Making Sense of HIV and Pregnancy

3-day prenatal course
Making Sense of HIV and Pregnancy: Introduction to Day 1

- HIV 101
- Perinatal Transmission
- 1st Trimester (0-13 weeks)
- 2nd Trimester (13-26 weeks)
- 3rd Trimester (26-40 weeks)
Making Sense of HIV and Pregnancy: Introduction to Day 2

- Labor
- Vaginal Delivery
- Cesarean Section
- After the delivery for mom and baby
- Contraception options
- STIs
Making Sense of HIV and Pregnancy: Introduction to Day 3

- Nutrition
- Post-partum depression
- Newborn care
- Administering AZT to your baby - demo
Prenatal Screening: First Trimester Tests

- Pap Smear
- STI testing & HIV testing
- Hepatitis B
- Complete blood count
- Blood type and RH factor
**Prenatal Screening: First Trimester Tests**

<table>
<thead>
<tr>
<th>Test</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urine Test</td>
<td>Every Visit</td>
</tr>
<tr>
<td>Blood Pressure Test</td>
<td>Every Visit</td>
</tr>
<tr>
<td>Weight</td>
<td>Every Visit</td>
</tr>
<tr>
<td>Fetal Heart Tones</td>
<td>12 weeks</td>
</tr>
<tr>
<td><strong>Prenatal Genetic Screen</strong></td>
<td><strong>16-18 weeks</strong></td>
</tr>
<tr>
<td>Ultrasound</td>
<td>18 weeks</td>
</tr>
<tr>
<td>Fundal Height</td>
<td>22 weeks</td>
</tr>
<tr>
<td>Glucola Test</td>
<td>24-28 weeks</td>
</tr>
<tr>
<td>Non-Stress Test / Bio physical profile</td>
<td>3rd Trimester</td>
</tr>
</tbody>
</table>
HIV 101 - What we will cover

- What is HIV?
- How is HIV transmitted?
- What cells does it infect?
- How does HIV cause illness?
- How is it treated?
HIV and AIDS

Human Immunodeficiency Virus

Acquired Immunodeficiency Syndrome
How is it transmitted?

• Through sharing of body fluids that contain HIV
  ▫ Blood
  ▫ Genital secretions
  ▫ Breast milk
  ▫ Pre-chewing
• Getting stuck by or sharing a needle when using drugs
• During pregnancy or childbirth
Risk of HIV Transmission

• *Risk of transmission through heterosexual sex*

  1 in 1000

• *Risk of transmission from untreated HIV during pregnancy*

  1 in 4
Decreasing Transmission: Pre-Chewing

- When the mother chews food and passes it on to baby
- This is dangerous because it can pass on organisms, including HIV
- Mom could have bleeding gums, small cuts from brushing teeth, or sharp food
- Child may be teething or have an infection in their mouth
- Same reasons why it isn’t recommend to share toothbrushes
What cells does it infect?

White Blood Cells
What cells does it infect?

- White Blood Cells
- Lymphocytes
- T-Cells
- Kills cells
- B-Cells
- Make antibodies
- Monocytes
- Macrophages

White Blood Cells
Immune System
Sexual Transmission of HIV-1
HIV Virus

- env Surface Glycoprotein SU pg120
- env Transmembrane Glycoprotein TM gp41
- gag Membrane Associated (Matrix) Protein MA p17
- gag Caspid CA Core shell p24
- RNA (2 molecules)
- pol Protease PR p9 Polymerse RT & RNase H RNH p66 Integrase IN p32
CCR5
(HIV Co-Receptor)

