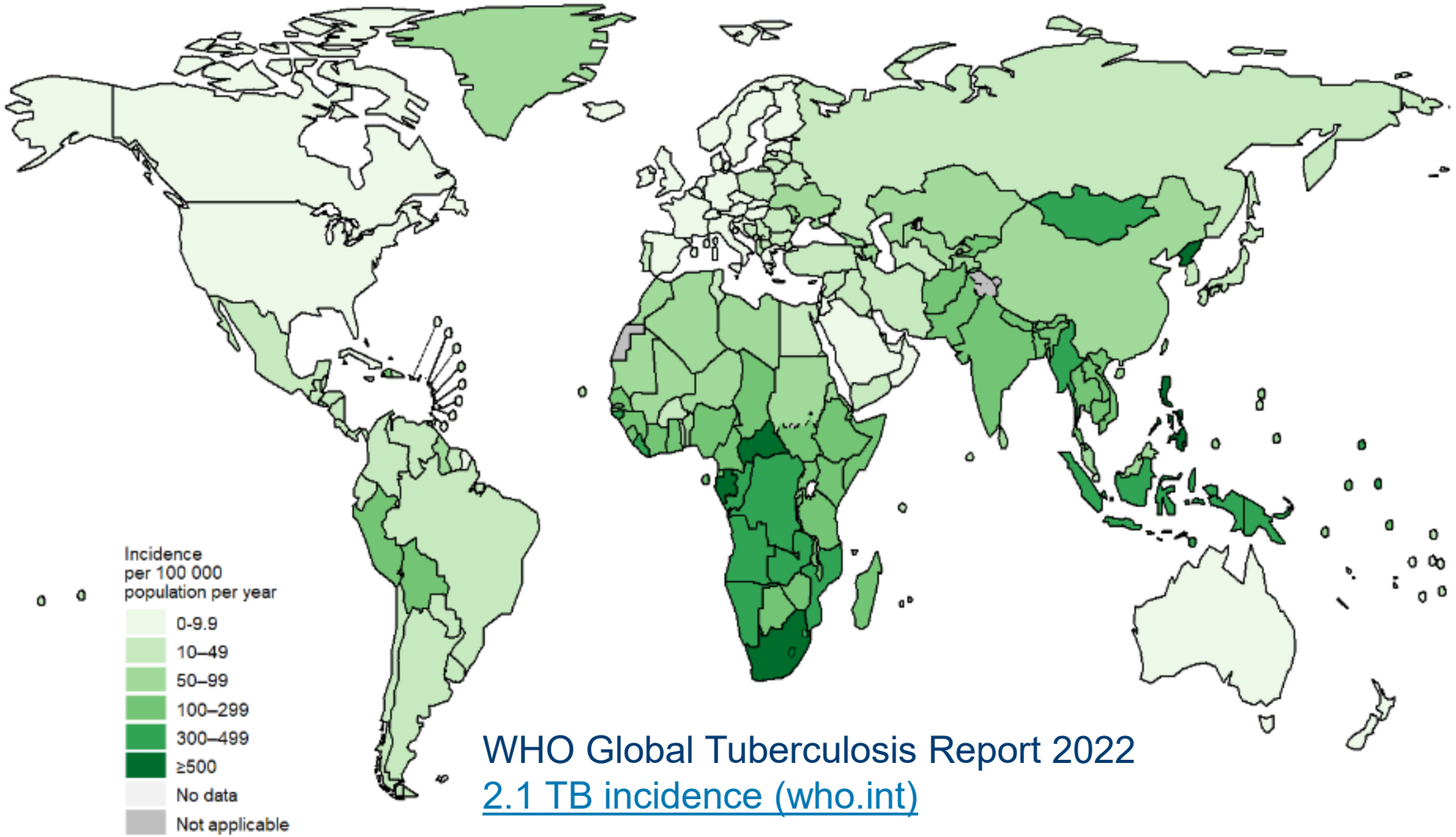
HEPATITIS B

CHAGAS DISEASE

OTHER LOCALLY ENDEMIC DISEASES

EMERGING INFECTIONS

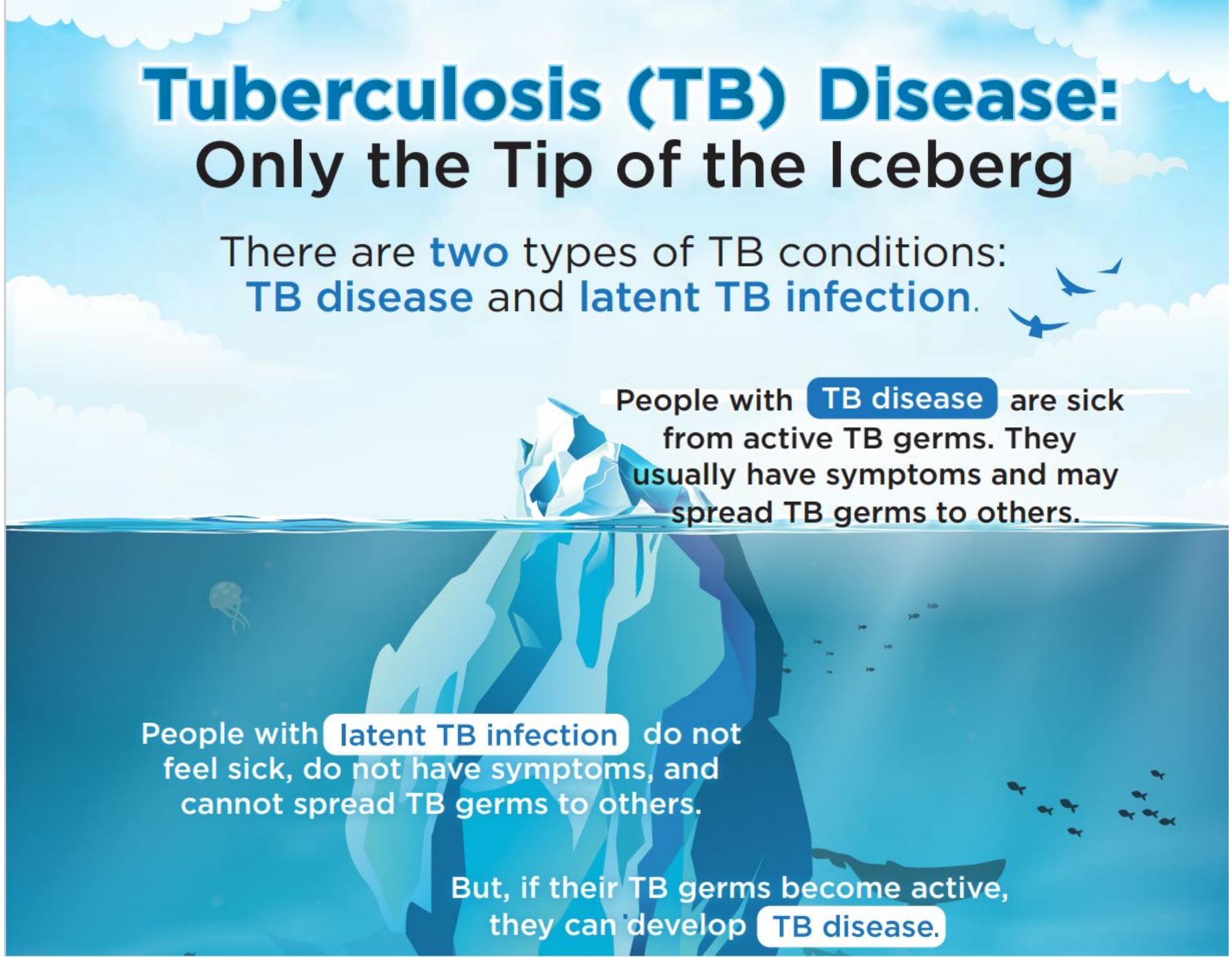
Fig. 2.1.3 Estimated TB incidence rates, 2021



WHO Global Tuberculosis Report 2022
2.1 TB incidence (who.int)

Tuberculosis (TB) Disease:
Only the Tip of the Iceberg

There are **two** types of TB conditions:
TB disease and **latent TB infection**.



Persons at high risk for developing TB disease fall into two categories: Recently Infected or Weakened Immune System

- Close contact of a person with infectious TB
- Immigrated from area with high rates of TB
- Under 5 years of age with positive TB test
- In a group with high rates of TB transmission (homeless persons, injection drug users, and persons with HIV infection)
- Work or reside in facility with high risk (hospitals, homeless shelters, correctional facilities, nursing homes, and residential homes)
- HIV infection
- Substance abuse
- Silicosis
- Diabetes mellitus
- Severe kidney disease
- Low body weight
- Organ transplants
- Head and neck cancer
- Medications that suppress the immune system such as in RA, IBD

Preferred treatment for Latent TB

•CDC and the National Tuberculosis Controllers Association (NTCA) **preferentially recommend short-course, rifamycin-based, 3- or 4-month latent TB infection treatment regimens** over 6- or 9-month isoniazid monotherapy.

•Three months of once-weekly isoniazid plus rifapentine (3HP)

•Four months of daily rifampin (4R)

•Three months of daily isoniazid plus rifampin (3HR)

Screening for Latent TB in Those Later Diagnosed with Active TB

› Open Forum Infect Dis. 2023 Nov 1;10(11):ofad545. doi: 10.1093/ofid/ofad545. eCollection 2023 Nov.

Prior Screening for Latent Tuberculosis Among Patients Diagnosed With Tuberculosis Disease: Missed Opportunities?

Heidi Fischer [1], Lei Qian [1], Zhuoxin Li [1], Saadiq Garba [2], Katia J Bruxvoort [1 3], Jacek Skarbinski [4 5], Jennifer H Ku [1], Bruno J Lewin [6 7], Parag S Mahale [1], Sally F Shaw [1], Brigitte C Spence [1], Sara Y Tartof [1 2]

Affiliations + expand

PMID: 38023560 PMCID: PMC10651207 DOI: 10.1093/ofid/ofad545

Results: A total of 1289 patients with observed TB disease were identified; 148 patients were LTBI positive and 84 were LTBI negative. **Patients not prescreened for LTBI made up 82.0% of observed TB disease cases (1057/1289).** Adding the hypothetical maximum estimate for prevented cases decreased the percentage of patients who were not prescreened for LTBI to 61.7% [1057/(1289 + 424)].

