

Neglected Infections of Poverty in the United States

**Clinician Outreach and
Communication Activity (COCA)**

Conference Call

November 2, 2010

Office of Public Health Preparedness and Response

Division of Emergency Operations



Objectives

At the conclusion of this hour, each participant should be able to:

- ❑ **Understand why neglected infections of poverty are important**
- ❑ **Discuss epidemiology, clinical presentation, diagnosis, treatment and gaps in our current understanding of Chagas disease in the United States**
- ❑ **Discuss epidemiology, clinical presentation, diagnosis, treatment and gaps in our current understanding of toxocariasis in the United States**
- ❑ **Discuss epidemiology, clinical presentation, diagnosis, treatment and gaps in our current understanding of trichomoniasis in the United States**

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TODAY'S PRESENTER



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Neglected Infections of Poverty in the United States

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Clinician Outreach and Communication Activity
November 2, 2010



Disclaimer

The findings and conclusions in this presentation are those of the author(s) and do not necessarily represent the views of the Centers for Disease Control and Prevention.

Neglected Infections of Poverty: Today's Presentation

- ❑ **Definition of neglected infections of poverty**
- ❑ **Distribution of poverty in the U.S.**
- ❑ **Highlight 3 infections:**
 - Chagas disease
 - Toxocariasis
 - Trichomoniasis
- ❑ **Resources and additional information**

What are the neglected infections of poverty?

- ❑ Infectious diseases concentrated in impoverished areas**
- ❑ Disproportionately affect minorities, women, and other disadvantaged groups**
- ❑ Can cause serious diseases in individuals**
- ❑ Overall burden of disease in the U.S. often uncertain**
- ❑ Studies on diagnosis and / or treatment often limited**
- ❑ Clinicians often receive little training so not well understood**

Neglected Infections of Poverty: The Diseases

- ❑ Chagas disease**
- ❑ Congenital cytomegalovirus (CMV) infection**
- ❑ Cysticercosis**
- ❑ Toxocariasis**
- ❑ Toxoplasmosis**
- ❑ Trichomoniasis**
- ❑ Others**