CD4 receptor

HIV virus

CD4 cell
Viron Binding

CD4 receptor

CCR5 (HIV Co-Receptor)
Fusion and Entry

CD4 receptor

CCR5 (HIV Co-Receptor)
Fusion and Entry

CD4 receptor

CCR5 (HIV Co-Receptor)
Reverse Transcription

CD4 receptor

CCR5 (HIV Co-Receptor)
Integration

CD4 receptor

CCR5
(HIV Co-Receptor)
Integration

CD4 receptor

CCR5 (HIV Co-Receptor)
Proviral Transcription

CD4 receptor

CCR5 (HIV Co-Receptor)
Translation

CD4 receptor

CCR5
(HIV Co-Receptor)
Viron Assembly

CD4 receptor

CCR5 (HIV Co-Receptor)
Viron Maturation and Budding

CD4 receptor

CCR5 (HIV Co-Receptor)
Antiretroviral Drugs

Nucleoside reverse transcriptase inhibitor
- ZDV, AZT, zidovudine, Retrovir
- ddI, didanosine, Videx
- 3TC, lamivudine, Epivir *
- d4T, stavudine, Zerit *
- ddC, zalcitabine, Hivid
- ABC, abacavir, Ziagen
- FTC, emtricitabine, Emtriva

Non-nucleoside reverse transcriptase inhibitors
- NVP, nevirapine, Viramune
- DLV, delavirdine, Rescriptor
- TMC-278, Rilpivirine
- EFV, etravirine, Sustiva *
- TMC 125, Etravirine,

Integrase Inhibitors
- MK0518, Raltegravir,
- GS9137, Elvitegravir

Nucleotide RTI
- viread, Tenofovir *

Combination Drugs
- Combivir = ZDV + 3TC
- Trizivir = ABC + 3TC + ZDV
- Truvada = Tenofovir + FTC *
- Epzicom = ABC + 3TC *
- Atripla = Tenofovir + FTC + EFV *
- Complerea
- Stribild

Fusion / Entry Inhibitors
- T-20, Enfuvirtide
- Maraviroc
- Vicriviroc
- TNX-355

Protease inhibitors
- IDV, indinavir, Crixivan
- NFV, nelfinavir, Viracept
- RTV, ritonavir, Norvir
- Lopinavir + ritonavir, Kaletra
- Tipranavir, Aptivus
- Fosamprenavir, Lexiva *
- Atazanavir, Reyataz *
- Darunavir, Prezista

* = Once Daily
Red = Combination Drugs
HIV Terminology

- **Viral Load**
  - Amount of virus circulating in peripheral blood
  - **GOAL** undetectable < 50 copies/ml
  - Check very trimester AND after initiation or change of meds
What the US Public Health Service says about Antiretroviral Drugs in Pregnant HIV-Infected Women

“Although considerations related to pregnancy may factor into decisions as to timing and choice of therapy, **pregnancy per se is not an adequate reason to defer standard therapy**... Standard antiretroviral therapy should be discussed with and offered to HIV-1 infected pregnant women. Additionally, to prevent perinatal transmission, **ZDV prophylaxis should be incorporated into whatever antiretroviral regimen is offered**...”
Antiretroviral Pregnancy Registry:
Updated July 31, 2013

1st Trimester Exposures, Any ARV
- 201 defects/6,926 births
- 2.9 defects for every 100 live births
- 2.3-3.3% chance for defects

Any Pregnancy Exposures, Any ARV
- 445 defects/15,451 births
- 2.9 defects for every 100 live births
- 2.6-3.1% chance for defects

CDC population birth defects surveillance program
- 2.72 defects for every 100 live births
- 2.1-2.23% chance for defects
Antiretroviral Drug Interactions

- OCP’s (estradiol)
- Protease Inhibitors
- Methergine (ergotamine)
HIV Terminology

- Resistance Testing
  - Genotyping & Phenotyping
  - Measures drug resistance to each antiretroviral medications
- Indications
  - Virologic failure
  - Suboptimal viral suppression after initiation of ART
  - Acute HIV infection
What does a genotype look like?

