Objectives

- Review epidemiologic data
- Understand effects of aging on the immune system
- Know how aging is impacting HIV patients and their community
Rates of Adults and Adolescents Living with Diagnosed HIV Infection, Year-end 2010—United States and 6 Dependent Areas

N = 888,921  Total Rate = 342.2

Reported Cases of HIV Infection (not AIDS), by Age Group at Diagnosis, Cumulative through 2007—47 States, the District of Columbia, and 5 U.S. Dependent Areas

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>HIV Infection (not AIDS)</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;13</td>
<td></td>
<td>5,821</td>
<td>2</td>
</tr>
<tr>
<td>13–14</td>
<td></td>
<td>529</td>
<td>&lt;1</td>
</tr>
<tr>
<td>15–24</td>
<td></td>
<td>53,579</td>
<td>16</td>
</tr>
<tr>
<td>25–34</td>
<td></td>
<td>114,163</td>
<td>34</td>
</tr>
<tr>
<td>35–44</td>
<td></td>
<td>103,080</td>
<td>30</td>
</tr>
<tr>
<td>45–54</td>
<td></td>
<td>44,938</td>
<td>13</td>
</tr>
<tr>
<td>55–64</td>
<td></td>
<td>12,120</td>
<td>3</td>
</tr>
<tr>
<td>&gt;65</td>
<td></td>
<td>3,360</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>337,590</td>
<td></td>
</tr>
</tbody>
</table>

Note: Data from 47 states, the District of Columbia, and 5 U.S. dependent areas with confidential name-based HIV infection reporting as of 2007.
Reported Cases of HIV Infection (not AIDS), by Age Group and Sex, Cumulative through 2007—47 States, the District of Columbia, and 5 U.S. Dependent Areas

- Males N = 242,580*
- Females N = 95,006*

Note: Data from 47 states, the District of Columbia, and 5 U.S. dependent areas with confidential name-based HIV infection reporting as of 2007.
*Excludes 746 cases of unknown sex.

Reported AIDS Cases, by Age Group at Diagnosis
Cumulative through 2007—United States and Dependent Areas

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;13</td>
<td>9,590</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>13–14</td>
<td>1,173</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>15–24</td>
<td>44,510</td>
<td>4</td>
</tr>
<tr>
<td>25–34</td>
<td>328,756</td>
<td>32</td>
</tr>
<tr>
<td>35–44</td>
<td>401,626</td>
<td>39</td>
</tr>
<tr>
<td>45–54</td>
<td>176,427</td>
<td>17</td>
</tr>
<tr>
<td>55–64</td>
<td>52,594</td>
<td>5</td>
</tr>
<tr>
<td>≥65</td>
<td>16,156</td>
<td>2</td>
</tr>
</tbody>
</table>

Total: 1,030,632
Persons Living with HIV/AIDS
By Age, New York State, end of year, 2002 and 2007*

* 2007 data are provisional

Source: NYSDOH BHAES
Persons Living with HIV/AIDS
By Age, New York State, end of year, 2002 and 2007*

* 2007 data are provisional

Persons Living with HIV/AIDS Age ≥50
New York State, end of year, 2002 and 2007*

* 2007 data are provisional

Source: NYSDOH BHAE
Persons Living with HIV/AIDS
By Age, New York State, end of 2007*

- 73.8% of PLWHA are 40 and older (88,585)

* 2007 data are provisional

Source: NYSDOH BHAE

Life Expectancy of Patients without AIDS

- Athena cohort – N = 4174; 1998-2007
  - 3700 were men in this Netherlands cohort
  - Compared to the general population
  - Expected life years remaining at age 25 was:
    52.7 years for those with asymptomatic HIV infection;
    53.1 years for the general population.
  - Modeled life expectancy of a patient presenting at an older age, for women and for those presenting with CDC B classification was slightly lower.

Van Sighem A et al. 17th CROI, 2010; Abstract 526.
The Immune System

- Thymus
- Lymph nodes
- Gastrointestinal tract

HIV Effects of Aging on the Immune System

- Reduced capacity to renew T-helper cell populations
- Chronic inflammatory condition of HIV itself
- Persistence of replicating HIV in gut tissue
Immune Systems of People with HIV…

- Age similarly to transplant patients.
- Age similarly to children born without a thymus.
- Age faster than those uninfected.

Deeks S. IDSA Philadelphia, PA;10/09

Clinical Effects of Aging

- Hypertension and cardiovascular disease
- Increasing risk for cancer
- Increasing risk for diabetes
- Osteopenia and osteoporosis
- Aging effects on the brain & nervous system
Heart & Vascular Disease and HIV Effects

- Small but real increased risk of myocardial infarction in patients on some HIV therapies
- Peripheral vascular disease
- Cerebrovascular disease

Incidence of Myocardial Infarction According to the Duration of Exposure to Combination Antiretroviral Therapy

SMART Study

- CD4 (T-helper cell) driven study
  - Continuous antiretroviral therapy arm VS.
  - Interrupted therapy until CD4 < 250 cells/cmm
    - When CD4 > 350 on HAART, therapy stopped
- Significantly more deaths in the treatment interruption arm than in the continuously, virally suppressed group
  - Heart disease
  - Kidney disease
  - Liver disease
  - Non-AIDS defining cancers