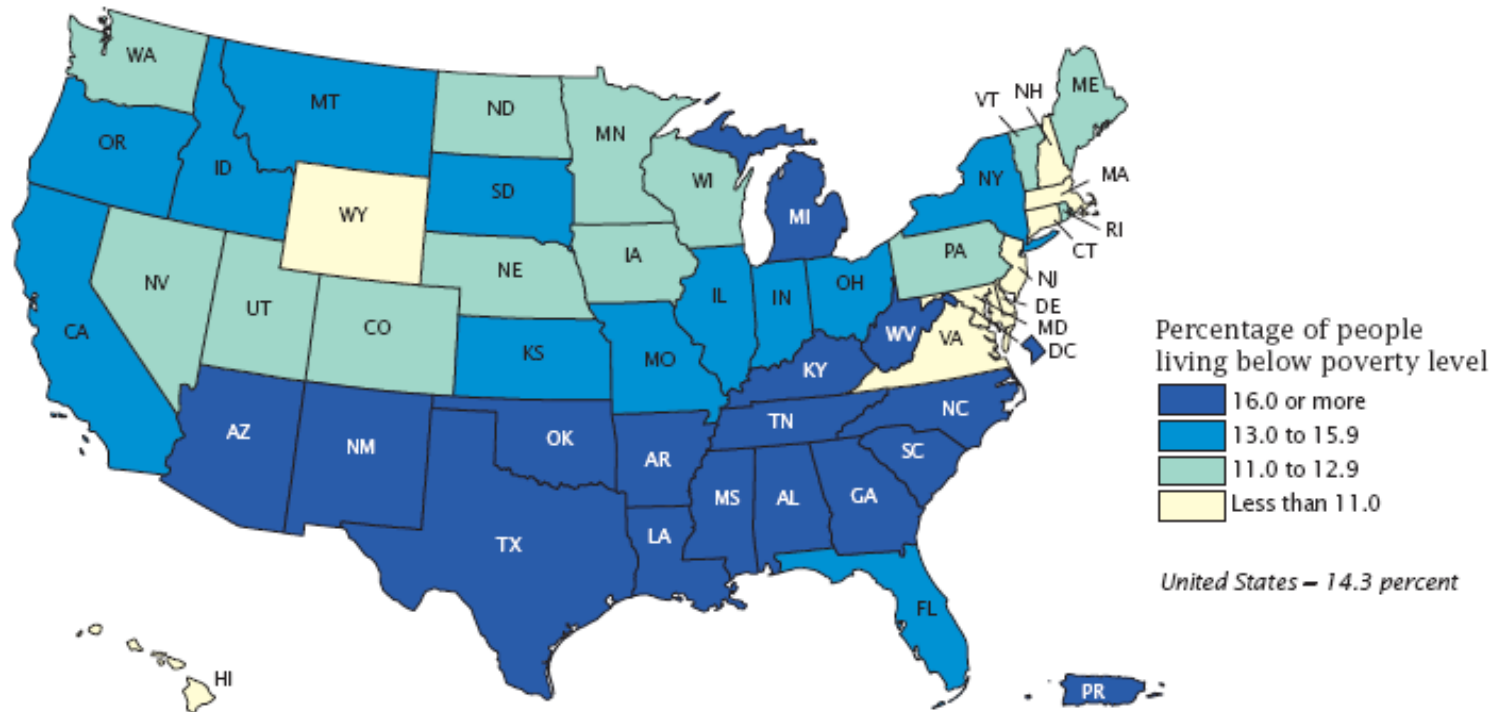
Poverty in the United States

- ❑ **Poverty defined based on pre-tax income and household size**
- ❑ **Certain groups at higher risk of poverty**
 - Non-white
 - Single parent households led by female
- ❑ **In 2009 14.3% of the U.S. population — 42.9 million people**
- ❑ **Six regions of poverty in the U.S.**

Distribution of Poverty in the U.S.



Figure 1.
**Percentage of People in Poverty in the Past 12 Months
by State and Puerto Rico: 2009**

