

# HIV Epidemiology

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20/06/01

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14.08.2001



# HIV Epidemiology

Colloque du 9 avril 2001

Pr B. Hirschel

Division des Maladies infectieuses

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# Table of contents

- HIV worldwide in 2000
- Risk factors for transmission
  - Heterosexual transmission: the Rakai study
- HIV and AIDS in Switzerland
- The effects of treatment

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## Global Situation in 2001

People living with HIV : 36.1 million

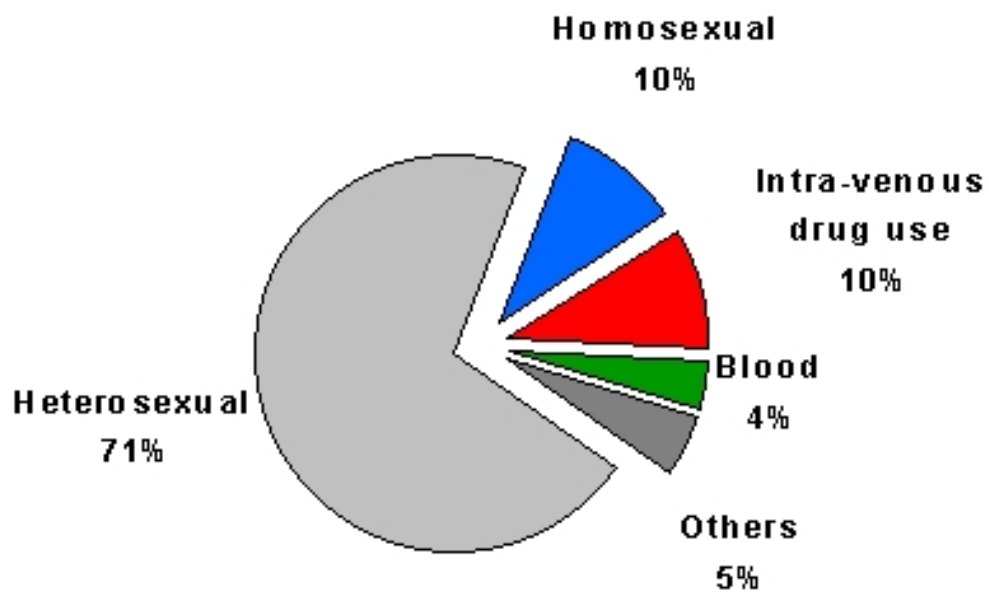
Deaths in 2000 : 3 million

New HIV infections in 2000: 5.3 million

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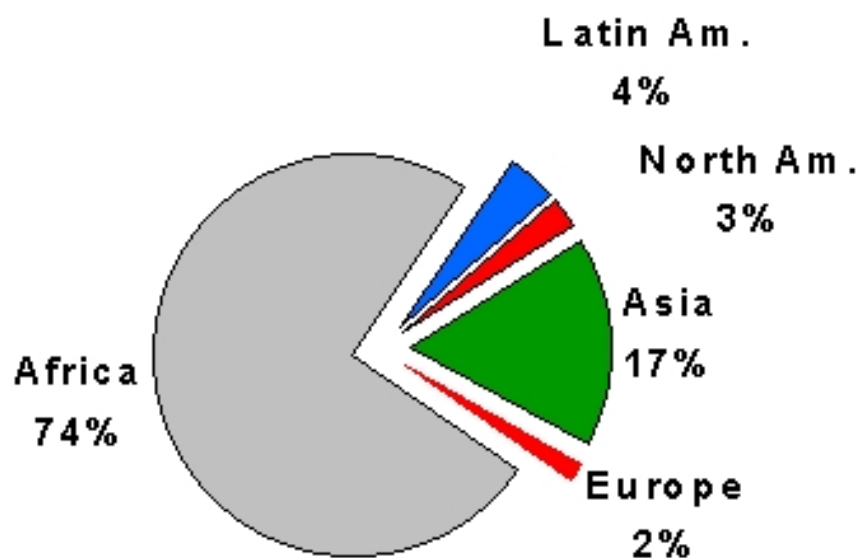
# Mode of transmission



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## Geographic distribution of persons living with HIV/AIDS in 2000