Testing Practices for Latent TB

JOURNAL ARTICLE ACCEPTED MANUSCRIPT EDITOR'S CHOICE

Latent tuberculosis infection testing practices in a large U.S. integrated healthcare system FREE

Jennifer H Ku ✉, Heidi Fischer, Lei X Qian, Kris Li, Jacek Skarbinski, Sally Shaw, Katia J Bruxvoort, Bruno J Lewin, Brigitte C Spence, Sara Y Tartof ✉

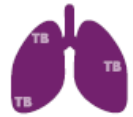
Clinical Infectious Diseases, ciae015, https://doi.org/10.1093/cid/ciae015

Published: 11 January 2024 **Article history** ▾

Results: **Among 1,211,971 individuals who met ≥1 screening criteria for LTBI, 210,025 (17%) were tested for LTBI.** Factors associated with higher adjusted odds of testing positive included male sex (1.32; 95% confidence interval, 1.30–1.35), Asian/Pacific Islander (**2.78**, 2.68–2.88), current smoking (1.24, 1.20–1.28), diabetes (1.13, 1.09–1.16), hepatitis B (1.45, 1.34–1.57), hepatitis C (1.54, 1.44–1.66), and birth in a country with an elevated TB rate (**3.40**, 3.31–3.49). **Despite being risk factors for testing positive for LTBI, none of these factors were associated with higher odds of LTBI testing.**

TAKE ON LATENT TB INFECTION

Up to 13 million people in the U.S. have latent tuberculosis (TB) infection.



Latent TB Infection

Latent TB infection means TB germs are in the body, but not enough to cause sickness or spread germs to others

TB Disease

If TB germs become active & multiply, latent TB infection turns into TB disease and can spread to others

1 in 10

Without treatment, 1 in 10 people with latent TB infection will develop TB disease

PEOPLE WHO SHOULD BE TESTED FOR TB INFECTION INCLUDE:

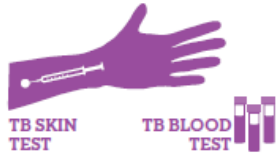
Contacts of people with TB disease

People who were born in or who frequently travel to countries where TB disease is common

People with health problems that make it hard to fight TB disease

People who spend time in places where TB is more common

TREATING LATENT TB INFECTION PREVENTS TB DISEASE



A skin test or blood test can be used to diagnose TB infection

1 dose
1 time per week
12 weeks

Shorter regimens help patients finish treatment

Treating latent TB infection is less costly than treating disease

ELIMINATING TB REQUIRES EXPANDING TESTING & TREATMENT OF LATENT TB INFECTION. CDC WORKS TO:

Engage Affected Communities & Medical Providers

Promote Effective Testing & Treatment Options

Develop New Guidance & Tools

To learn more about latent TB infection: www.cdc.gov/tb
October 2021

Centers for Disease Control and Prevention
National Center for HIV, Viral Hepatitis, STD, and TB Prevention

Latent TB and Hepatitis B Co-Infection

› Am J Med. 2023 Nov 22:S0002-9343(23)00707-6. doi: 10.1016/j.amjmed.2023.10.031. Online ahead of print.

Screening Practices and Risk Factors for Co-Infection with Latent Tuberculosis and Hepatitis B Virus in an Integrated Healthcare System - California, 2008-2019

Debbie E Malden [1], Robert J Wong [2], Amit S Chitnis [3], Theresa M Im [1], Sara Y Tartof [4]

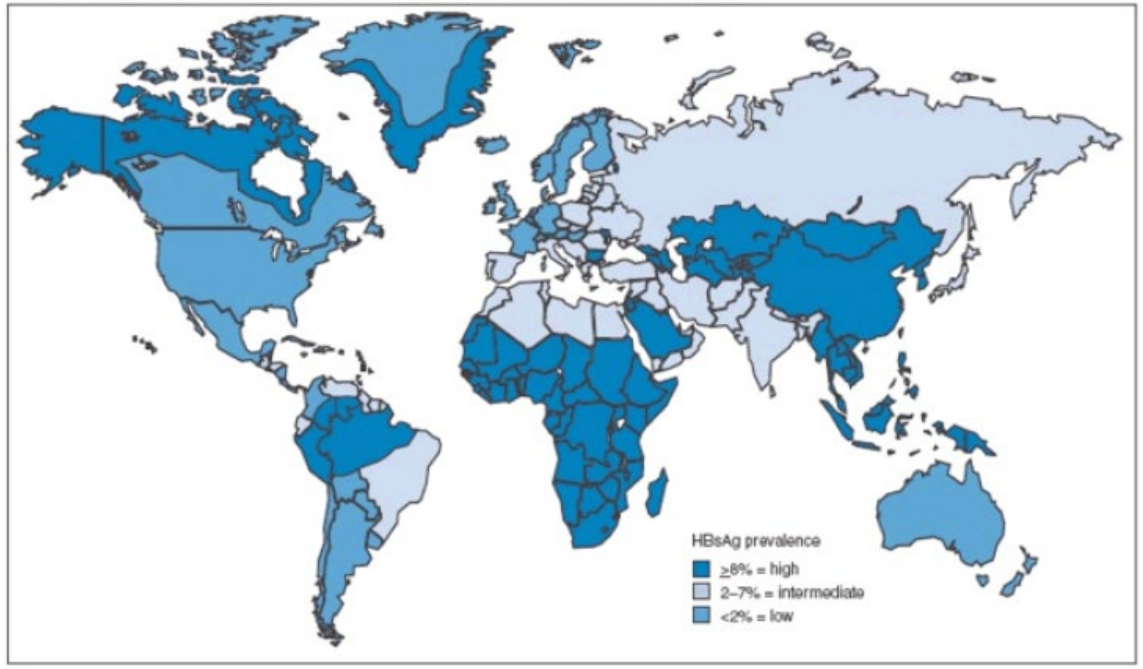
Affiliations + expand

PMID: 38000687 DOI: 10.1016/j.amjmed.2023.10.031

Results: Among 1997 HBV patients screened for latent tuberculosis, 23.1% were co-infected, and among 35,820 patients with latent tuberculosis screened for HBV, 1.3% were co-infected. **Among HBV patients, co-infection risk was highest among Asians compared with White** race/ethnicity (29.4% vs 5.7%, aOR 4.78; 95% confidence interval [CI], 2.75-8.31), **and persons born in a high-incidence country compared with low-incidence countries (31.0% vs 6.6%; aOR 4.19; 95% CI, 2.61-6.73).** For patients with latent tuberculosis, risk of co-infection was higher among Asian (aOR 9.99; 95% CI, 5.79-17.20), or Black race/ethnicity (aOR 3.33; 95% CI, 1.78-6.23) compared with White race/ethnicity. Persons born in high-incidence countries had elevated risk of co-infection compared with persons born in low-incidence countries (aOR 2.23; 95% CI, 1.42-3.50). **However, Asians or persons born in high-incidence countries were screened at similar rates to other ethnicities or persons born in low-incidence countries.**

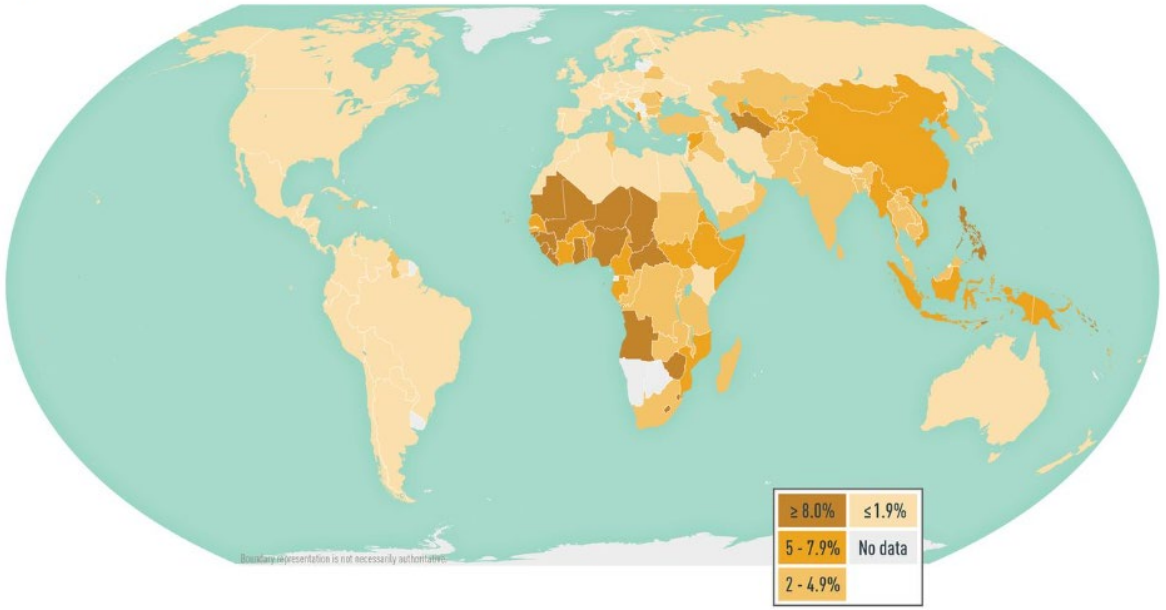
Change in Hepatitis B Worldwide Prevalence

FIGURE 1. Geographic distribution of chronic hepatitis B virus (HBV) infection, 2005*