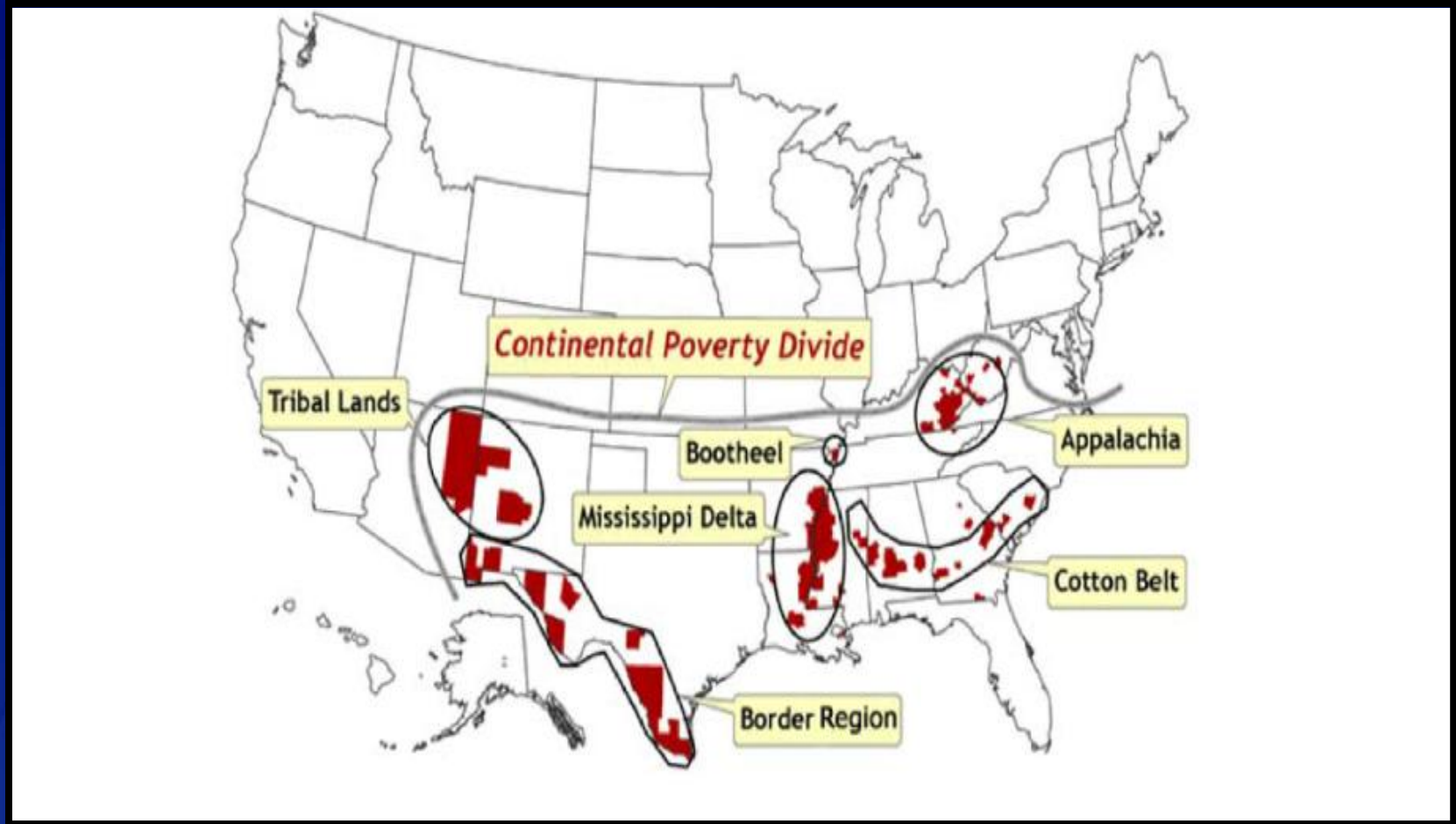


Sources: U.S. Census Bureau, American Community Survey, 2009, Puerto Rico Community Survey, 2009.

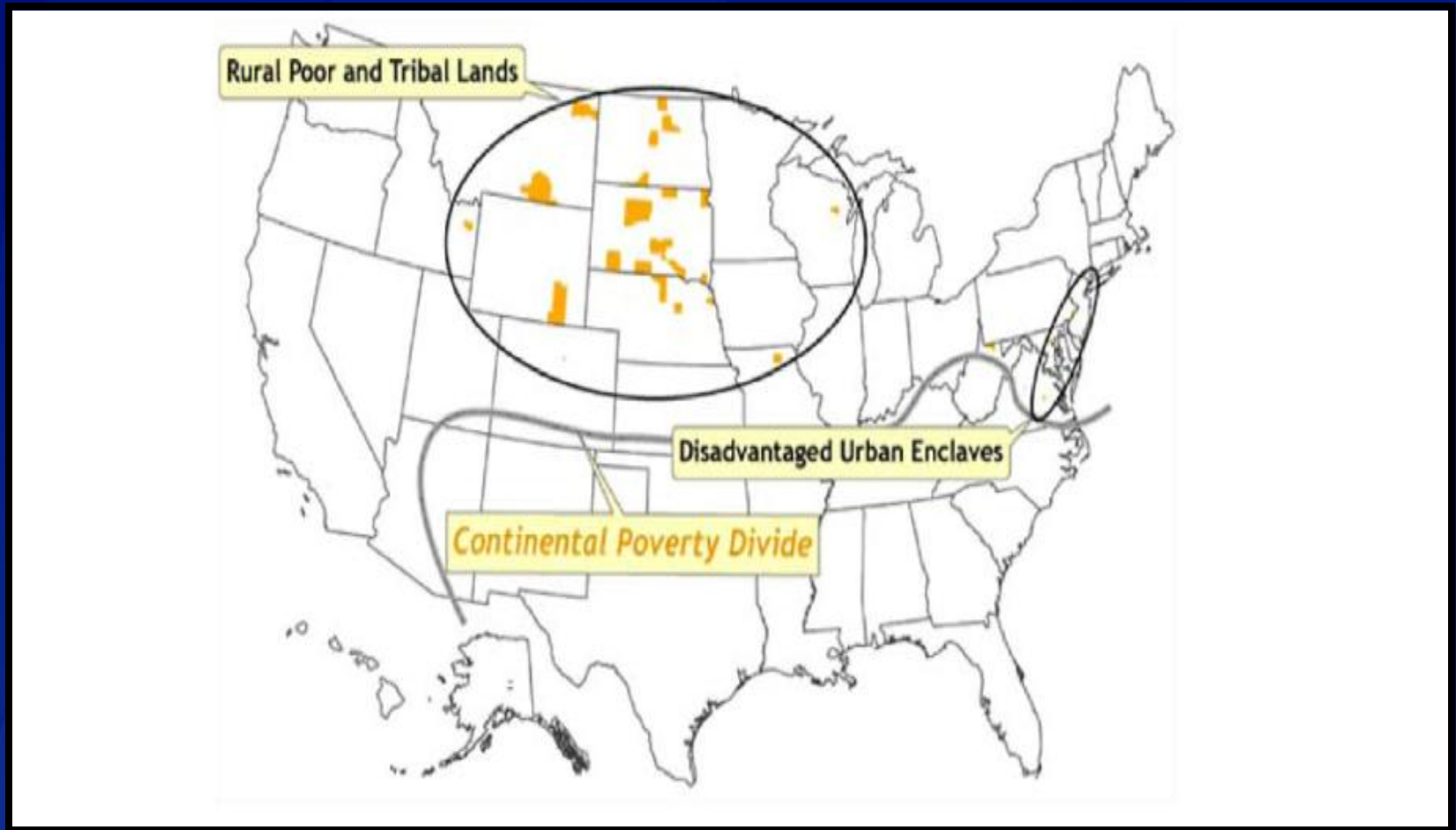
Poverty & Health in the U.S.