### Treatment Interruption and CVD Risk

**Relative Hazard (DC/VS) of CVD Events According to Baseline ART**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Relative Hazard (DC/VS) (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>5472</td>
<td>1.57 (1.00-2.46)</td>
</tr>
<tr>
<td>None</td>
<td>876</td>
<td>4.41 (0.94-20.8)</td>
</tr>
<tr>
<td>On PI</td>
<td>2073</td>
<td>1.00 (0.53-1.91)</td>
</tr>
<tr>
<td>On NNRTI, but no PI</td>
<td>1980</td>
<td>2.07 (0.89-4.54)</td>
</tr>
<tr>
<td>Nucleos(t)ides only</td>
<td>544</td>
<td>1.78 (0.43-7.46)</td>
</tr>
</tbody>
</table>

**Graph:**
- **Y-axis:** Major CVD Event, %
- **X-axis:** Years From Randomization
- **Legend:** DC, VS
- **Data Points:**
  - DC: 2752, 1306, 713, 379, 10
  - VS: 2720, 1292, 696, 377, 10

Relative hazard 1.57 (1.00-2.46); \( P = 0.05 \).

**Notes:**
- DC = drug conservation; VS = viral suppression.
- Reproduced with permission from Philips et al.
Smoking

“Cigarette smoking is the most important modifiable cardiovascular risk factor among HIV-infected patients.”


Smoking

“Cessation of smoking is more likely to reduce cardiovascular risk than either the choice of antiretroviral therapy or the use of any lipid-lowering therapy.”

Lung Disease & Effect of HIV

- Recurrent pneumonias
- Asthma
- Smoking-related lung disease
  - Emphysema
  - Chronic obstructive pulmonary disease (COPD)
  - Chronic bronchitis
- Pulmonary hypertension
- Lung cancer

Impact of Cigarette Smoking on Mortality and QOL Among PLWHA

- 867 HIV+ from Veterans Aging Cohort 3 Site Study
- 63% current smokers, 22% former smokers
- Current smokers had highest VL (compared to former or never smokers. p=.001)
- Smoking was strongly associated with increased respiratory symptoms (cough, dyspnea), noninfectious pulmonary disease (COPD &/or asthma), and bacterial pneumonia

Smoking Prevalence among PLWHA Receiving Care in NYS: 2005

<table>
<thead>
<tr>
<th>Use Status</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currently Use</td>
<td>638</td>
<td>59.2</td>
</tr>
<tr>
<td>Used in the Past</td>
<td>264</td>
<td>24.5</td>
</tr>
<tr>
<td>Never Used</td>
<td>175</td>
<td>16.3</td>
</tr>
<tr>
<td>Total</td>
<td>1077</td>
<td>100</td>
</tr>
</tbody>
</table>

NYS DOH AIDS Institute, OMD/OPER

Incidence Rate Ratios of Non-AIDS Defining Malignancies: 1992-2002

Endocrine (Hormonal) Disorders with HIV & Aging

- Insulin resistance and diabetes
  - Even more risk if also co-infected with HCV
- Thyroid disease
- Menopausal changes
- Bone metabolism

Factors Associated with Insulin Resistance & Diabetes

<table>
<thead>
<tr>
<th>Physical Inactivity¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal Obesity¹,²</td>
</tr>
<tr>
<td>Family History¹</td>
</tr>
<tr>
<td>Non-White Race¹</td>
</tr>
<tr>
<td>Dyslipidemia¹</td>
</tr>
</tbody>
</table>

**Other Risk Factors**

- Some Antiretroviral Therapies³,⁴
- HIV & Hepatitis C Coinfection⁵

2. Danoff et al. 3. Noor et al. 4. FDA “Dear Health Care Professional” Letter. 5. Duong et al.
Aging & HIV Effects on the Nervous System

- Memory impairment
  - Neuro-cognitive testing
- Peripheral neuropathy
- Vascular disease
  - Effects on carotid arteries and small vessels of the brain

Liver Disease & HIV Effects

- **Liver Diseases**
  - Chronic hepatitis B or C
  - Past or current alcohol dependence
  - Fatty liver
  - Can each lead to cirrhosis
- **Clinical presentation**
  - Fatigue
  - Encephalopathy
  - Bleeding
  - Liver cancer
Medication Effects

- Drug-drug interactions
- Medication side effects and tolerability
- Previous medications or doses no longer as well tolerated as we grow older
- Poly-pharmacy

Health Screens

- Blood pressure
- Cholesterol & triglycerides
- Blood glucose
- Colonoscopy if 50 or older
- Mammograms
- Pelvic and rectal exams
  - Anal PAP smears
- Prostate specific antigen for prostate cancer
- Vitamin D level/calcium for bone health
  - DEXA scans?
Summary

- Aging is a natural part of living

- Presentation of some medical conditions may be accelerated in patients with HIV
  - Effects of the disease itself
  - Lesser effects due to antiretroviral therapy

- Benefits of antiretroviral therapy significantly outweigh potential, long-term side effects

Special Thanks to...

- NY State Department of Health’s Bureau of HIV/AIDS Epidemiology

- Centers for Disease Control
THANK YOU!