Total: 36.1 million

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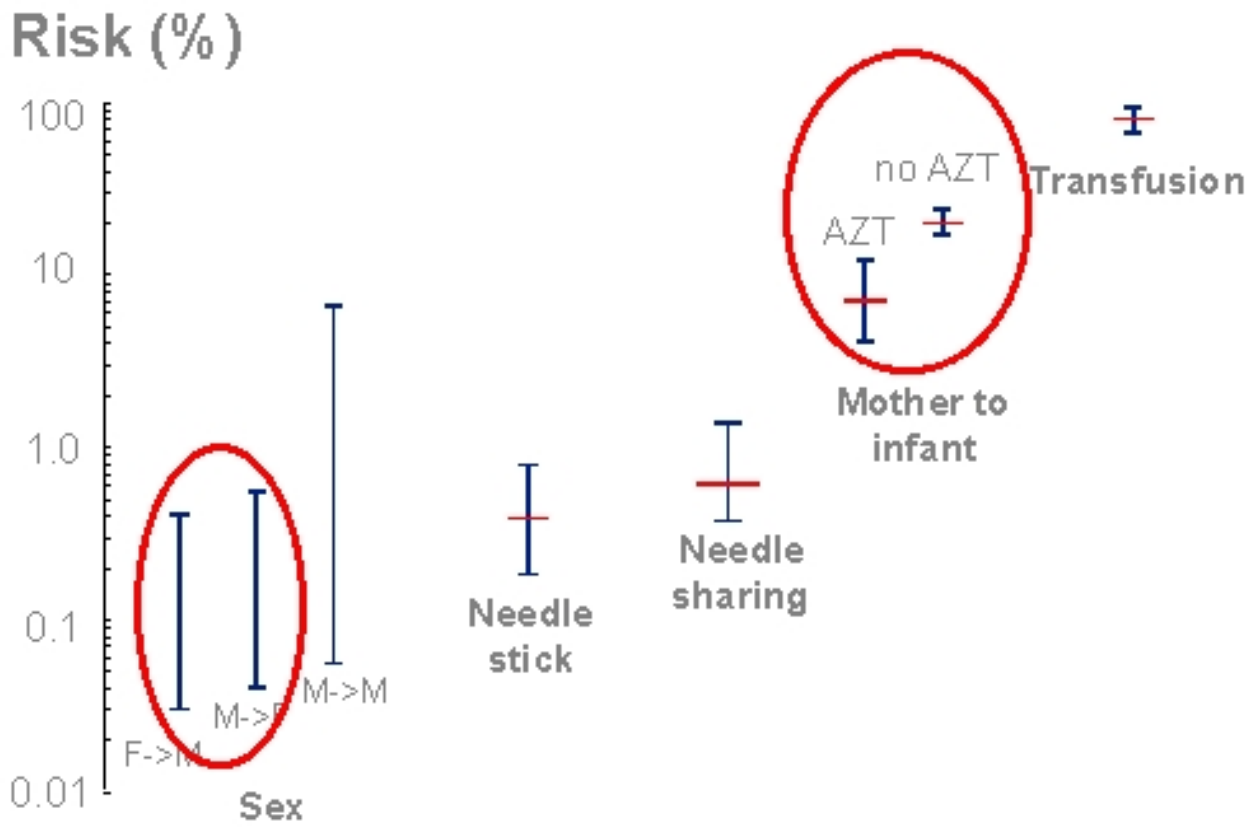
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# P of HIV transmission



Ref: Royce R A et Al., NEJM 1997;336:1072-8



# Factors influencing sexual transmission

- Exposure (condoms, menses... )!
- Viral Load!
- Inflammation!

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## Increase/decrease of VL

<b>Factor</b>	<b>Infectiousness</b>	<b>Vulnerability</b>
PHI	↑↑	N/A
Late stage	↑↑	N/A
HAART	↓↓	↓ (PEP!)



## Local Inflammation

<b>Factor</b>	<b>Infectiousness</b>	<b>Vulnerability</b>
STD	↑↑	↑↑
Genital trauma	↑↑	↑↑
Ectopy	↑↑	↑↑
Nonoxynol	?	↑↑
IUD	?	↑

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# Other Protective Factors

<b>Factor</b>	<b>Infectiousness</b>	<b>Vulnerability</b>
Circumcision	↓	↓
Delta-32	?	↓

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# Uncertain Influence....

