University of Vermont
Community Medical School

The AIDS Pandemic
25 years in Vermont
Changes and the future

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The AIDS Pandemic
25 years in Vermont
Changes and the future

- History
- Virology and immunology
- Epidemiology; World, US and local pandemic
- Clinical illness
- Changes during the past 25 years
- Vermont Model of care
- The future
Epidemiologic Notes and Reports

Pneumocystis Pneumonia --- Los Angeles

In the period October 1980-May 1981, 5 young men, all active homosexuals, were treated for biopsy-confirmed Pneumocystis carinii pneumonia at 3 different hospitals in Los Angeles, California. Two of the patients died. All 5 patients had laboratory-confirmed previous or current cytomegalovirus (CMV) infection and candidal mucosal infection. Case reports of these patients follow.
Epidemiologic Notes and Reports

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June 1982

Lymphoma among Homosexual Men
Kaposi Sarcoma in Gay men in Los Angeles

December 1982

AIDS among Patients with Hemophilia A
Transfusion Associated Acquired Immune AIDS
Unexplained Immunodeficiency and Opportunistic Infections in infants
January 1983
AIDS in Prison Inmates
Immunodeficiency Among Female Sexual Partners of Males with AIDS

May 1983
Human T-Cell Leukemia Virus (HTLV) Infection in Patients with AIDS

March 1987
AZT released

Pneumocystis Pneumonia --- Los Angeles

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Virology and Immune Pathogenesis
HIV is a Virus

**Viruses**
- HIV
- Rhinovirus
- Hepatitis B, C virus
- Influenza

**Bugs that can cause infections**
- Amoeba
- Giardia

**Parasite**

**Fungi**
- Candida albicans
- Aspergillus

**Bacteria**
- Staphylococcus
- Streptococcus
Viruses

• Microscopic infectious agents that can replicate only inside a host cell

• Made up of
  o Genes
    ▪ RNA or DNA
  o Protein coat
  o Envelope
HIV is a “simple” virus

- Single-stranded RNA virus
- 9 genes
HIV is a viral infection that leads to AIDS.

- HIV Infection
  - Human Immunodeficiency Virus
- Leads to AIDS
  - Acquired Immune Deficiency Syndrome
HIV Replicates Backwards
It is a Retrovirus

"Normal"
DNA ---> RNA ---> Protein
Polymerase Protease

"Backward, or Retro"
RNA ---> DNA ---> RNA ---> Protein
RT Protease
HIV enters the Immune cells, replicates and kills the cell.
HIV Attacks the Immune System

- Complex of cells and proteins that
  - Fight infection
  - Kill abnormal (tumor) of infected cells
- White blood cells
  - PMN
  - Cellular immunity
    - T lymphocytes
      - CD 4 cells (T cells)
      - CD 8 cells (NK cells)
  - Humoral immunity
    - B lymphocytes
      - Antibody (immunoglobulin)
CD4 cell (T cell) is the quarter back of the immune system.

- **Humoral**
  - Neutralizing antibody

- **Cell Mediated**
  - CD8 Cytotoxic T Lymphocyte

- **Cytokine Dysregulation**
During HIV infection there is progressive loss of CD 4 (T cells).
T cell Decline Over Years

T cell

HIV

AIDS
Clinical Consequences of Viral Escape

- Acquired Immune Deficiency Syndrome (AIDS): CD 4 < 200 cells/μL, opportunistic infections, cancers
- Clinical Consequences:
  - Primary Infection
  - Asymptomatic: CD 4 > 500 cells/μL
  - Clinical Latency
  - Asymptomatic: CD 4 > 500 cells/μL
  - Bacterial Infections: TB, thrush

CD 4 Count
- Years

Viral Load
- Years

1000
1000
500
500
200
200
50
50
HIV is a viral infection that leads to AIDS

HIV Infection

- Human Immunodeficiency

Leads to

- immune destruction
- falling CD 4 T cells
- ~ 10 years

AIDS

- Acquired Immune Deficiency Syndrome

- symptomatic
- immune failure
- opportunistic infections
- reportable

- Pneumocystic pneumonia
- Toxoplasmosis
- Mycobacterial illness
- CMV
- Lymphoma
Epidemiology

World, US and local pandemic
HIV Incidence and Prevalence, United States, 1977-2006

Living with HIV in US
1,106,400 [1,056,400 – 1,156,400]
Proportion of AIDS Diagnoses, by Race/Ethnicity, United States, 1985-2009

NOTE: Data are estimates and represent AIDS diagnoses by year.
The HIV/AIDS Epidemic in the U.S.