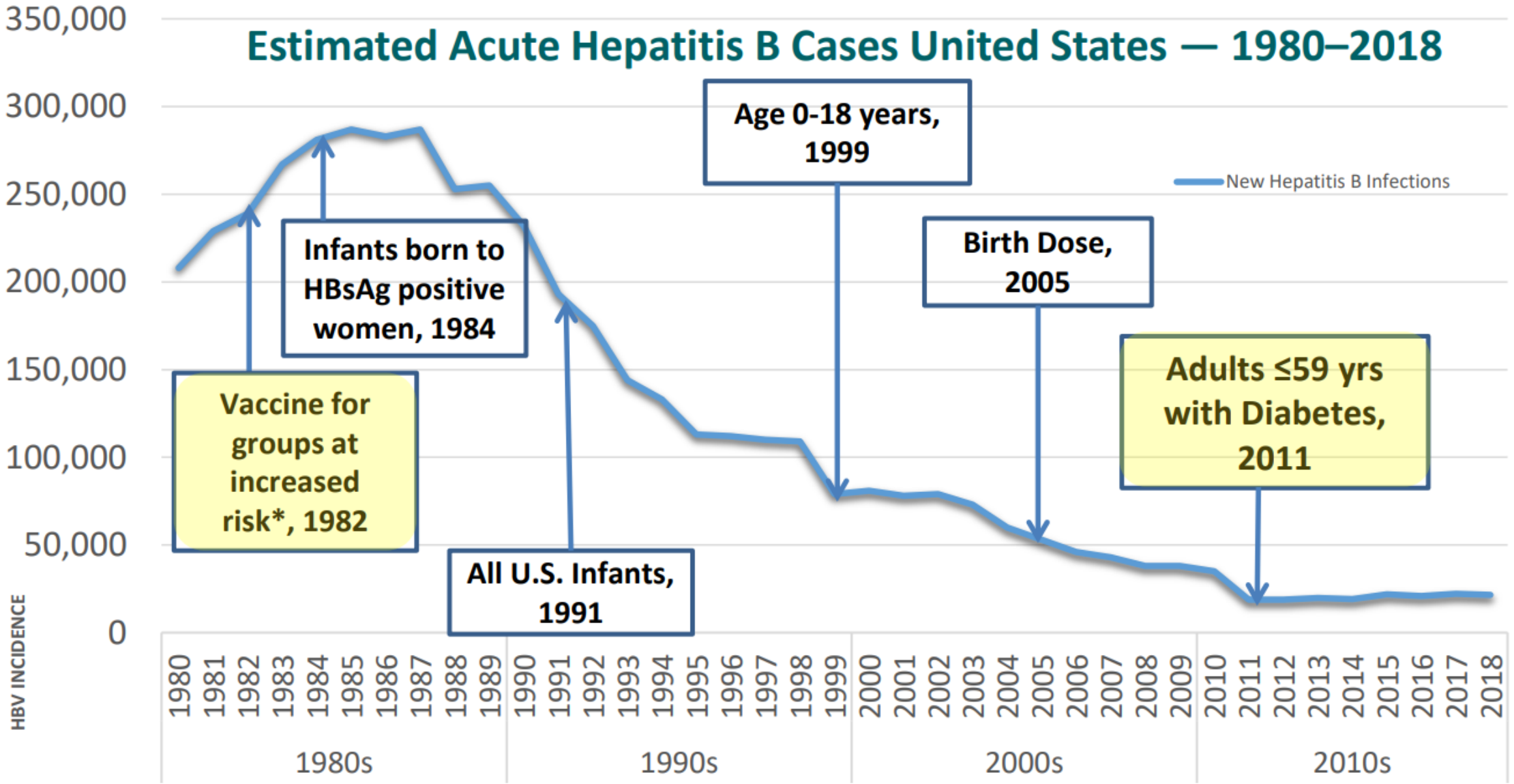
*For multiple countries, estimates of prevalence of hepatitis B surface antigen (HBsAg), a marker of chronic HBV infection, are based on limited data and might not reflect current prevalence in countries that have implemented routine childhood hepatitis B vaccination. In addition, HBsAg prevalence rates might vary within countries by subpopulation and locality.

Map 5-07 Worldwide prevalence of hepatitis B virus infection



View Larger Figure

Disease data source: 2021 estimates of hepatitis B virus disease burden. CDA Foundation Polaris Observatory. Available from: https://cdafound.org/polaris-countries-distribution/.



Source: National Notifiable Diseases Surveillance System (NNDSS)

*Health care providers, MSM, IDU, hemodialysis patients, household & sexual partners of persons with chronic HBV, persons in certain institutional settings, e.g., inmates of long-term correctional facilities.

Global, regional, and national burden of hepatitis B, 1990–2019

Findings

There was a 31·3% (29·0 to 33·9) decline in all-age prevalence between 1990 and 2019, with a more marked decline of 76·8% (76·2 to 77·5) in prevalence in children younger than 5 years.

The **number of HBV-related deaths increased between 1990 and 2019 (by 5·9% [–5·6 to 19·2]).**

HBV-related diseases resulted in 555 000 global deaths (487 000 to 630 000) in 2019.

Interpretation

The prevalence of chronic HBV infection declined over time, particularly in children younger than 5 years, since the introduction of hepatitis B vaccination.

But **HBV-related death counts increased as a result of population growth, ageing, and cohort effects.**

There are marked disparities in burden and progress across the world.

HBV interventions, such as vaccination, testing, and treatment, must be strategically supported and scaled up to achieve elimination.

Global, regional, and national burden of hepatitis B, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. GBD 2019 Hepatitis B Collaborators Open Access Published: June 20, 2022.

Chronic Hepatitis B

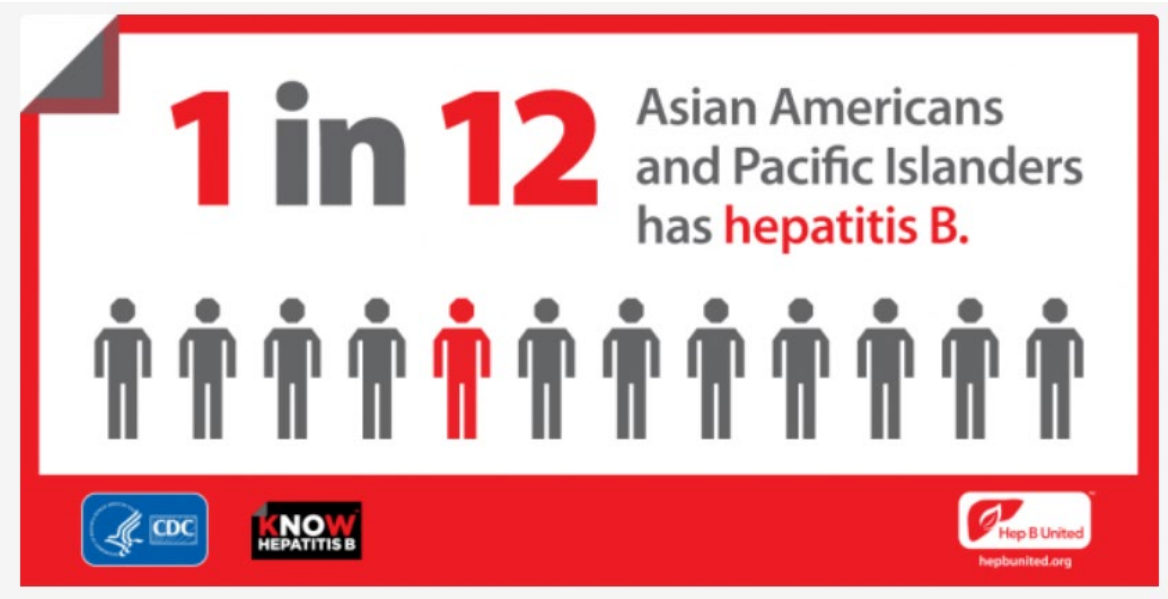


Table 2.3. Reported risk behaviors/exposures† among reported cases of acute hepatitis B — United States, 2018

Risk behaviors/exposures	Risk identified*	No risk identified	Risk data missing
Injection drug use	549	969	1,804
Multiple sex partners	199	671	2,452
Surgery	117	962	2,243
Men who have sex with men §	49	353	1,648
Sexual contact ¶	42	603	2,677
Needlestick	71	959	2,292
Household contact (non-sexual) §	12	633	2,677
Occupational	4	1,369	1,949
Dialysis patient	13	1,022	2,287
Transfusion	1	1,103	2,218

Source: CDC, Nationally Notifiable Diseases Surveillance System.

* Case reports with at least one of the following risk behaviors/ exposures reported 6 weeks to 6 months prior to symptom onset: 1) injection drug use; 2) multiple sex partners; 3) underwent surgery; 4) men who have sex with men; 5) sexual contact with suspected/confirmed hepatitis B case; 6) sustained a percutaneous injury; 7) household contact with suspected/confirmed hepatitis B case; 8) occupational exposure to blood; 9) dialysis; and 10) transfusion.

† Reported cases may include more than one risk behavior/exposure.

§ A total of 2,050 acute hepatitis B cases were reported among males in 2018.

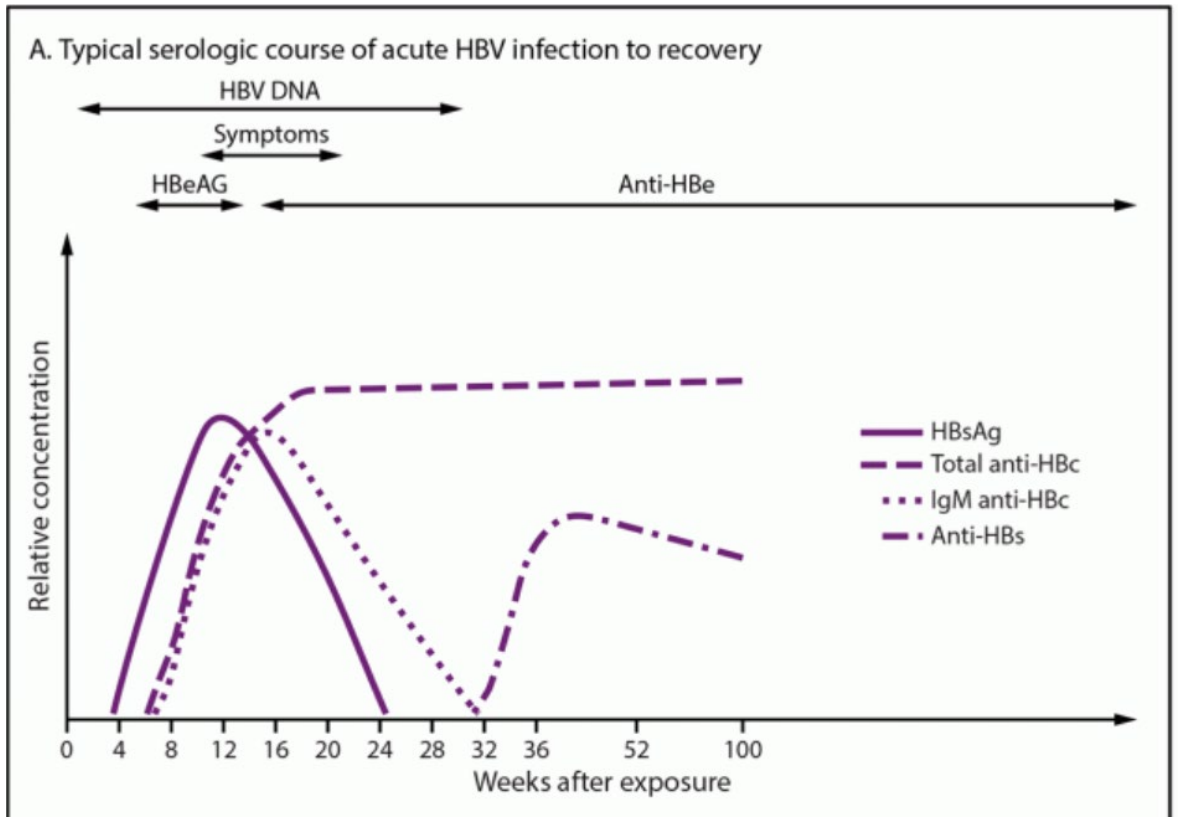
¶ Cases with more than one type of contact reported were categorized according to a hierarchy: (1) sexual contact; (2) household contact (non-sexual).

