Objectives

• Review Current Knowledge about HIV in older patients (Epidemiology, Clinical Outcomes w ART)
• Discuss Aging Phenomena in HIV
• Discuss the Advent of Non-AIDS health-related conditions in older patients with HIV Infection
• Discuss Psychosocial Issues / Advance Directives
Faces of HIV

Enrico McLane
Age: 52
HIV: 17 years
Short-term memory loss
two hip replacements

Norma Martinez
Age: 61
HIV: 12 years
lipodystrophy, fatigue

Doug Turkington
Age: 52
HIV: 20 years
osteoporosis, two hip replacements

Cesar Figueroa
Age: 50
HIV: 20 years
Dementia, neuropathy, depression

Joe Westmoreland
Age: 53
HIV: 27 years
memory loss, fatigue, peripheral neuropathy in feet and hands

Mike Weyand
Age: 58
HIV: 20 years
Osteoporosis, lipodystrophy, memory loss
<table>
<thead>
<tr>
<th>Age</th>
<th>US</th>
<th>NA-ACCORD</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-19</td>
<td>3764</td>
<td>38</td>
</tr>
<tr>
<td>20-24</td>
<td>21197</td>
<td>468</td>
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<tr>
<td>25-29</td>
<td>39603</td>
<td>1164</td>
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<tr>
<td>30-34</td>
<td>54895</td>
<td>1863</td>
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<tr>
<td>35-39</td>
<td>83935</td>
<td>3128</td>
</tr>
<tr>
<td>40-44</td>
<td>121465</td>
<td>4765</td>
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<tr>
<td>45-49</td>
<td>128546</td>
<td>5455</td>
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<td>50-54</td>
<td>94957</td>
<td>4236</td>
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<td>55-59</td>
<td>57359</td>
<td>2658</td>
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<tr>
<td>60-64</td>
<td>28141</td>
<td>1345</td>
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<tr>
<td>&gt;64</td>
<td>22103</td>
<td>910</td>
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</table>

Clinical Outcomes in Older Patients Treated with ART

- Virologic Suppression
- Immunologic Response
- Mortality
Percent with VL suppression across time by Age

- 18-<30 years
- 30-<40 years
- 40-<50 years
- 50-<60 years
- ≥60 years

Months since ART initiation

6 months 12 months 18 months 24 months
Percent with VL suppression across time by Age group and Regimen

Althoff K IEDEA Feb 2010
Mean Increase in CD4 by Age 2 years after HAART

- 18-<30 years
- 30-<40 years
- 40-<50 years
- 50-<60 years
- ≥60 years

**Months since ART initiation**

- 6 months
- 12 months
- 18 months
- 24 months

Althoff K IEDEA Feb 2010
Mean Increase in CD4 by age and regimen

**Boosted PIs**

- **18-<30 years**
- **30-<40 years**
- **40-<50 years**
- **50-<60 years**
- **≥60 years**

**NNRTIs**

- **18-<30 years**
- **30-<40 years**
- **40-<50 years**
- **50-<60 years**
- **≥60 years**
Aging Reduces T cell Diversity

Slide courtesy Jorg Goronzy, MD
Immunosenescence

• Immune system in older persons
  - Increased populations of terminally differentiated CD8 cells (CD28 negative)
  - Reduced level of naïve CD4 and CD8 cells, with reduced T cell proliferation
  - Increased T cell activation, with increased levels of inflammatory markers
  - Thymic insufficiency / failure

• All are accelerated in HIV
Proportion of Persons Surviving, by Number of Months after AIDS Diagnosis during 1997–2004 and by Age Group—United States and Dependent Areas
### HIV Outcomes: What we Know Already

<table>
<thead>
<tr>
<th>Metric</th>
<th>Comparison</th>
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<tbody>
<tr>
<td>Adherence</td>
<td>Older &gt; Younger</td>
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<tr>
<td>HIV-1 RNA suppression</td>
<td>Older &gt; Younger, doesn’t vary by class</td>
</tr>
<tr>
<td>CD4 response</td>
<td>Younger &gt; Older</td>
</tr>
<tr>
<td>Mortality</td>
<td>Older &gt; Younger, usually due to non HIV causes</td>
</tr>
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</table>
## Non HIV Causes of Death Since ~2000

<table>
<thead>
<tr>
<th>Source</th>
<th>Of Known</th>
<th>Leading Causes (%)</th>
<th>Reference</th>
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<tbody>
<tr>
<td>NY State Death Certificates</td>
<td>26%</td>
<td>Alcohol/drug abuse (31%), CVD (24%), Cancer (21%)</td>
<td>Ann Intern Med 2006;145:397-406</td>
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<tr>
<td>Barcelona Death Certificates</td>
<td>60%</td>
<td>Liver (23%), Infection (14%), Cancer (11%), CVD (6%)</td>
<td>HIV Med 2007:8;251-8</td>
</tr>
<tr>
<td>HOPS Ascertainment</td>
<td>63%</td>
<td>Liver (18%), CVD (18%), Pulmonary (16%), Renal (12%), GI (11%), Infection (10%) Cancer (8%)</td>
<td>J Acquir Immune Defic Syndr 2006;43:27-34</td>
</tr>
<tr>
<td>Cascade Ascertainment</td>
<td>63%</td>
<td>Liver (20%), Infections (24%), Unintentional (33%), Cancer (10%), CVD (9%)</td>
<td>AIDS 2006;20;741-9</td>
</tr>
</tbody>
</table>
Definitions