- ❑ **Poverty linked to decreased life expectancy**
- ❑ **Increased chronic diseases**
- ❑ **Increased infant and child mortality**
- ❑ **Analyses suggest 8 regional mortality / disease patterns in U.S.**

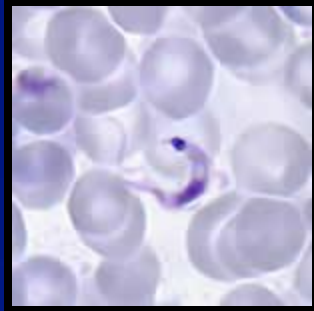
Clusters of Poverty & Disease in the United States



Clusters of Poverty & Disease in the United States



CHAGAS DISEASE



Chagas disease: Transmission



- ❑ Caused by the protozoan parasite *Trypanosoma cruzi*
- ❑ Primary mode of transmission — infected triatomine bugs
- ❑ Other modes of transmission include:
 - Blood transfusion
 - Organ & tissue transplantation
 - Congenital
 - Lab accidents
 - Foodborne

Photo of triatomine bug courtesy S. Kjos

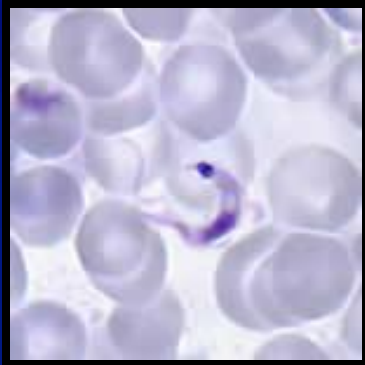
Chagas disease: Distribution

Disease endemic in
much of Latin America
(*highlighted in yellow*)

Both the parasite & the
triatomine bug are found
in the U.S. — domestic
vector-borne
transmission possible



Fig. 25.1 Geographic distribution of *T. cruzi* infection. (From WHO 1986 Epidemiology and control of African trypanosomiasis: Report of a WHO Expert Committee. WHO Tech Rep Ser 739:41.)



Chagas disease: Burden in U.S.



- ❑ **Estimated 300,000 or more infected Latin American immigrants currently living in the U.S.***
 - California, Florida, Texas disproportionately affected
 - Other concentrations include: AZ, GA, IL, NC, NY, VA
- ❑ **Blood donor screening started in early 2007**
 - Since screening began, 1,267 infected donors identified
 - > 40 with no recognized risk factor

*Bern C, Montgomery SP. An estimate of the burden of Chagas disease in the United States. *Clin Infect Dis* 2009; **49**: e52–54.