New Universal Hepatitis B Screening Recommendation

Universal Hepatitis B Screening Rationale

- **Universal screening:** Universal screening of adults is cost-effective compared with risk-based screening and averts liver disease and death
- **Triple panel screening:** Using the triple panel (HBsAg, anti-HBs, and total anti-HBc) is recommended for initial screening because it can help identify persons who have an active HBV infection, have resolved infection and might be susceptible to reactivation, or are vaccinated
- **Adults aged ≥18 years:** An "all adults" recommendation was considered more feasible to implement (e.g., for integrating into electronic medical record alerts) than one among specific age groups.
- **Children and adolescents aged <18 years:** Children and adolescents aged <18 years were not included in the universal screening recommendation because of the low prevalence of HBV infection in this age group and high levels of HepB vaccination.
- **New risk groups:** The addition of three new risk groups was based on the HBV infection prevalence cutoff of ≥1%. (persons incarcerated or formerly incarcerated; persons with a history of sexually transmitted infections or multiple sex partners; and persons with a history of hepatitis C virus infection)

Typical serologic courses of acute and chronic hepatitis B virus infection



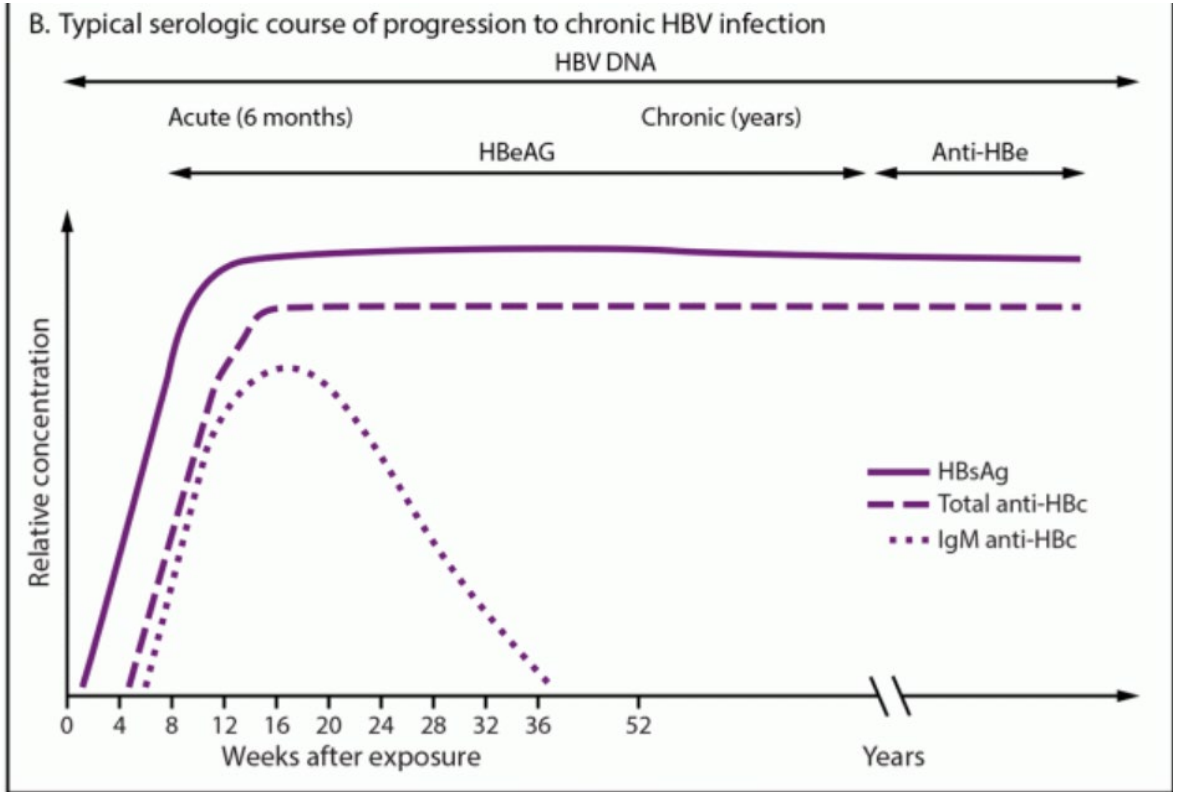
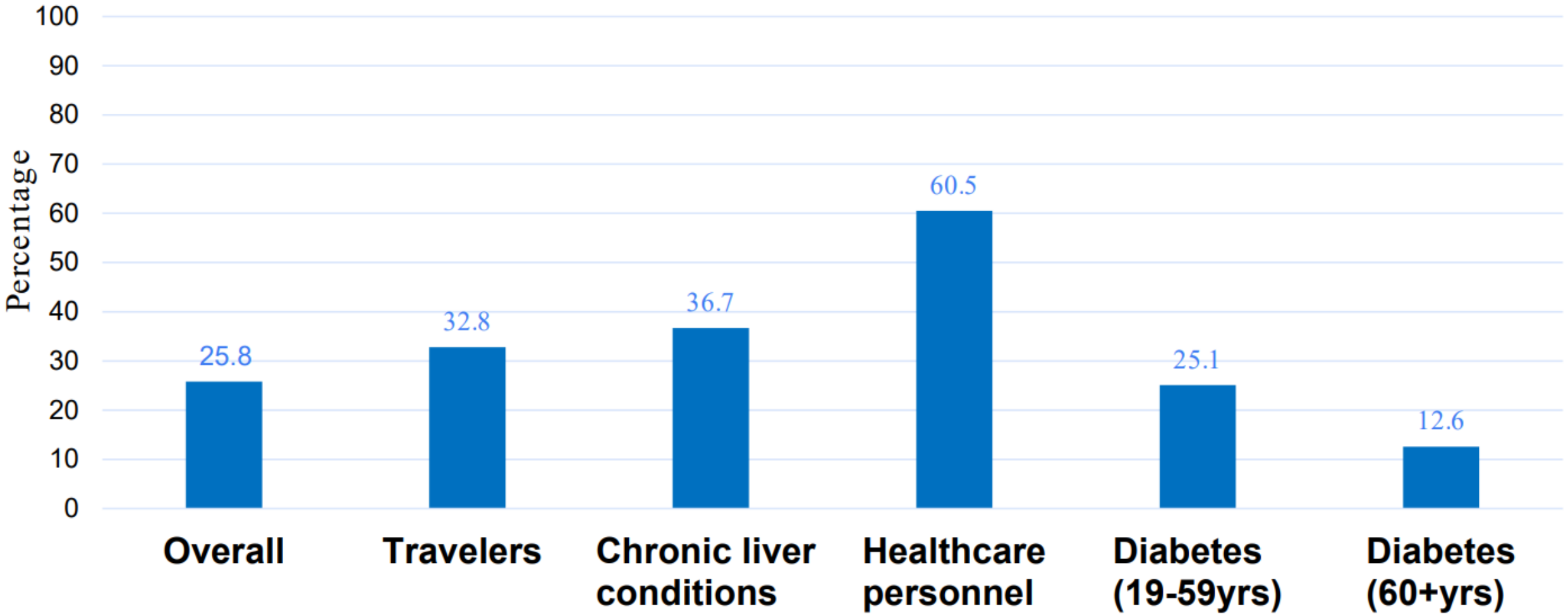


TABLE 1. Interpretation of screening test results for hepatitis B virus infection and recommended actions

Return

Clinical state	HBsAg	Anti-HBs	Total anti-HBc*	IgM anti-HBc	Action†
Acute infection	Positive	Negative	Positive	Positive	Link to HBV infection care
Chronic infection	Positive	Negative	Positive	Negative§	Link to HBV infection care
Resolved infection	Negative	Positive	Positive	Negative	Counsel about HBV infection reactivation risk
Immune (immunity inferred from receipt of previous vaccination)	Negative	Positive¶	Negative	Negative	Reassure if history of HepB vaccine series completion; if partially vaccinated, complete vaccine series per ACIP recommendations
Susceptible, never infected	Negative	Negative**	Negative	Negative	Offer HepB vaccine per ACIP recommendations
Isolated core antibody positive††	Negative	Negative	Positive	Negative	Depends on cause of positive result

Hepatitis B vaccine coverage (≥3 doses) among adults aged ≥19 years*, National Health Interview Survey (NHIS) – US, 2017



Vaccination Coverage Among Adults in the United States, National Health Interview Survey, 2017.
https://www.cdc.gov/vaccines/imz-managers/coverage/adultvaxview/pubs-resources/NHIS-2017.html#box2

* 19-59 years plus adults with diabetes

Universal Hepatitis B Vaccination in Adults Aged 19–59 Years: Updated Recommendations of the Advisory Committee on Immunization Practices — United States, 2022
Weekly / April 1, 2022 / 71(13);477–483

Summary

What is already known about this topic?

Vaccination with hepatitis B (HepB) vaccines shows well-established safety and efficacy. However, because of risk factor–based approaches of previous vaccination recommendations, coverage among adults has been suboptimal.

What is added by this report?

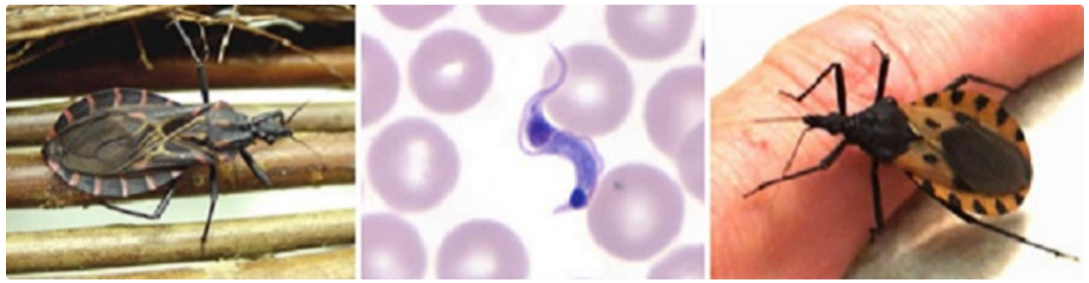
In addition to groups for whom HepB vaccination is already recommended, the Advisory Committee on Immunization Practices recommends that all adults aged 19–59 years should receive HepB vaccines.

What are the implications for public health practice?

Universal adult HepB vaccination through age 59 years removes the need for risk factor screening and disclosure and could increase vaccination coverage and decrease hepatitis B cases.