BCP, Pregnancy

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# VL and heterosexual transmission: The Rakai Study

- A study of HIV prevention through mass treatment of STDs
- Such treatment diminished the STD « load », but not the HIV incidence
- Stored samples available, retrospectively tested for HIV: identification of sero-discordant couples
- What was the risk of acquiring HIV among the initially seronegative sex partners?  
**(Note: No anti-retroviral treatment!)**

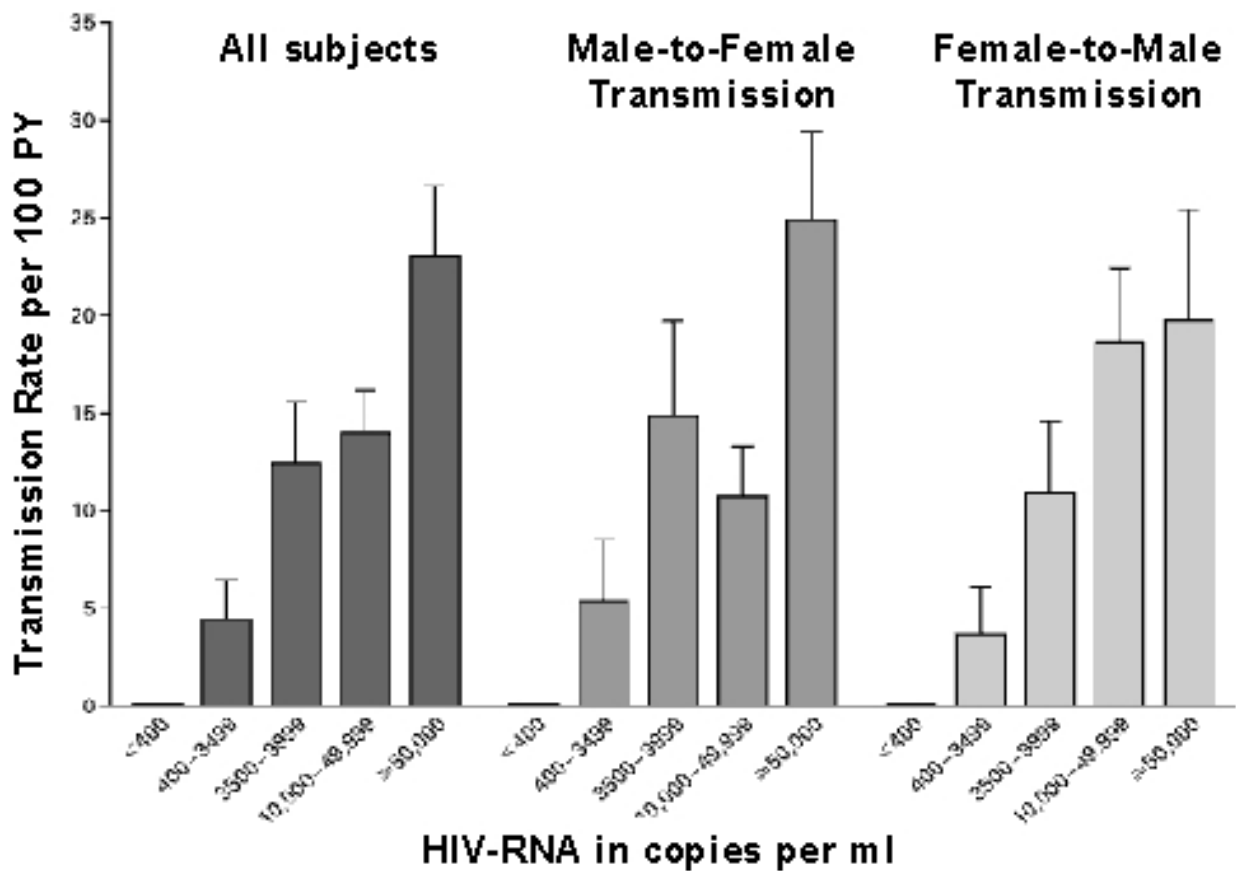
Quinn TC et al. NEJM 2000; 342:921-930

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## P of HIV transmission in serodiscordant couples

