TRICHLOMONAS VAGINALIS
A TRICH-Y PROBLEM

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Fun Facts about *T. vaginalis*

• Protozoan first described in 1836 by Alfred Donné\(^1\)

• 1940’s – established as an etiologic agent of vaginitis\(^2, 3\)

• Roughly the size of a leukocyte\(^4\)

• 4 anterior flagella responsible for motility

• Some strains infected with *T. vaginalis* viruses (TVVs)\(^5\)

• Capable of phagocytosis – can engulf other reproductive tract pathogens\(^6, 7\)

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Trichomonas vaginalis

Global Prevalence = 187.0 million adults

Age Specific Prevalence – *T. vaginalis*

**NHANES 2001-2004**
(Women)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-19</td>
<td>2.1</td>
</tr>
<tr>
<td>20-29</td>
<td>2.3</td>
</tr>
<tr>
<td>30-39</td>
<td>4.0</td>
</tr>
<tr>
<td>40-49</td>
<td>3.6</td>
</tr>
</tbody>
</table>
### Who is Most Likely to Be Infected?

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Adjusted Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Race</td>
<td>6.9 (3.0 – 15.9)</td>
</tr>
<tr>
<td>Low Educational Attainment</td>
<td>2.2 (1.3 – 3.5)</td>
</tr>
<tr>
<td>Lifetime Number Sex Partners</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.7 (0.2 – 2.5)</td>
</tr>
<tr>
<td>2</td>
<td>1.2 (0.4 – 3.4)</td>
</tr>
<tr>
<td>3-5</td>
<td>2.7 (1.1 – 6.4)</td>
</tr>
<tr>
<td>≥6</td>
<td>3.2 (1.3 – 8.3)</td>
</tr>
<tr>
<td>Douching</td>
<td>2.0 (1.2 – 3.5)</td>
</tr>
</tbody>
</table>

Clinical Spectrum in Women

- ~50% asymptomatic

- Vaginitis
  - Vaginal discharge
    *(Profuse & frothy is pathognomonic)*
  - Vulvar irritation

- Dysuria
  - ~33% of TV-infected women

- Cervicitis
  - Characteristic “strawberry cervix”
  - Uncommon but highly specific
  - May include post-coital bleeding & cervical friability

Hobbs et al, STD 2008
Clinical Spectrum in Men

- Up to 77% asymptomatic
- 2 – 18% of nongonococcal urethritis (NGU) cases
- Dysuria most common complaint
- > 2/3 of men spontaneously clear infection within 2 weeks

An Underappreciated Pathogen

- *T. vaginalis* and Preterm Birth

Summary OR = 1.4 (1.2 – 1.8)

**NOTE:** Weights are from random effects analysis

 исследования

<table>
<thead>
<tr>
<th>Study</th>
<th>RR (95% CI)</th>
<th>Infected</th>
<th>Uninfected</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azargoon 2006</td>
<td>0.74 (0.28, 1.97)</td>
<td>4/67</td>
<td>77/960</td>
<td>3.89</td>
</tr>
<tr>
<td>Buchmayer 2006</td>
<td>1.61 (1.21, 2.13)</td>
<td>45/563</td>
<td>2092/80192</td>
<td>17.44</td>
</tr>
<tr>
<td>Cocchi 1997</td>
<td>1.35 (1.19, 1.52)</td>
<td>257/1730</td>
<td>1239/12080</td>
<td>23.53</td>
</tr>
<tr>
<td>French 2006</td>
<td>1.62 (0.63, 4.19)</td>
<td>3/30</td>
<td>55/867</td>
<td>4.08</td>
</tr>
<tr>
<td>Johnson 2011</td>
<td>1.30 (0.93, 1.88)</td>
<td>26/109</td>
<td>109/621</td>
<td>13.98</td>
</tr>
<tr>
<td>Kiss 2004</td>
<td>6.78 (1.33, 34.46)</td>
<td>1/3</td>
<td>43/874</td>
<td>1.54</td>
</tr>
<tr>
<td>Minkoff 1984</td>
<td>1.71 (0.67, 4.38)</td>
<td>4/18</td>
<td>28/200</td>
<td>4.16</td>
</tr>
<tr>
<td>Rusti 2011</td>
<td>2.62 (1.49, 4.25)</td>
<td>2/2</td>
<td>148/448</td>
<td>9.82</td>
</tr>
<tr>
<td>Stenger 2010</td>
<td>1.02 (0.86, 1.23)</td>
<td>109/428</td>
<td>497/2000</td>
<td>21.57</td>
</tr>
<tr>
<td>Overall (I² = 62.7%, p = 0.006)</td>
<td>1.42 (1.15, 1.75)</td>
<td>452/2956</td>
<td>5276/78048</td>
<td>100.00</td>
</tr>
</tbody>
</table>

*Silver et al. Sex Transm Dis 2014*
An Underappreciated Pathogen

*T. vaginalis & Preterm PROM*
Summary OR = 1.4 (1.1 – 1.8)

*T. vaginalis & SGA*
Summary OR = 1.5 (1.3 – 1.7)