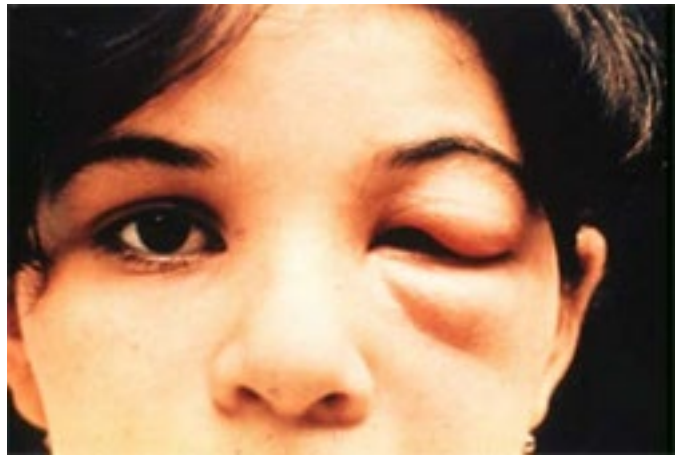
CHAGAS DISEASE – NOT SO EXOTIC

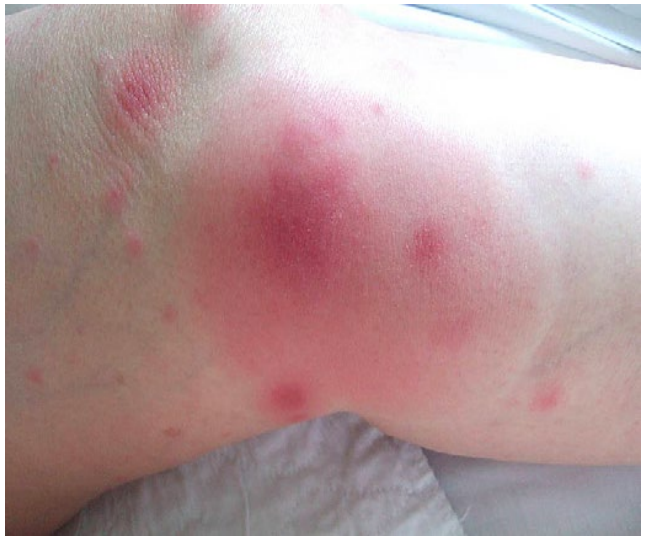
Slides courtesy of David Hamer, MD, Department of Global Health, Boston University as well as CDC (www.cdc.gov/parasites/chagas/)



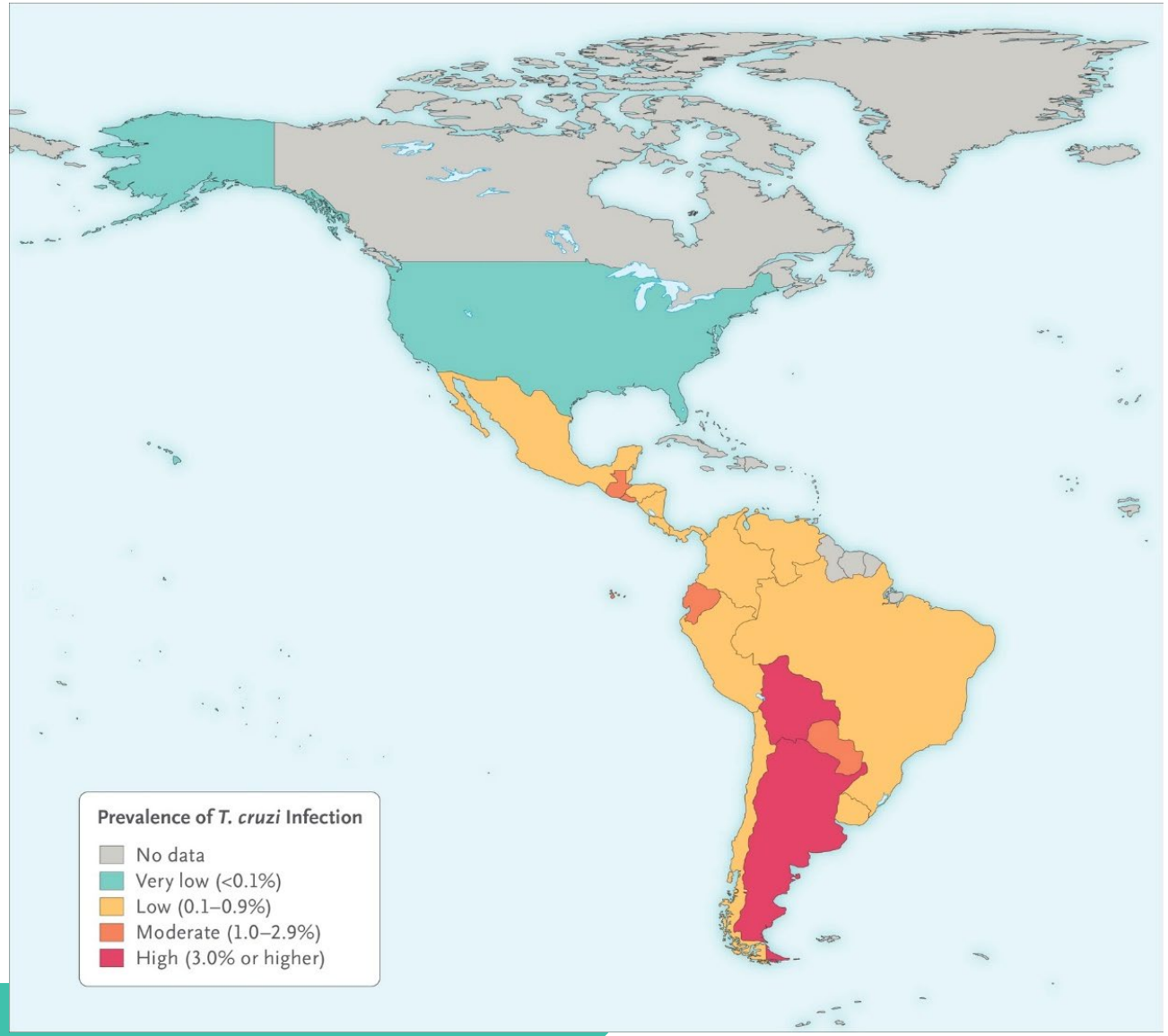
Chagas disease is named after the Brazilian physician Carlos Chagas, who discovered the disease in 1909. It is caused by the parasite *Trypanosoma cruzi*, which is transmitted to animals and people by insect vectors and is found only in the Americas (mainly, in rural areas of Latin America where poverty is widespread). Chagas disease (*T. cruzi* infection) is also referred to as American trypanosomiasis.

Images: Left and Right: Various species of triatomine bugs, which if infected can transmit *T. cruzi*. Center: *T. cruzi* trypomastigote in a thin blood smear stained with Giemsa. (Credit: DPDx)





Where is Chagas disease endemic?



- 6-7 million people infected worldwide
- 21 endemic countries:
  - 13% of population is at risk
- US is not considered an endemic country
  - 326,000–347,000 cases in the U.S (estimated)

Bern, NEJM 2015

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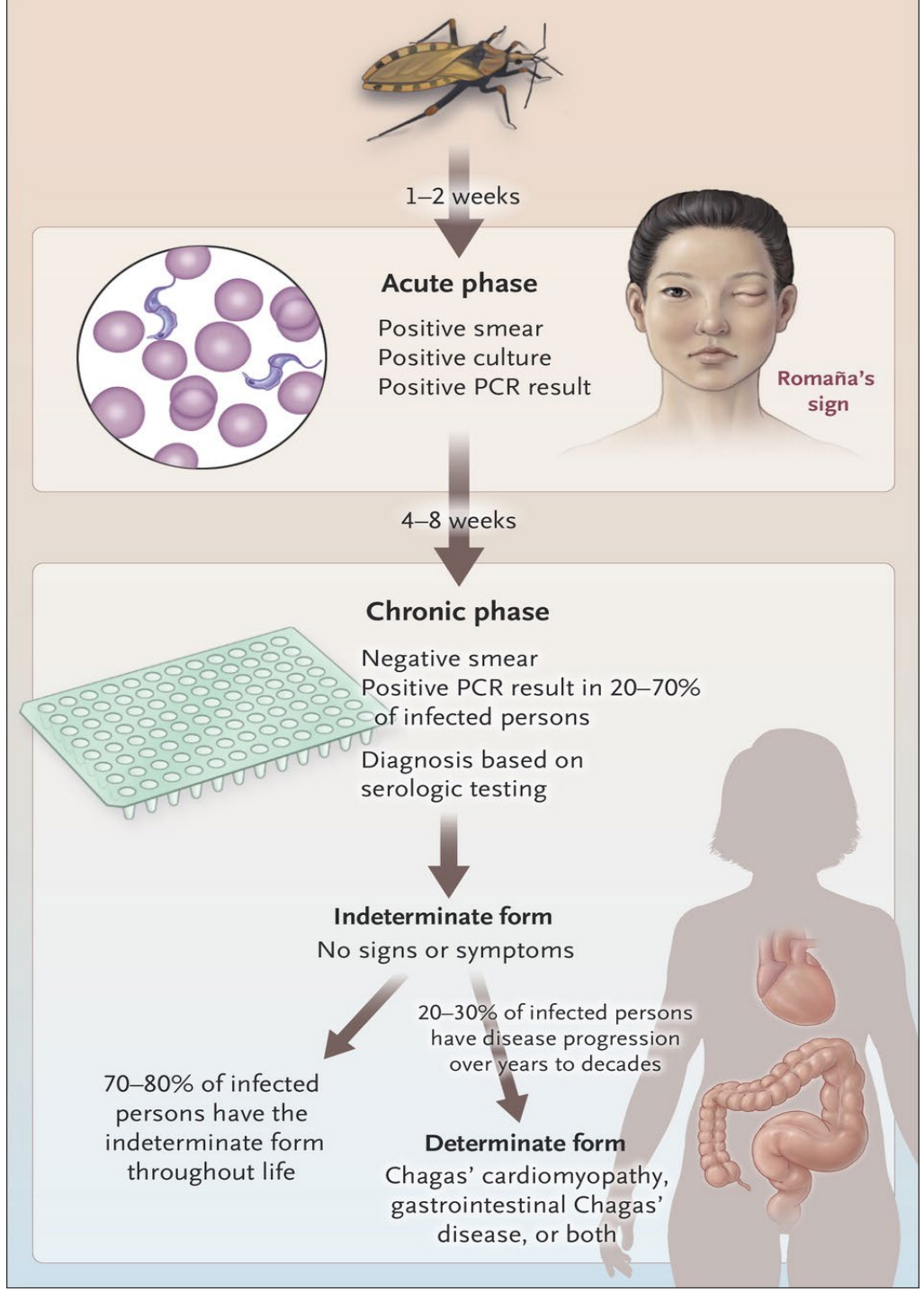
Exposure