- Comorbidity: additional diseases beyond the index disease
- Multimorbidity: co-occurrence of diseases and functional consequences (the whole is worse than sum of the parts) = the aggregate burden of illness
- Age, several conditions, function/cognition
Impact of multimorbidity on 3-year decline in physical functioning

<table>
<thead>
<tr>
<th>OR</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
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<tr>
<td>2 diseases</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>&gt;=3 diseases</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>5</td>
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</table>
Impact of multimorbidity on 3-year mortality
Incidence of Cancer in HIV-Infected Persons in the Post-HAART Era

Incidence of Cancer in HIV-Infected Persons in the Post-HAART Era

Interesting lack of increase in Breast or Prostate CA

Age at cancer diagnosis among people with AIDS and in the general population 1980-2006

<table>
<thead>
<tr>
<th></th>
<th>Observed</th>
<th>Expected in age adjusted group</th>
<th>P value</th>
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<tbody>
<tr>
<td>NHL</td>
<td>39</td>
<td>43</td>
<td>&lt;.001</td>
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<tr>
<td>Cervical</td>
<td>39</td>
<td>41</td>
<td>.03</td>
</tr>
<tr>
<td>Rectal</td>
<td>46</td>
<td>51</td>
<td>.002</td>
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<tr>
<td>Lung</td>
<td>49</td>
<td>53</td>
<td>.001</td>
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<tr>
<td>Hodgkin's</td>
<td>41</td>
<td>38</td>
<td>&lt;.001</td>
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<tr>
<td>Breast</td>
<td>44.5</td>
<td>45</td>
<td>.2</td>
</tr>
<tr>
<td>Prostate</td>
<td>59</td>
<td>59</td>
<td>.5</td>
</tr>
</tbody>
</table>

For most cancers: there is no difference in age at cancer diagnosis among persons with AIDS compared to the general population.
Increasing Prevalence in Diabetes With Age in Both HIV-Infected and Non-Infected Populations

- 7219 HIV (61% male) and 2,792,971 non-HIV (30% male) individuals, for a total 7,101,180 person-years

Age Group

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65+

DM Incidence Rates (per 100 person-years)

HIV
Non-HIV

Currier J et al. 9th CROI; 2002; Seattle. Abstract 677.
Accelerated Coronary Aging in HIV-infected patients > age 40 (avg. ART ~ 11 yrs)

Avg vascular age 15 yrs > chronologic age

Thus Increased Arterial Calcium

Increased Risk Factor Profiles = Increased CAD

Neurologic Issues in HIV and Aging

- In patients enrolled in the Hawaii Aging HIV Cohort:
  - HIV-associated dementia 2x greater in subjects age ≥50 vs those age 20-39 (OR 2.13 [1.02-4.44])
  - Increased Risk of HAD remains significant after adjustment for ART, HIV-1 RNA, CD4, education, race, drug use, and Beck Depression Inventory score (OR 3.26, [1.32-8.07])
Endocrinologic Morbidity

• **Testosterone Deficiency**: 54% of HIV-infected patients had testosterone <300 ng/dL.

• Low androgen levels were associated with increasing age, HIV+ IDU, HCV+ and use of psychotropic medications

• **Menopause**: Occurs at younger age in HIV infection average age 46 (IQR 39-49)

• Associated with increased symptoms of estrogen withdrawal

Klein CID 2005; Schoenbaum E CID 2005
BMD is lower and Fracture Prevalence is higher in HIV infection

- BMD lower in HIV+ men at the femoral neck (p<0.05) and lumbar spine (p=0.06);
- Differences significant after adjusting for age, weight, race, testosterone level, and prednisone and IDU
- A 38% increase in fracture rate among HIV+ men

Arnsten AIDS 2007
Triant J Clin Endo Metab 2008
Psychosocial Issues

- Isolation
- Lack of support
- Financial issues
- DPOA / Directives
Eras of the HIV Epidemic

Opportunistic infection era
- Crisis management
- Treatment of opportunistic infections
- Palliative care
- Primary care

Antiretroviral era
- Focus on viral pathogenesis
- Specialization and medicalization of HIV care (“HIV specialist”)

Chronic disease era
- HIV disease management
- Co-morbidities and aging
- Primary care

Conclusions

• HIV / AIDS in US is increasingly an older population

• Compared to younger patients, older HIV patients have:
  - Better virologic response, Less immunologic boost, Shortened survival

• Comorbid disease is prevalent

• Psychosocial issues and advanced directives are important, especially in the setting of multi-morbidity
Resources

- [http://www.aahivm.org/hivandagingforum](http://www.aahivm.org/hivandagingforum)
- [http://www.americangeriatrics.org](http://www.americangeriatrics.org)
- Patient-Centered Care for Older Adults with Multiple Chronic Conditions. JAGS 60:1957-68, 2012