Epidemiology of HIV/AIDS

Giovanni Rezza

Epidemiology Unit
Department of Infectious Diseases
People living with HIV/AIDS: 39.5 million [34.1–47.1 million]
New HIV infections in 2006: 4.3 million [3.6 – 6.6 million]
Deaths due to AIDS in 2006: 2.9 million [2.5 – 3.5 million]
HIV prevalence (%) in adults in Africa, 2005
HIV Incidence vs. Prevalence
HIV incidence in people aged 15–49 years old in Africa, 1984–2004

Graph showing the HIV incidence trend for different countries in Africa from 1984 to 2004.
HIV prevalence by age group among antenatal clinic attendees in South Africa, 2000-2005
HIV incidence and prevalence in Kenya in persons between 15 and 49 years old
The genetic diversity of HIV

Types: HIV-1 and HIV-2

HIV-1 groups: M, N, O

HIV-1 Subtypes and circulating recombinant forms
Does the HIV-1 subtype make the difference?

- Type D more aggressive than subtype A?
- Evidence of difference in infectiousness
-arent cross-immunity: implications for eventual vaccines?
-arent pattern of resistance to ARV drugs
- Difference in detectability through standard serological tests
Social and demographic consequences of the epidemic
Changes in life expectancy in selected African countries with high and low HIV prevalence: 1950 - 2005

Source: UN Department of Economic and Social Affairs (2001). World Population Prospects, the 2000 Revision.
Orphans due to AIDS, 1990–2010

Source: Metropolitan Life Scenario 80
The population effect of HAART: Can decreased transmission probability per single act be counterbalanced by increased probability of at-risk sexual contact?

- Decreased plasma viral load
- Decreased viral load in semen/vaginal secretions
- Decreased mother-to-child transmission

VS

- Prolonged survival
- Improved quality of life
- Increased risky behaviour (indirect effect)
Impact of behavioral change on the incidence of HIV infection in the HAART era

Blower SM et al, Science 2000
HIV and the other poverty-related diseases

The interaction with

Malaria and Tuberculosis
Dual Infection with HIV and Malaria fuels the spread of both diseases in sub-Saharan Africa (Abu-Raddad et al. Science, 2006)
Epidemiology of CNS diseases among persons affected by HIV/AIDS

The effect of ARV treatment and risk group
CNS AIDS-defining illnesses by year of diagnosis
(N 65828) – Italian National AIDS Registry (ISS)
CNS AIDS-defining illnesses by year of diagnosis
(N 65828) – Italian National AIDS Registry (ISS)

<table>
<thead>
<tr>
<th>Year Range</th>
<th>Cerebral Toxoplasmosis</th>
<th>PML</th>
<th>Primary brain Lymphomas</th>
<th>HIV encephalopathy</th>
<th>CMV retinitis</th>
<th>Extrapulmonary cryptococcosis</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1989</td>
<td>4.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.1%</td>
</tr>
<tr>
<td>1989-96</td>
<td>7.2%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8.6%</td>
</tr>
<tr>
<td>1997-02</td>
<td>6.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.8%</td>
</tr>
<tr>
<td>2003-06</td>
<td>5.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.3%</td>
</tr>
</tbody>
</table>
## Adjusted OR for HIV Encephalopathy (Without considering the competitive – but not protective- effect of KS)

<table>
<thead>
<tr>
<th>Effect</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDUs</td>
<td>1.57</td>
<td>1.21 – 2.03</td>
</tr>
<tr>
<td>ARV</td>
<td>0.97</td>
<td>0.74 – 1.29</td>
</tr>
<tr>
<td>Time of HIV diagnosis &gt; 6 months before first AIDS-defining illness</td>
<td>1.30</td>
<td>0.96 – 1.75</td>
</tr>
</tbody>
</table>
Factors affecting variations in the pattern of CNS opportunistic diseases

- ARV treatment (probably no differential effect)
- Risk group (consider higher risk among IDU)
- Data analysis (competitive risk models vs. proportional incidence)
- Different circulation of specific infectious agents
- Diagnostic bias in inter-regional comparison

Final recommendation: please use the right methods and a critical approach to NeuroAIDS epidemiology!