↓

Acute phase

↓

Chronic phase



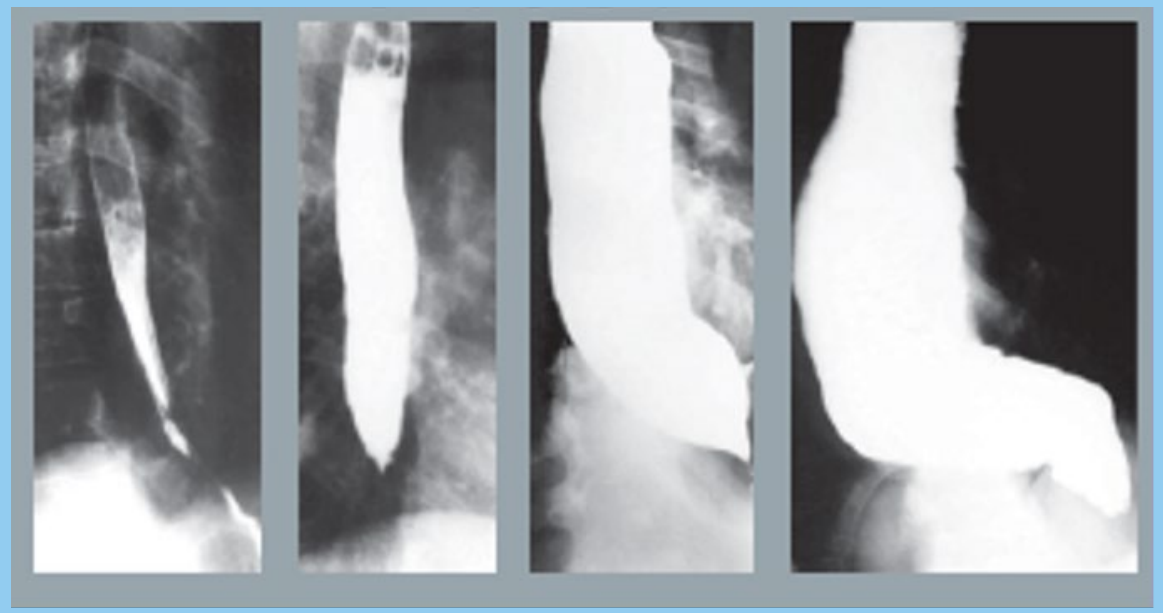
Bern C, NEJM 2015.

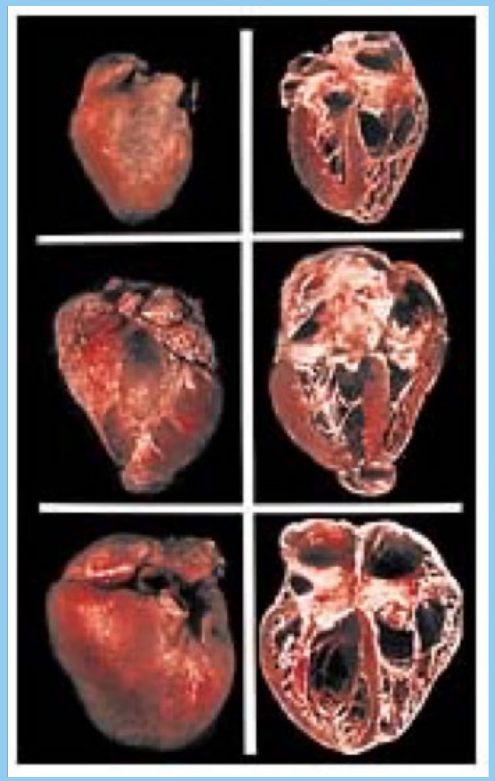
Congenital Chagas Disease

- Approximately 40,000 women of reproductive age with Chagas disease in US
- Estimated 63–315 cases of congenital Chagas disease occur annually
- Women at risk should be screened before or during pregnancy (Mexico, C. America, S. America)
- 10-40% of infants symptomatic at birth
  - May present with prematurity, hepatosplenomegaly, jaundice, anemia and thrombocytopenia
  - Less commonly hydrops fetalis, pneumonitis and meningoencephalitis
- 20-30% may develop later cardiac complications

- References: Bern CID 2009; Montgomery AJTMH 2014; Oliveira Exp Rev Anti Infect Ther 2010