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Trade Name</th>
<th>Interpretation</th>
<th>Mutations Detected</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nucleoside RT Inhibitors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AZT Zidovudine</td>
<td>Retrovir</td>
<td>Sensitive</td>
<td>None</td>
</tr>
<tr>
<td>3TC Lamivudine</td>
<td>Epivir</td>
<td>Resistant</td>
<td>M184V</td>
</tr>
<tr>
<td>ddI Didanosine</td>
<td>Videx</td>
<td>Low resistance</td>
<td>M184V</td>
</tr>
<tr>
<td>ddC Zalcitabine</td>
<td>Virii</td>
<td>Resistant</td>
<td>M184V</td>
</tr>
<tr>
<td>d4T Stavudine</td>
<td>Zerit</td>
<td>Sensitive</td>
<td>None</td>
</tr>
<tr>
<td>Abacavir</td>
<td>Zidovent</td>
<td>Sensitive</td>
<td>None</td>
</tr>
<tr>
<td>Abacavir+AZT+3TC</td>
<td>Trizivir</td>
<td>Sensitive</td>
<td>None</td>
</tr>
<tr>
<td>Tenofovir</td>
<td>Virco</td>
<td>Sensitive</td>
<td>None</td>
</tr>
<tr>
<td>AZT+3TC</td>
<td>Compliva</td>
<td>Low resistance</td>
<td>M184V</td>
</tr>
<tr>
<td><strong>Non-nucleoside RT Inhibitors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nevirapine</td>
<td>Viramune</td>
<td>Resistant</td>
<td>[V108I][K103N]</td>
</tr>
<tr>
<td>Delavirdine</td>
<td>Rescriptor</td>
<td>Resistant</td>
<td>[K103N][V108I]</td>
</tr>
<tr>
<td>Efavirenz</td>
<td>Sustiva</td>
<td>Resistant</td>
<td>[K103N][V108I]</td>
</tr>
<tr>
<td><strong>Protease Inhibitors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indinavir</td>
<td>Crizine</td>
<td>Low resistance</td>
<td>L90IL</td>
</tr>
<tr>
<td>Ritonavir</td>
<td>Norvir</td>
<td>Low resistance</td>
<td>L90IL</td>
</tr>
<tr>
<td>Saquinavir</td>
<td>Fortovase</td>
<td>Resistant</td>
<td>L90IL</td>
</tr>
<tr>
<td>Nelfinavir</td>
<td>Viracept</td>
<td>Resistant</td>
<td>L90IL</td>
</tr>
<tr>
<td>Tipranavir+Ritonavir</td>
<td>Kaletra</td>
<td>Sensitive</td>
<td>None</td>
</tr>
<tr>
<td>Amprenavir</td>
<td>Aconerase</td>
<td>Sensitive</td>
<td>None</td>
</tr>
</tbody>
</table>

Other Mutations Detected: L63P

All HIV GenotypR™ results must be interpreted in the context of both clinical and laboratory findings. Interpretation algorithm can be accessed at www.SpecialtyLabs.com or by calling Client Services at 800-421-4449.

- **Resistant:** One or more primary mutations shown in bold
- **Low resistance:** One or more secondary mutations with no primary
- **Sensitive:** No primary or secondary mutations detected

This test or one or more of its components was developed and its performance characteristics determined by Specialty Laboratories. It has not been cleared or approved by the U.S. Food and Drug Administration. The FDA has determined that such clearance or approval is not necessary. This test is used for clinical purposes. It should not be regarded as investigational or for research. This laboratory is certificated under the Clinical Laboratory Improvement Amendments of 1988 (CLIA) as qualified to perform high complexity clinical laboratory testing.