Chagas disease: Symptoms

❑ Acute phase, 4 – 8 weeks

- Usually asymptomatic
- 10 – 20% non-specific febrile illness
- Less commonly Romaña's sign



❑ Chronic phase, lifelong

- Asymptomatic indeterminate form
- 20 – 30% manifest symptomatic disease
 - Cardiac — heart failure, sudden death, stroke
 - Gastrointestinal — organomegaly

Chagas disease: Diagnosis

❑ Testing available through CDC

- Acute infection — blood smear, hemoculture, PCR useful
- Chronic infection — serologic tests useful

❑ No gold standard test

- Test for acute infection are sensitive, but the acute phase is often not recognized
- Tests for chronic infection have issues with sensitivity and specificity — usually require two different positive tests

Chagas disease: Treatment

❑ Nifurtimox or benznidazole

- Neither FDA approved but both available through CDC's IND protocol for compassionate use
- Data on efficacy in chronic infection evolving
- Side effects frequent, especially adults, and requires monitoring
- Under-utilized — less than 11% of blood donors identified by screening seek treatment through CDC

❑ Other management issues

- Yearly H&P and ECG with rhythm strip
- Work up for long-term complications as indicated

Chagas disease: Who should be treated?

□ Always offer

- Acute infection
- Congenital
- Children \leq 18 years old with chronic infection
- Immunocompromised patients with reactivation

□ Generally offer

- Women of reproductive age
- Adults \leq 50 years old with indeterminate form or mild to moderate cardiomyopathy
- Patients in whom immunosuppression is anticipated

Chagas disease: Who should be treated?

❑ **Optional**

- Adults >50 years old without advanced cardiomyopathy

❑ **Generally do not offer**

- Patients with advanced cardiomyopathy with congestive heart failure
- Patients with impairment of swallowing

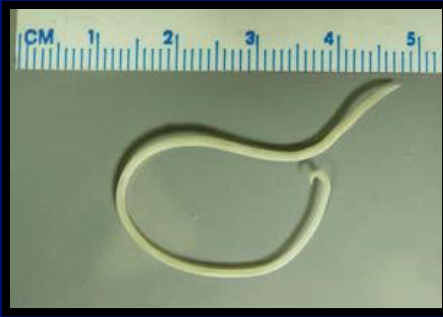
❑ **Should almost never offer**

- During pregnancy
- Patients with severe renal or hepatic insufficiency

Chagas Disease: Prevention

- ❑ Educate people and healthcare providers about who is at risk for infection**
- ❑ Screen donors to prevent transfusion and transplant-associated disease**
- ❑ Screen for congenital infection**
- ❑ Counsel travelers to endemic areas to avoid putting themselves at risk**

TOXOCARIASIS



Toxocariasis: Transmission



- ❑ **Human disease caused by infection with larval stages of dog/cat roundworm**
 - *Toxocara* eggs are shed in dog / cat feces
 - Humans become infected by ingesting
 - Embryonated eggs in soil or food
 - Encysted larvae in raw tissues (cows, sheep, chickens)

- ❑ **Larvae migrate and encyst in humans but do not develop into adults or reproduce in them**

Toxocariasis: Epidemiology



- ❑ **NHANES data suggest ~14% of the U.S. pop is infected**
 - Highest prevalence in the southern U.S. (> 17%)
 - Affects Non-Hispanic Blacks more than other groups
 - Associated with poverty, low education level, and dog ownership

- ❑ **Environmental contamination of soil common**
 - Sand boxes and areas in yard where animals defecate
 - Up to 20% of soil samples in U.S. parks positive, though data are limited