- **Annual New HIV Infections**: ~50,000
- **People Living with HIV/AIDS**: ~1.1 Million
- **People with HIV/AIDS Not In Care**: ~40%
- **People with HIV Who Don’t Know They Are Infected**: ~20%

The HIV Population is Ageing

By 2015, >50% of HIV patients in the US will be over 50 years old

Luther and Wilkin, Clin Geriatr Med 2007
Vermont
Comprehensive Care Clinics

Active and New Patients by Calendar Year

Active
New


174 204 234 243 278 283 290 310 310 328 313 339 353 383 397 407 420 433

63 57 63 52 42 30 41 60 46 54 35 41 32 55 50 42 50 38
Clinical Illness
Before (1995)
Highly Active Anti-Retroviral Therapy

- inadequate therapy
- opportunistic infections (OI)
- people dying from AIDS
- hospice care
HIV Can be stopped
Anti-retrovirals 2013

- **NRTIs/NtRTIs**
  - Abacavir
  - Didanosine
  - Emtricitabine (FTC)
  - Lamivudine
  - Stavudine
  - Tenofovir
  - Zalcitabine
  - [Lamivudine/zidovudine]
  - [Abacavir/lamivudine]
  - [Lamivudine/zidovudine/abacavir]
  - [Emtricitabine/tenofovir]

- **NNRTIs**
  - Delavirdine
  - Efavirenz
  - Nevirapine
  - Etravirine

- **PIs**
  - Atazanavir
  - Fosamprenavir
  - Indinavir
  - Lopinavir/ritonavir
  - Nelfinavir
  - Ritonavir
  - Saquinavir
  - Tipranavir
  - Darunavir

- **Fusion Inhibitor**
  - Enfuvirtide

- **Integrase Inhibitor**
  - Raltegravir
  - Elvitegravir
  - Dolutegravir

- **Entry Inhibitor**
  - Maraviroc

- **3 and 4 Drug Combo**
  - Atripla
  - Complera
  - Stribild

From KY Smith, MD, MPH, at 11th RW Program Clinical Update, IAS–USA.
Advances with HAART


Incidence per 1000 Patient-Years

Decline in Opportunistic Infection

Year


HAART
Changes during the past 25 years
A diagnosis of AIDS meant death
Progress in HIV Therapy

- 1987
  - Zidovudine (AZT) (NRTI)
- Up to 1995
  - More NRTI
- 1995
  - Saquinavir (PI)
- 1995-2005
  - More PI
- 1997
  - Efavirenz (NNRTI)
- 2003
  - T-20 (Fusion inhibitor)
- 2006
  - Second generation PI
- 2007
  - Second generation NNRTI
  - Chemokine receptor antagonist
- 2008-09
  - Integrase inhibitors

**HAART**
- 3 drug combination
  - 2 NRTI + PI
  - 2 NRTI + NNRTI

More Potent Salvage
Highly Active Anti-Retroviral Therapy

Before HAART (1995)
- inadequate therapy
- opportunistic infections (OI)
- people dying from AIDS
- hospice care

After HAART (After 1995)
- able to suppress HIV
- people not dying from AIDS
- less OI
- “chronic illness”
  - toxicities
  - resistance
- dying from:
  - malignancy
  - hepatitis
  - CAD
  - smoking
Progress in Anti-Retroviral Therapy

1996 HAART
- numerous pills
- multi-dose daily
- multiple food restrictions
- multiple toxicities

2012 HAART
- fewer pills
- once daily dosing
- minimal food restrictions
- fewer toxicities

10-15 pills three times daily
1 pill once per day
Decrease in AIDS Deaths since 1994 with HAART
Trends in Annual Rates of Death
Persons 25–44 Years Old,
United States, 1987–2009
Vermont Model of Care
HIV Service Delivery in Vermont
Prior to the CCC Program

**Barriers to HIV care:**

- providing complex care in rural areas
- limited experience of regional providers
- long travel distances for expert care
- financial concerns of the hospitals and providers
- limited mass transportation
- concerns about confidentiality
- isolation from community

**Consequences**

- Patients not seeking care
- increased ER visits and hospitalizations
- Patients leaving their community for HIV care
- long travel distances for patients
- Community and regional providers uninvolved
HIV Service Delivery Model: The CCC Vermont Model

• State of the art, personal and confidential HIV health care can be provided in rural Vermont.