Albert Rabowitch, MD, PhD
Chief Medical Officer
NFV + EFV + Combivir: March 1998 - June 2000

**CD4**

- March 1997: 150
- September 1997: 170
- March 1998: 200
- September 1998: 220
- March 1999: 250
- September 1999: 280
- March 2000: 300
- June 2000: 350

**HIV RNA**

- March 1997: 1000
- September 1997: 1000
- March 1999: 3000
- September 1999: 6000
- March 2000: 1000
- June 2000: 100
Adherence Predicts Outcome

Percentage Suppression

Pills Taken (%)

- 95-100
- 90-95
- 80-90
- 70-80

Suppression
Timing of Transmission

1/3 Antepartum (in utero)

2/3 Peripartum

Breast Feeding 8-16% risk
Perinatal Transmission of HIV

- Maternal
  - ARV use
  - Viral Load
  - Smoking
  - Illicit Drug Use
  - Unprotected Sex

- Placental
  - Transplacental

- Fetal
  - ARV use
  - When bag of water breaks

Transvaginal Obstetrical
Strategies to Interrupt Perinatal Transmission

- Antiretroviral therapy (AZT, NVP)
- Cesarean Delivery
- Bottle feeding
- Pre-chewing

Nairobi Breast Feeding Study

425 HIV infected women randomized

- 212 Breast Fed
- 213 Formula Fed

61 (36.6%) infected infants
31 (20.5%)

Excess breast feeding risk: 16.2% (1.5, 25.9)
Mode of Delivery: Cesarean Section

• Fetal Benefit
  ▫ Most beneficial for women NOT taking ARV therapy and those with a viral load higher than 1000
  ▫ For women with a viral load lower than 1000 offers no prevention benefit
  ▫ Women should be explained the benefits and risks of all modes of delivery and the choice is ultimately up to the woman
Decreasing Transmission: Less than 2% transmission rate

• Start AZT and two other antiviral medications as soon as possible (14-34 weeks)
• Viral load < 50 count
• IV AZT load given to mother during labor, until baby’s cord is clamped
• Oral AZT to baby as soon as possible after delivery and every 12 hours as prescribed
• No breastfeeding
## Perinatal HIV Transmission rates

<table>
<thead>
<tr>
<th>Study</th>
<th>#</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scott (85/87)</td>
<td>20</td>
<td>50-65%</td>
</tr>
<tr>
<td>Italian Cohort (89)</td>
<td>486</td>
<td>33%</td>
</tr>
<tr>
<td>ECS (1992)</td>
<td></td>
<td>14%</td>
</tr>
<tr>
<td>WITS</td>
<td>&gt;1000</td>
<td>20.5%</td>
</tr>
<tr>
<td>PACTG 076 Placebo</td>
<td>209</td>
<td>22.6%</td>
</tr>
<tr>
<td>PACTG 076 ZDV Group</td>
<td>210</td>
<td>7.6%</td>
</tr>
<tr>
<td>ACTG 185 (1997)</td>
<td>1035</td>
<td>4.8%</td>
</tr>
<tr>
<td>North Carolina + ZDV</td>
<td>409</td>
<td>3%</td>
</tr>
<tr>
<td>North Carolina – ZDV</td>
<td></td>
<td>17%</td>
</tr>
<tr>
<td>(Ficus, 1996)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New York + ZDV</td>
<td>939</td>
<td>6%</td>
</tr>
<tr>
<td>New York – ZDV</td>
<td></td>
<td>27%</td>
</tr>
<tr>
<td>(Wade, 1996)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Florida + ZDV</td>
<td>145</td>
<td>3%</td>
</tr>
<tr>
<td>Florida – ZDV</td>
<td></td>
<td>25%</td>
</tr>
<tr>
<td>(Delke, 1999)</td>
<td></td>
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<tr>
<td><strong>PACTG 316</strong></td>
<td><strong>1500</strong></td>
<td><strong>1.5%</strong></td>
</tr>
</tbody>
</table>
HIV Transmission Graph

Estimated Number of Perinatally Acquired AIDS Cases, by Year of Diagnosis, 1985–2006—United States and Dependent Areas

Note. Data have been adjusted for reporting delays and cases without risk factor information were proportionally redistributed.
Legal Disclosure of HIV Results

- Doctor to Partner
- Doctor to Spouse
- Doctor to father of the baby