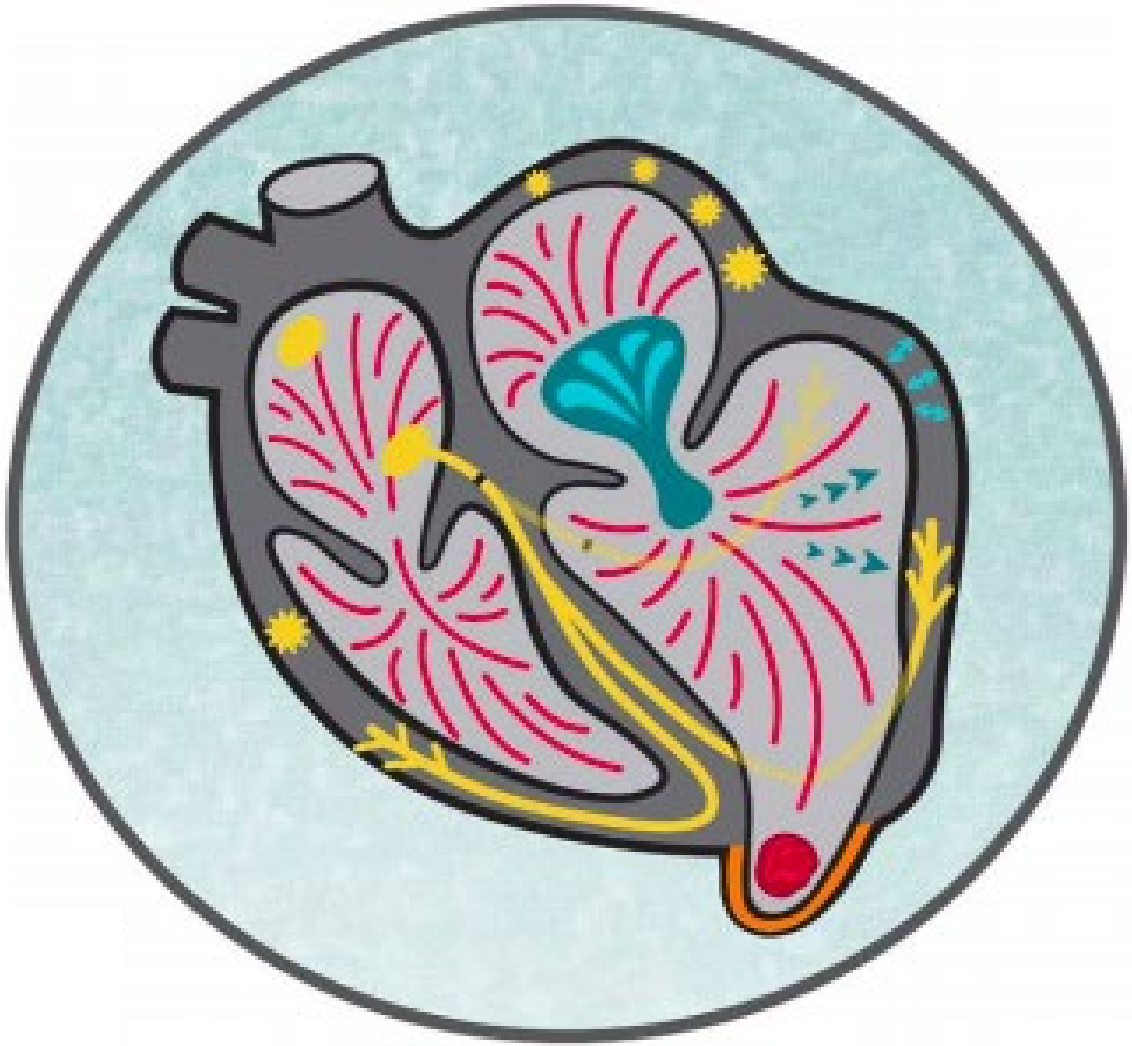
Adult Manifestations





Cardiac Rhythms

Myocardial Abnormalities



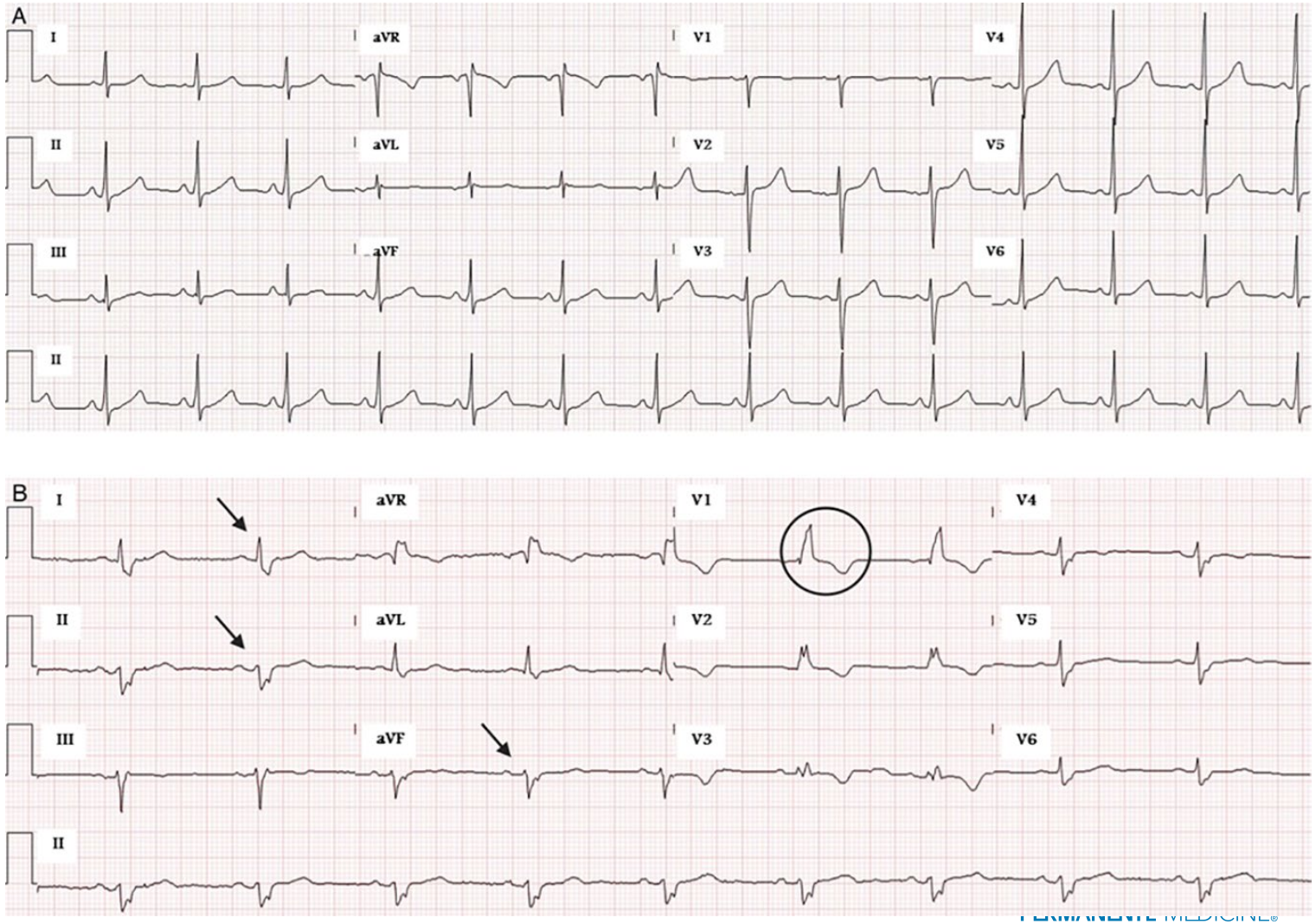
Aneurysms

Thrombo-embolism

Carmo, *Circulation* 2018

Arrhythmias

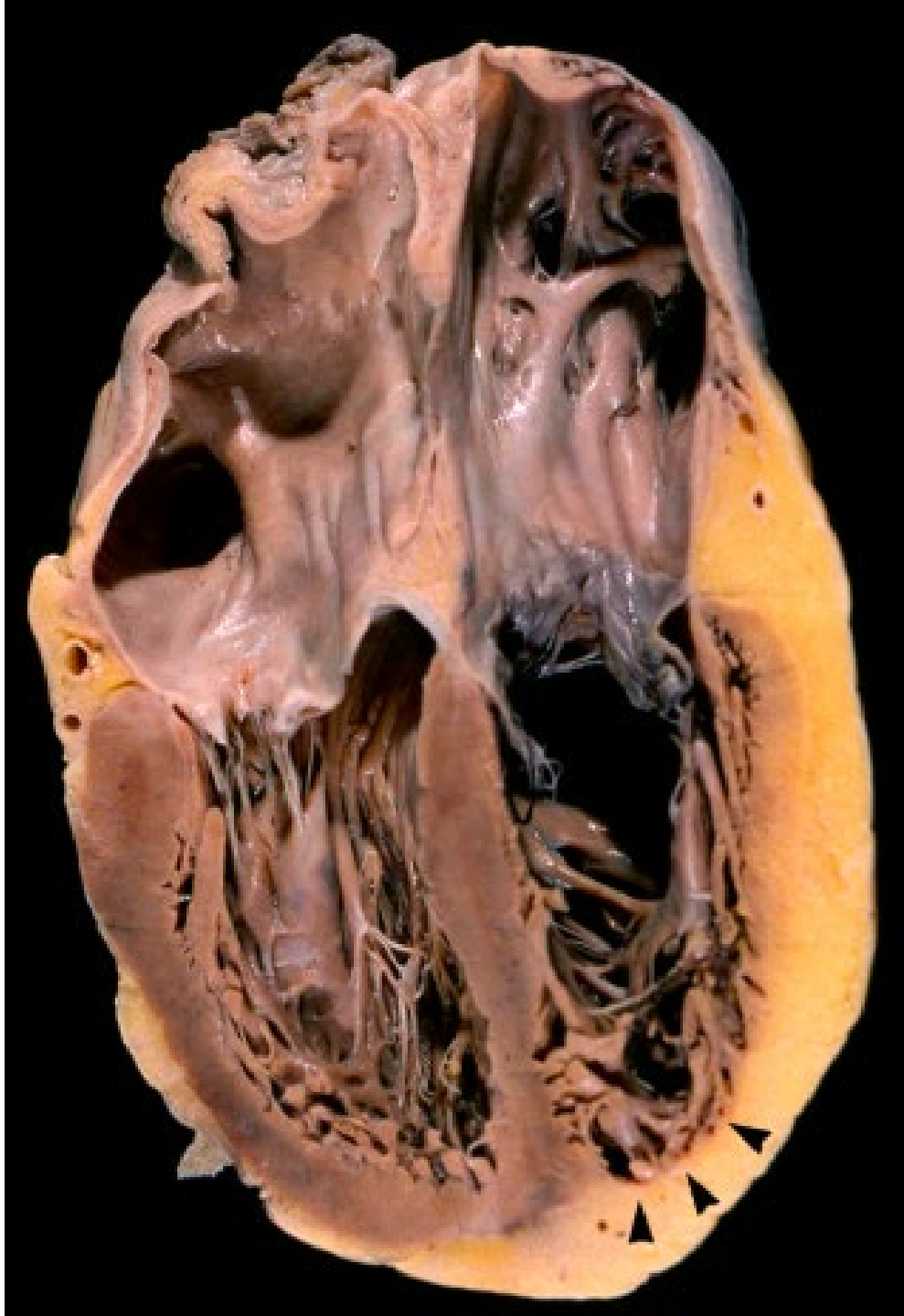
- Bradyarrhythmias
- Tachyarrhythmias
- Conduction delays
  - RBBB most common
  - LAFB, PVCs



Carmo et al, *Circulation* 2018

Chronic Chagas Cardiomyopathy

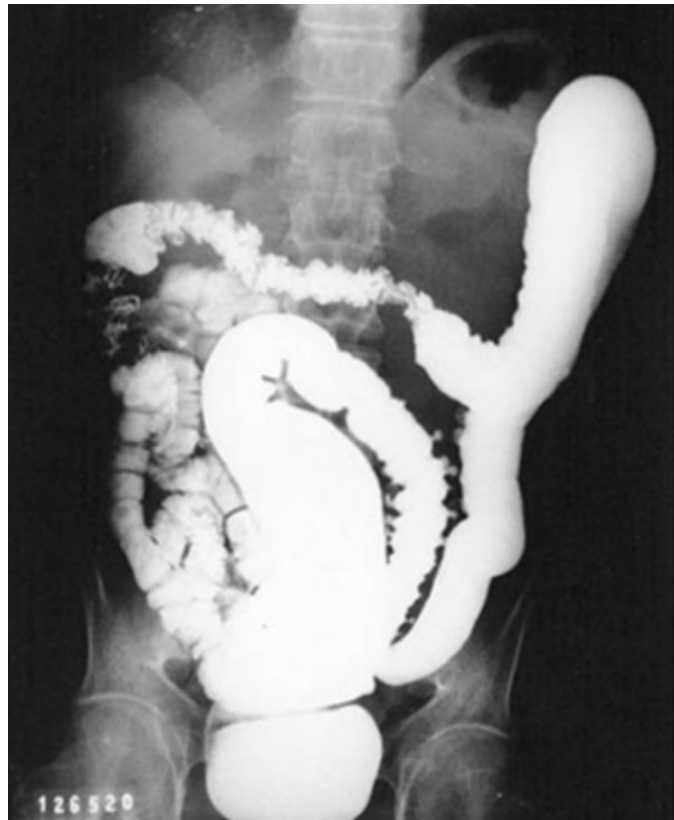
- #1 cause non-ischemic cardiomyopathy in Latin America
- 25-35% deaths in patients with Chagas heart disease



Rassi et al, Infect Dis Clin North Am 2012;
Carmo et al, *Circulation* 2018

Chagas GI Disease

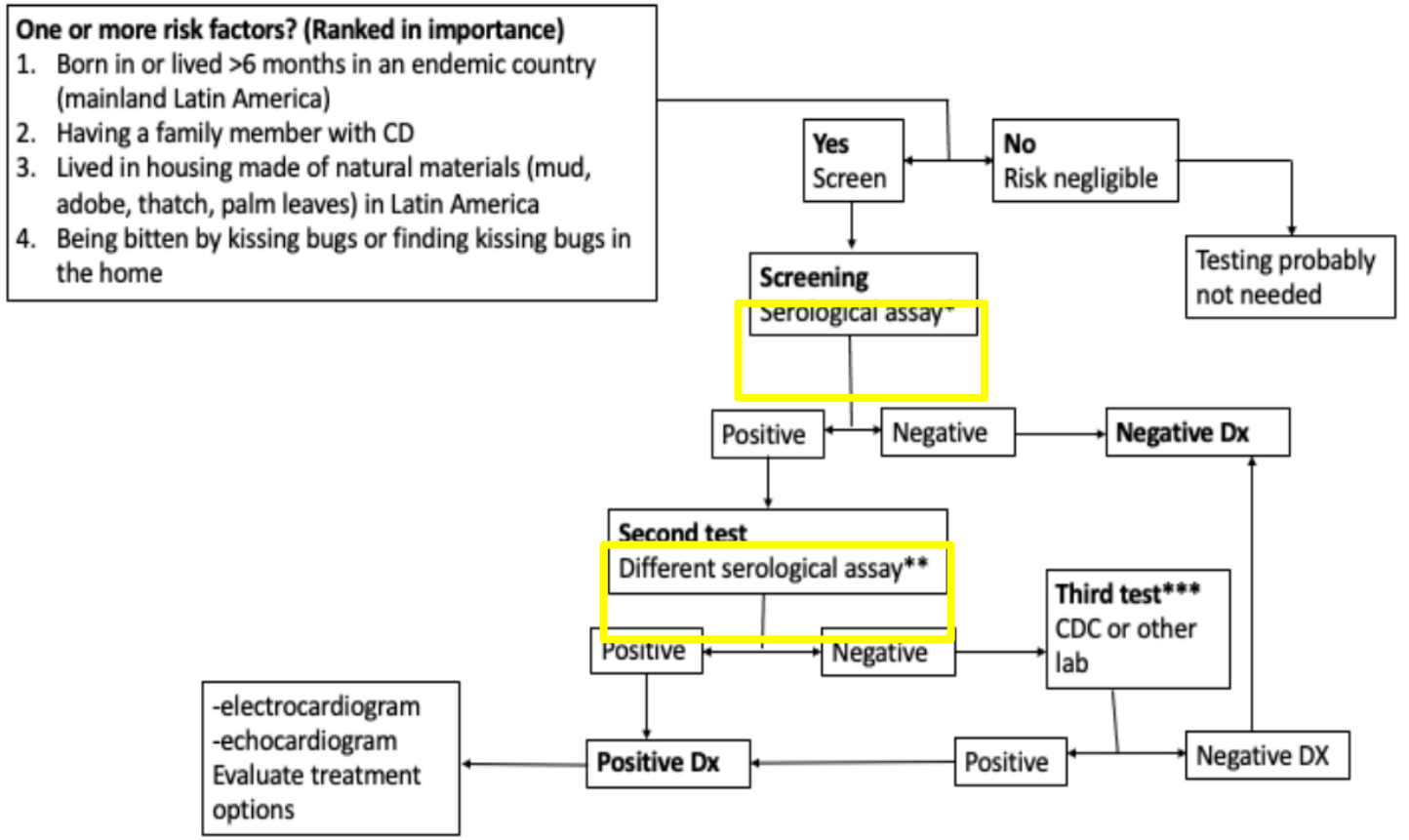
- More common in Southern Cone of South America
- Any part of the GI tract may be affected
  - Esophagus and colon most common
- 20% may be asymptomatic
- Esophageal disease often manifests as dysphagia
- Colon involvement most commonly presents as progressive constipation



Diagnosing *T. cruzi* infection

- Serologic testing ➡ single positive result does NOT confirm the diagnosis

- Need at least **two tests** (different techniques/ antigens - whole-parasite lysate and recombinant)



Forsyth CJ et al. JID 2021

Chagas Treatment

- Benznidazole (first line option) or nifurtimox
- Indicated in all acute and congenital infections
- Cure in >90% of congenitally infected infants during the first year of life
- Prevents progression to cardiac and GI complications
- Treatment better tolerated in children

TREATMENT CONSIDERATIONS

Antitrypanosomal treatment is recommended for all cases of acute and congenital Chagas disease, reactivated infection, and chronic *T cruzi* infection in individuals 18 years or younger.