• A team approach involving a MD, NP, SW, ASO was instrumental in providing psychosocial support and case management.

• 4 statewide clinics
Ryan White Comprehensive AIDS Resources Emergency (CARE) Act

• On August 18, 1990, by wide bipartisan margins, both houses of Congress passed the groundbreaking Ryan White Comprehensive AIDS Resources Emergency (CARE) Act, named for an Indiana teen who lost his life to AIDS.

• When enacted in 1990, the CARE Act was adopted for a 5-year period. It was reauthorized in 1996, 2000, 2006, and 2009.
White Comprehensive AIDS Resources Emergency Act
Ryan White Care Act

Named in honor of Ryan White an Indiana teenager who contracted AIDS through hemophilia treatment. He was diagnosed with AIDS in 1984 and was subsequently expelled from school because of the disease. White became a well-known advocate for AIDS research and awareness, until his death on April 8, 1990.

Ryan White’s physician listens to his lungs as his mother, Jeanne White-Ginder, looks on, 6 months before the Act bearing his name became law.
Ryan White CARE Act
Reauthorization in 2000

• Senator James Jeffords (VT), Chairman, Senate Health, Education, Labor and Pension Committee, introduced bipartisan legislation that would reauthorize federal AIDS prevention and treatment programs.

• Jeffords’ legislation includes several provisions developed on the basis of advice from the Vermont HIV/AIDS community. The bill also includes new preferences for grants targeted at providing care services in rural areas. A key provision of the bill will boost Vermont’s minimum state-grant funding under the program from $250,000 per year to $500,000 per year, which will allow the state to help people with HIV and AIDS access the essential care and treatments necessary to manage their HIV infection and to maintain their health.
Comprehensive Care Clinics

1987
Burlington CCC
- Patient Surveys
- Hospital surveys

1994
RRMC CCC 1994
Meeting with
- patients
- advocacy groups
- hospital administration

1995
Brattleboro CCC 1995

1996
St Johnsbury CCC 1996

Ryan White Care Act Funding
- Special Project of National Significance (SPNS)
- Title III (part C)
- Title II (Part B)


Map of Vermont with CCC locations marked.

- 1994
- 1995
- 1996
- 1999
- 2001
- 2004
- 2007
- 2012
- 2015
Comprehensive Care Clinics
Active Patients Cared for by Year
Comprehensive Care Clinics

Burlington
- Deborah Kutzko
- Casey laPointe
- Shelly Gage
- Ellen Postlewaite
- Hella Douglas
- Chris Grace
- Kemper Alston
- Mary Ramundo
- Lou Polish
- Kristen Pierce
- Jo Finnigan

Rutland
- Eliz McGrath
- Rick Dunworth
- Sheela Martel
- Chris Jacobsen
- Shelly Gage
- Hella Douglas
- Chris Grace
- Lou Polish
- Sarah Mooney

St Johnsbury
- Tonya Howard
- Sue Taney
- Mary Ramundo
- Shelly Gage
- Hella Douglas

Brattleboro
- Mary Zubriske
- Deb Jones
- John Fields
- Kemper Alston
- Jeff Parsonnet
- Shelly Gage
- Hella Douglas
Future

Challenges and Opportunities
Over 7000 new HIV infections a day in 2009

- About 97% are in low and middle income countries
- About 1000 are in children under 15 years of age
- About 6000 are in adults aged 15 years and older, of whom:
  - almost 51% are among women
  - about 41% are among young people (15-24)
Estimated number of persons aged ≥13 years living with diagnosed and undiagnosed HIV infection.
Testing to Treatment Cascade
We can do better
HAART as Treatment and Prevention

Test all
Treat all
Control HIV
Reduce Inflammation
Reduce Mortality and Morbidity
Reduce Transmission
Less new HIV infections
As early as possible

Less Opportunistic infections
An on line program to help Vermonters locate HIV testing and care resources

http://gettestedvermont.com/
HIV/AIDS can be PREVENTED + TREATED.

Free HIV Testing
Prevention Counseling
Medical Treatment

Burlington: 802.847.4594
Brattleboro: 802.257.8860
Rutland: 802.747.1830
St. Johnsbury: 802.751.7603

getttestedvermont.com is a program of the Comprehensive Care Clinics of
Fletcher Allen Health Care
In alliance with The University of Vermont

Do you know your HIV status?

Be proud.
Protect your health.
Protect your partners.

Get tested!
President Obama's
State of the Union Address
AIDS-Free Generation