Toxocariasis: Symptoms



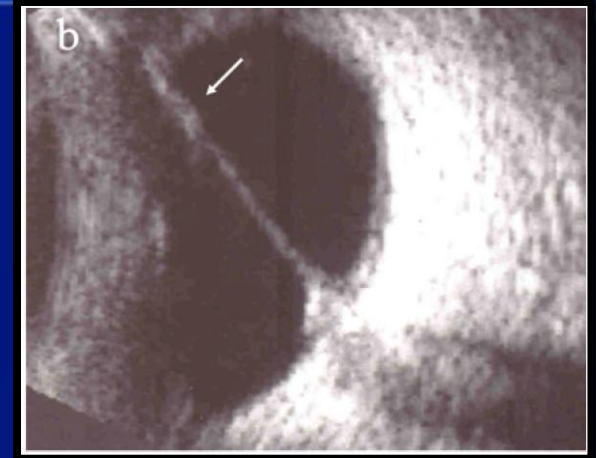
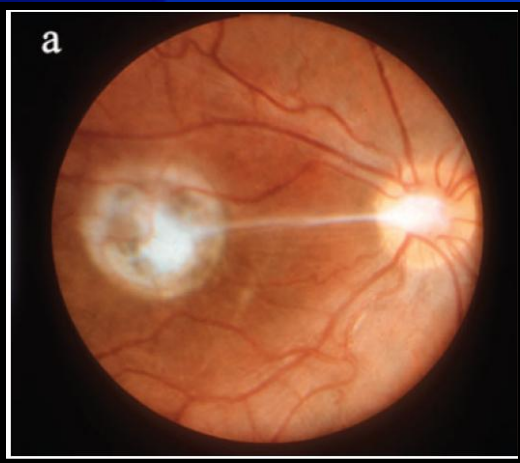
- ❑ **Many / most asymptomatic**
- ❑ **Caused by reaction to dead / dying larvae**
- ❑ **Mild toxocariasis ('covert' or 'common')**
 - In children — fever, headache, behavioral & sleep disturbances, cough, anorexia, abdominal pain, hepatomegaly, nausea & vomiting, eosinophilia (may or may not be present)
 - In adults — chronic dyspnea & weakness, rash, pruritus, abdominal pain, eosinophilia often present
- ❑ **Visceral toxocariasis (a.k.a. visceral larva migrans)**
- ❑ **Ocular toxocariasis (a.k.a. ocular larva migrans)**

Toxocariasis: Visceral Toxocariasis (VT)

- ❑ **VT typically occurs in children 2 – 7 years old**
- ❑ **Symptoms — fever, lower respiratory symptoms, hepatomegaly, abdominal pain, anorexia**
- ❑ **Other symptoms specific to organ involved**
 - Hepatic granulomas
 - Chronic prurigo, pruritus, urticaria, eczema, vasculitis
 - Eosinophilic meningitis or encephalitis, myelitis, optic neuritis, radiculitis, cranial nerve palsy
 - Less commonly myocarditis, nephrotic syndrome, arthritis
- ❑ **Labs — marked eosinophilia, anemia, hypergammaglobulinemia, increased titers to A & B blood group antigens**

Toxocariasis:

Ocular Toxocariasis (OT)



- ❑ OT typically occurs in 5 – 10 year olds
- ❑ Usually affects single eye
- ❑ Symptoms — strabismus, unilateral decreased vision, leukocoria
- ❑ Eye exam — peripheral, posterior pole retinal granuloma and endophthalmitis, vitreous band on ultrasound





Toxocariasis: Diagnosis



❑ Serologic tests: ELISA

- 78% sensitive and 92% specific for VT for CDC ELISA
- Reduced sensitivity for OT
- Some cross-reactivity with other helminths

❑ Biopsy

- Visualize larvae surrounded by eosinophilic infiltrate
- Not commonly used

❑ **CANNOT diagnose with stool O&P as eggs not excreted by humans**

Toxocariasis: Treatment

- ❑ **Mild toxocariasis often does not need treatment**
- ❑ **VT treated with 5 days albendazole, +/- corticosteroids for allergic symptoms**
- ❑ **OT treated with 2 – 4 weeks of albendazole, + *aggressive anti-inflammatory treatment* with corticosteroids, and surgery**
- ❑ **Few controlled trials on treatment, confirming cure difficult, and albendazole not FDA-approved for this indication**



Toxocariasis: Prevention



❑ Dog / cat targeted

- Regular de-worming
- Always clean up after your pet during walks and clean pet play areas weekly (takes >1 week for eggs to embryonate)

❑ Human targeted

- Do not allow young children to play in areas where animals defecate
- Cover sandboxes when not in use
- Prevent geophagia
- Use good hygiene practices (e.g. washing hands with soap and water) after playing with pets and after outdoor activities