In adults aged 19 to 50 years without advanced heart disease, etiologic treatment may slow development and progression of cardiomyopathy and should generally be offered; treatment is considered optional for those older than 50 years.

Individualized treatment decisions for adults should balance the potential benefit, prolonged course, and frequent adverse effects of the drugs.

Strong consideration should be given to treatment of previously untreated patients with human immunodeficiency virus infection or those expecting to undergo organ transplantation.

Reference: Bern C, Montgomery SP, Herwaldt BL, et al. Evaluation and Treatment of Chagas Disease in the United States: A Systematic Review. *JAMA.* 2007;298(18):2171–2181. doi:10.1001/jama.298.18.2171

You Are What You Eat

What is worse than finding a worm in your salad?

Finding half a worm

A Destructive Worm by F. Graetz
This image is available from the United States Library of Congress's Prints and Photographs division

Case: 49 year old construction worker from Mexico

Clinical history: 4 weeks of headache, blurry vision

One month of intermittent episodes of throbbing bilateral frontal headache , followed by a darkened vision, dizziness, and a feeling of being about to pass out. Episodes happen around 3-4 times a week and each episode lasts a few seconds.

On day of admission, pt was outside with his wife when she noticed that his R eye was smaller than the left, and his mouth was crooked, prompting her to bring him into the ED.

Pt reports a similar episode around 10 years ago of headache, blurred vision and was diagnosed with migraine

Physical Exam: Significant for hyporeflexia

Lab Tests: CBC, lytes normal

Imaging: CT head with diffuse hydrocephalus

Lumbar puncture: opening pressure 33 cm H2O, 70 wbc (86% L), glucose 102, protein 75

CYSTICERCOSIS

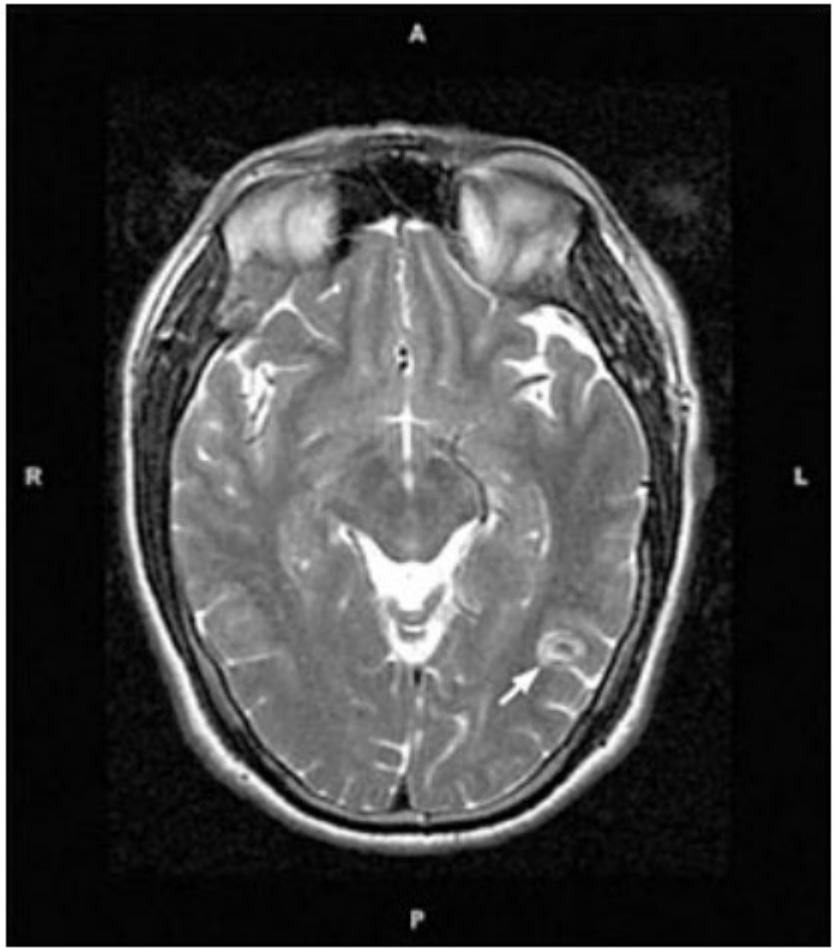
Cysticercosis: An Emerging Parasitic Disease

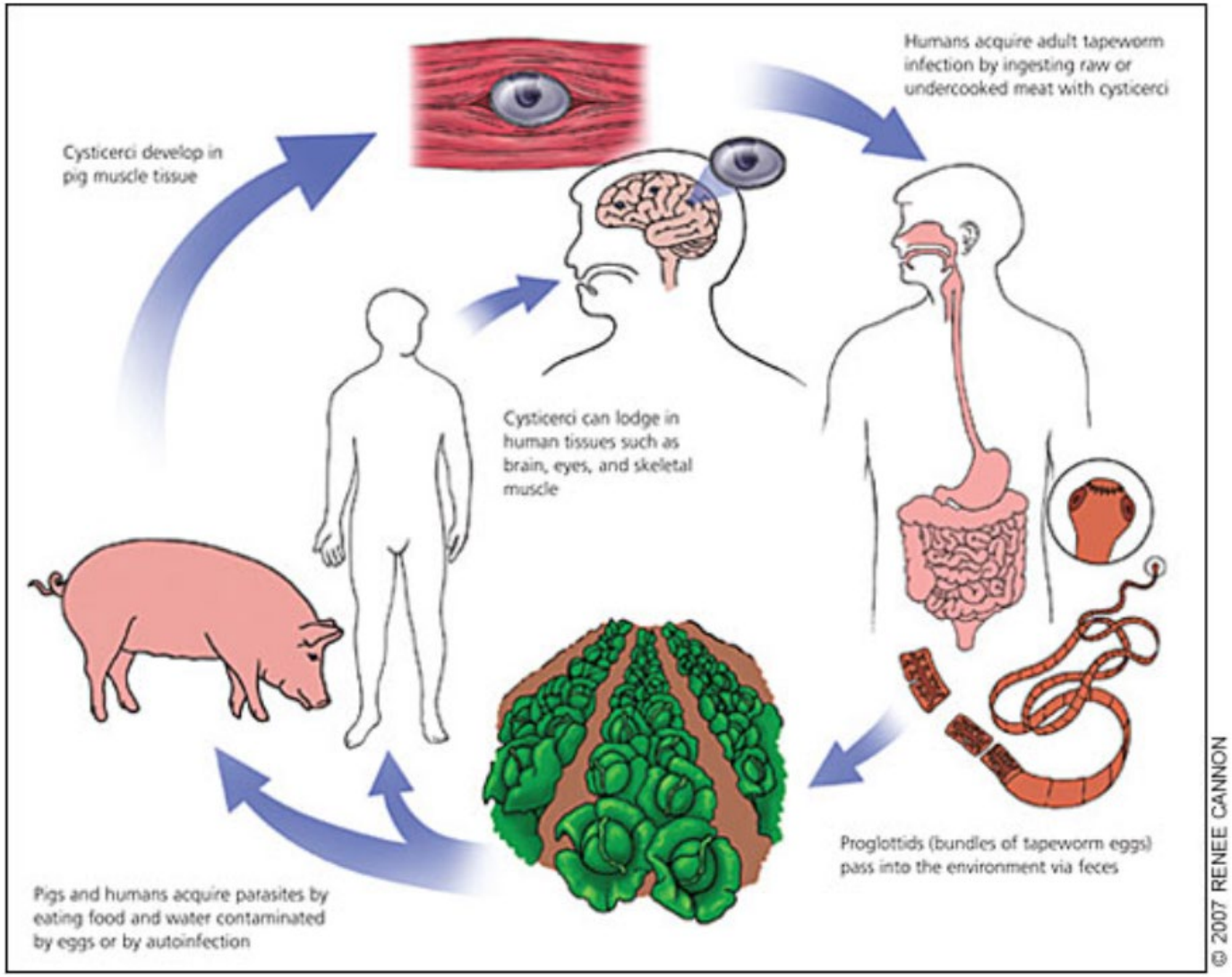
PDF Print Comments

ROBERT KRAFT, MD

This is a corrected version of the article that appeared in print.

Am Fam Physician. 2007;76(1):91-96





Life cycle of Taenia solium larvae.

Cisticercosis

The larval stage of the pork tapeworm, Taenia solium, causes the clinical syndrome of cysticercosis, with humans as dead-end hosts after ingestion of T. solium eggs.

The most common parasitic disease worldwide, with an estimated prevalence greater than 50 million persons infected

Neurocysticercosis is the most prevalent infection of the brain worldwide

Endemic in Mexico, Central and South America, and parts of Africa, Asia, and India

Evaluation and Treatment

Symptoms can include seizures, headaches, focal neurologic symptoms, visual disturbances, and localized skeletal muscle nodules and pain

All patients with cysticercosis should have an ophthalmologic examination to rule out ocular involvement

Calcified or heavy-infection (50 or more cysts) neurocysticercosis does not warrant antihelminthic therapy

Non-enhancing and enhancing cystic parenchymal neurocysticercosis should be treated with seven to 14 days of albendazole

For neurocysticercosis with seizures, steroids should be used concomitantly with antihelminthic therapy.

California officials confirm 2 cases of dengue, a mosquito-borne illness rarely transmitted in US

By AP Author | Published November 3, 2023 | Los Angeles County | Associated Press |

Summary

Ask a geographic history as part of your social history

- Place of birth / residence and exposures

Latent TB

- Screen persons born or residing in endemic countries & Treat

Hepatitis B

- Screen for chronic hepatitis B & immunity, Vaccinate if non-immune

Chagas Disease

- Screen women at risk before or during pregnancy & symptomatic newborns
  Treat persons under 18 years old, selected persons 19 to 50 years old, and persons with HIV or anticipating transplant

THANK YOU