*Also associated with low birth weight*

Silver et al. Sex Transm Dis 2014
**T. vaginalis & HIV-infection in Women**

### HIV Acquisition

- **HIV shedding** elevated

### HIV Transmission

- **Synergy with bacterial vaginosis (BV):**
  - **TV alone:** OR = 4.1 (1.8-9.4)
  - **BV alone:** OR = 5.7 (2.6-12.0)
  - **TV & BV:** OR = 18.6 (6.7-51.7)
Diagnosis of *T. vaginalis*

Clinical Diagnoses

- Profuse, frothy vaginal discharge
  - pH > 4.5

- “Strawberry cervix”

- Urethral discharge
  - (less purulent than GC)
  - ≥5 PMNs – Gram stain

**BUT** – Clinical diagnosis is fairly **unreliable** (majority are asymptomatic)
Detection of *T. Vaginalis*

**Microscopy:**
Wet-mount
(motile trichomonads)

**Culture:**
In-Pouch Assay

**Antigen Detection:**
- OSOM
- Xenotope

**NAAT:**
- PCR
- TMA
## Diagnostic Test Performance - *T. vaginalis*

Adapted from Poole and McClelland, STI 2013

<table>
<thead>
<tr>
<th>Assay</th>
<th>Manufacturer</th>
<th>Sensitivity %</th>
<th>Specificity %</th>
<th>Sensitivity %</th>
<th>Specificity %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Women</td>
<td>Men</td>
<td>Women</td>
<td>Men</td>
</tr>
<tr>
<td>Wet mount microscopy</td>
<td>-</td>
<td>36.4-82.0</td>
<td>99.1-100.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Immuno-chromatic Ag detection</td>
<td>OSOM&lt;sup&gt;1&lt;/sup&gt;</td>
<td>83.3-98.0</td>
<td>98.9-99.4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>XenoStrip-Tv&lt;sup&gt;2&lt;/sup&gt;</td>
<td>66.7-90.0</td>
<td>92.5-100</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Culture</td>
<td>Diamond’s medium</td>
<td>95.7</td>
<td>100.0</td>
<td>56.0-100</td>
<td>99.0%-100.0</td>
</tr>
<tr>
<td></td>
<td>In-Pouch TV&lt;sup&gt;3&lt;/sup&gt;</td>
<td>69.7-73.3</td>
<td>100.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NAAT</td>
<td>PCR (urine)</td>
<td>90.8-100.0</td>
<td>93.4-99.2</td>
<td>91.7-100</td>
<td>88.0-99.4</td>
</tr>
<tr>
<td></td>
<td>PCR (swab)</td>
<td>97.8-98.6</td>
<td>97.4-97.8</td>
<td>81.6-98.6</td>
<td>94.9-95.5</td>
</tr>
<tr>
<td></td>
<td>TMA: Aptima TV&lt;sup&gt;4&lt;/sup&gt;</td>
<td>95.2-100.0</td>
<td>98.0-100.0</td>
<td>96.0</td>
<td>90.5-96.3</td>
</tr>
</tbody>
</table>

<sup>1</sup> Sekisui Diagnostics; <sup>2</sup> Xenotope Diagnostics; <sup>3</sup> Biomed Diagnostics; <sup>4</sup> Hologic (Gen-Probe)
## 2011 European (IUSTI/WHO) Guideline

### T. vaginalis and Bacterial Vaginosis

<table>
<thead>
<tr>
<th>Recommended Regimen</th>
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<tbody>
<tr>
<td>Metronidazole 400 - 500mg orally twice daily for 5 - 7 days</td>
</tr>
<tr>
<td><em>OR</em></td>
</tr>
<tr>
<td>Metronidazole 2g orally in a single dose</td>
</tr>
<tr>
<td><em>OR</em></td>
</tr>
<tr>
<td>Tinidazole 2g orally in a single dose</td>
</tr>
</tbody>
</table>
**T. vaginalis – Treatment Considerations**

**GOOD NEWS**
- Antimicrobial resistance generally low
  - Metronidazole: 4 – 10%
  - Tinidizole: ~1%
- Higher dosing often effective for treatment failures
- Alternative regimens (although evidence is limited):
  - Intravaginal paromomycin + high-dose tinidazole
  - Intravaginal boric acid
  - Nitazoxinide

**BAD NEWS**
- **Single dose** therapy with metronidazole not recommended for HIV+ individuals or women with BV
  - 5-7 days of metronidazole instead
- Some evidence PTB can occur in pregnant women after treatment, but inconclusive

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**CDC STD Treatment Guidelines 2015**
Summary – *T. vaginalis*

- An **underappreciated pathogen**, associated with
  - Vaginitis and NGU
  - Perinatal Morbidity: Preterm Birth, PROM, SGA, and LBW
  - HIV – increased risk of acquisition and transmission

- Individuals with *T. vaginalis* infections should
  - Abstain from sex until therapy for index & partners is completed
  - Refer partners for evaluation and treatment

- Limited global data on population estimates of *T. vaginalis*
  - Lack of surveillance activities limits our understanding of the burden of *T. vaginalis* infections
THANK YOU!

26th European Congress of Clinical Microbiology and Infectious Disease

Pr Cécile Bébéar – Université de Bordeaux

Pr Jorgen Jensen – Statens Serum Institut

Pr Marcia Hobbs – University of North Carolina

Hologic, Inc – San Diego, California

US National Institutes of Health / National Institute of Allergy & Infectious Diseases