TRICHOMONIASIS

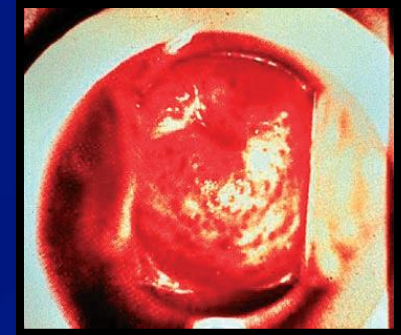


Trichomoniasis: Epidemiology



- ❑ ***Trichomonas vaginalis* is a parasite spread through sexual contact**
- ❑ **5 – 7 million cases estimated yearly in the U.S.**
- ❑ **Prevalence may be up to 20 million in the U.S.**
 - 2.8% in young adult women & 1.7% in young adult men
 - In STD clinics, 28–34% in women & 13–17% in men
 - 10-fold higher among African American women compared to non-Hispanic white women (13.3% vs. 1.3%)

Trichomoniasis: Symptoms



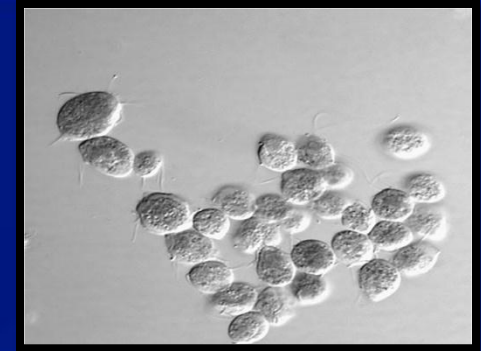
- ❑ **Can be asymptomatic**
 - 46% of men with trichomoniasis in one U.S. study
 - 16% of asymptomatic women in Zimbabwe were infected
- ❑ **In women, vaginal discharge, pruritus, or dysuria**
- ❑ **In men, urethral discharge or dysuria**
- ❑ **Physical exam may reveal mucopurulent discharge, 'strawberry cervix', cervical erythema, or cervical friability**

Trichomoniasis: Morbidity



- ❑ **Associated with other sexually-transmitted infections**
- ❑ **Consequences of *T. vaginalis* infection:**
 - Premature rupture of membranes
 - Preterm birth
 - Low birth weight
 - Pelvic inflammatory diseases
 - Increase susceptibility to HIV transmission

Trichomoniasis: Diagnosis



❑ In women

- Wet prep — only 60–70% sensitive
- Point-of-care tests by OSOM Trichomonas Rapid Test (Genzyme Diagnostics) and by Affirm VP III (Becton Dickenson)
 - Performed on vaginal secretions
 - >83% sensitive and >97% specific
- Papanicolaou smear — not recommended for *Trichomonas* screening
- PCR, culture on special media

❑ In men

- Wet prep of urethral discharge, prostatic secretions, or urethral scrapings — uncertain sensitivity
- PCR, culture on special media

Trichomoniasis: Treatment

- ❑ **Course of antimicrobial metronidazole or tinidazole**
- ❑ **Sex partners of patients should be treated**
- ❑ **Metronidazole resistance estimated at around 5%**
 - Data on management limited
 - If treatment with 2g metronidazole fails (and reinfection excluded) then treat with metronidazole 500 mg BID for 7 days **OR** tinidazole 2g once
 - If either therapy fails then treat with metronidazole **OR** tinidazole 2g daily for 5 days
 - If this fails then consult CDC for testing and management (telephone: 404-718-4141, website: <http://www.cdc.gov/std>)

Trichomoniasis: Treatment in Pregnancy

- ❑ Treat symptomatic women**
- ❑ Counsel asymptomatic women about the risk and benefits of treatment and defer until 37 weeks**
- ❑ Metronidazole is pregnancy category B**
- ❑ Tinidazole is pregnancy category C**

SUMMARY AND RESOURCES

Chagas: Summary of Key Issues

- ❑ True burden of disease in the U.S. is uncertain**
- ❑ Asymptomatic phase results in missed diagnoses**
- ❑ No gold standard diagnostic tests**
- ❑ Data on efficacy of treatment of chronic infection in adults is limited**
- ❑ Many patients with diagnosed infection not getting treatment**

Toxocariasis: Summary of Key Issues

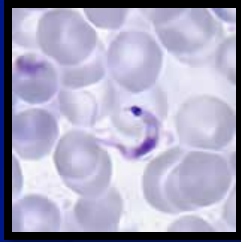
- ❑ True burden of infection in U.S. uncertain**
- ❑ Incomplete understanding of morbidity of 'asymptomatic' infections**
- ❑ Serologic tests may be negative in patients with mild disease or with OT**
- ❑ Limited data on efficacy of treatment of severe disease**

Trichomoniasis: Summary of Key Issues

- ❑ True burden of infection is uncertain**
- ❑ Infections may be missed in patients who are asymptomatic**
- ❑ Consequences of asymptomatic infection in pregnancy are unclear**

Neglected Infections of Poverty in the U.S.: Summary

- ❑ **Neglected Infections of Poverty:**
 - Disproportionately affect minorities, women, and disadvantaged persons in both urban and rural settings
 - Often unrecognized, undiagnosed, untreated
 - Infection often 'asymptomatic', making diagnosis difficult
 - Data to guide diagnosis and / or treatment limited
- ❑ **Important to consider these diseases when evaluating populations at risk**
- ❑ **For more information on Neglected Infections of Poverty, visit**
http://www.cdc.gov/ncidod/dpd/features/nip_factsheet.pdf



Chagas disease: Resources



- ❑ Guidance for Evaluation and Treatment available at http://www.cdc.gov/chagas/health_professionals/index.html
- ❑ Patients and physician fact sheets (English & Spanish) available at http://www.cdc.gov/chagas/health_professionals/index.html
- ❑ General information available at www.cdc.gov/chagas
- ❑ CME and CNE unit “Chagas Disease: What U.S. Clinicians Need to Know” available at <http://www.cdc.gov/chagas/CME/>



Toxocariasis: Resources



- ❑ For general information visit

<http://www.cdc.gov/ncidod/dpd/parasites/toxocara/default.htm>

- ❑ For information for health professionals, including treatment recommendations, visit

<http://www.cdc.gov/ncidod/dpd/professional/default.htm>



Trichomoniasis: Resources



- ❑ For general information visit <http://www.cdc.gov/std/trichomonas/>
- ❑ A downloadable brochure is available at <http://www.cdc.gov/std/trichomonas/the-facts/>
- ❑ Treatment guidelines are available at <http://www.cdc.gov/std/treatment/2006/vaginal-discharge.htm#vagdis3>

Suggested Readings

- ❑ Hotez PJ. Neglected infections of poverty in the USA. *PLoS NTDs* 2008; 2: e256.
- ❑ Bern C et al. Evaluation and treatment of Chagas disease in the U.S. *JAMA* 2007; 298: 2171–81.
- ❑ Rubinsky-Elefant G et al. Human toxocariasis: diagnosis, worldwide seroprevalences and clinical expression of the systemic and ocular forms. *Annals of Trop Med & Parasitology* 2010; 104: 3–23.
- ❑ Despommier D. Toxocariasis: clinical aspects, epidemiology, medical ecology, and molecular aspects. *Clin Micro Rev* 2003; 16: 265–72.

Suggested Readings

- ❑ **Wendal KA et al. Trichomoniasis: challenges to appropriate management. *Clin Infect Dis* 2007; 44: s123–s129 .**
- ❑ **Swygard H et al. Trichomoniasis: clinical manifestations, diagnosis, and management. *Sex Transm Infect* 2004; 80: 91–5.**

Acknowledgements

Thanks to:

Susan Montgomery, DPDM

Kelly Stimpert, DPDM

Jeff Jones, DPDM

Evan Secor, DPDM

Kim Workowski, DSTDP

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Thank you for joining!

Please email us questions at coca@cdc.gov

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Emergency Preparedness and Response


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- What CDC Is Doing
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Neglected Infections of Poverty in the United States

CE = Continuing Education Credits

Date: November 2, 2010
Time: 2:00 PM – 3:00 PM (Eastern Time)

Presenter(s):

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LCDR U.S. Public Health Service
Medical Officer
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Overview:

Neglected infections of poverty are a group of parasitic, bacterial, and viral infections that disproportionately affect impoverished groups in the United States, and lead to illness in a significant number of individuals in vulnerable populations. These infections are often not well studied or tracked; thereby impacting diagnosis, treatment, and prevention. During this call, a CDC subject matter expert will describe the epidemiology, diagnosis, and treatment of 3 neglected infections of poverty - *Chagas Disease*, *Toxocariasis*, and *Trichomoniasis*.




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