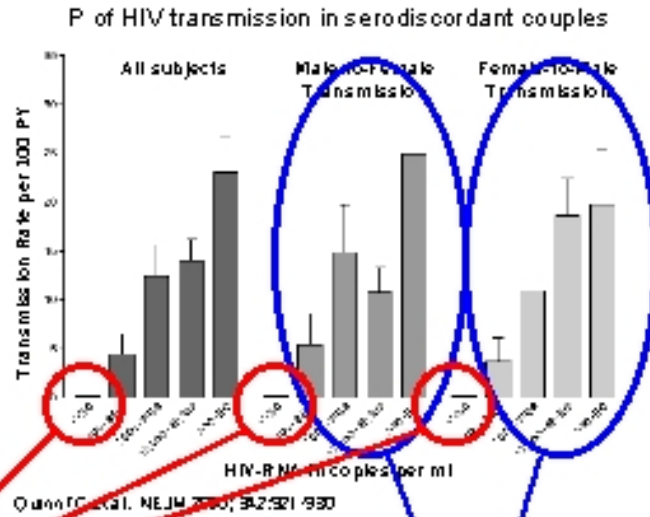


Quinn TC et al. NEJM 2000; 342:921-930

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# Note, please....



No transmission when VL < 1500

No difference in female to male, as opposed to male-to-female transmission



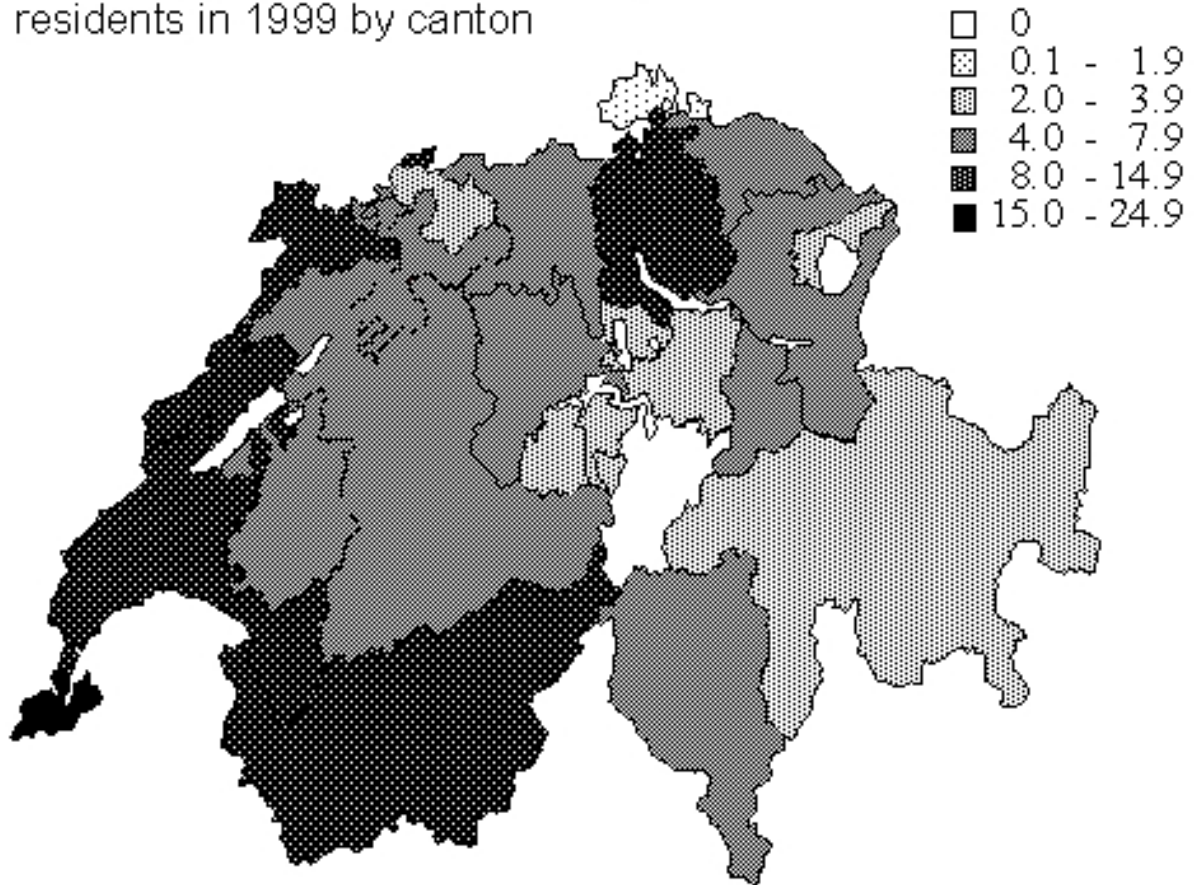
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Laboratory reports of HIV+ tests per 100'000 residents in 1999 by canton



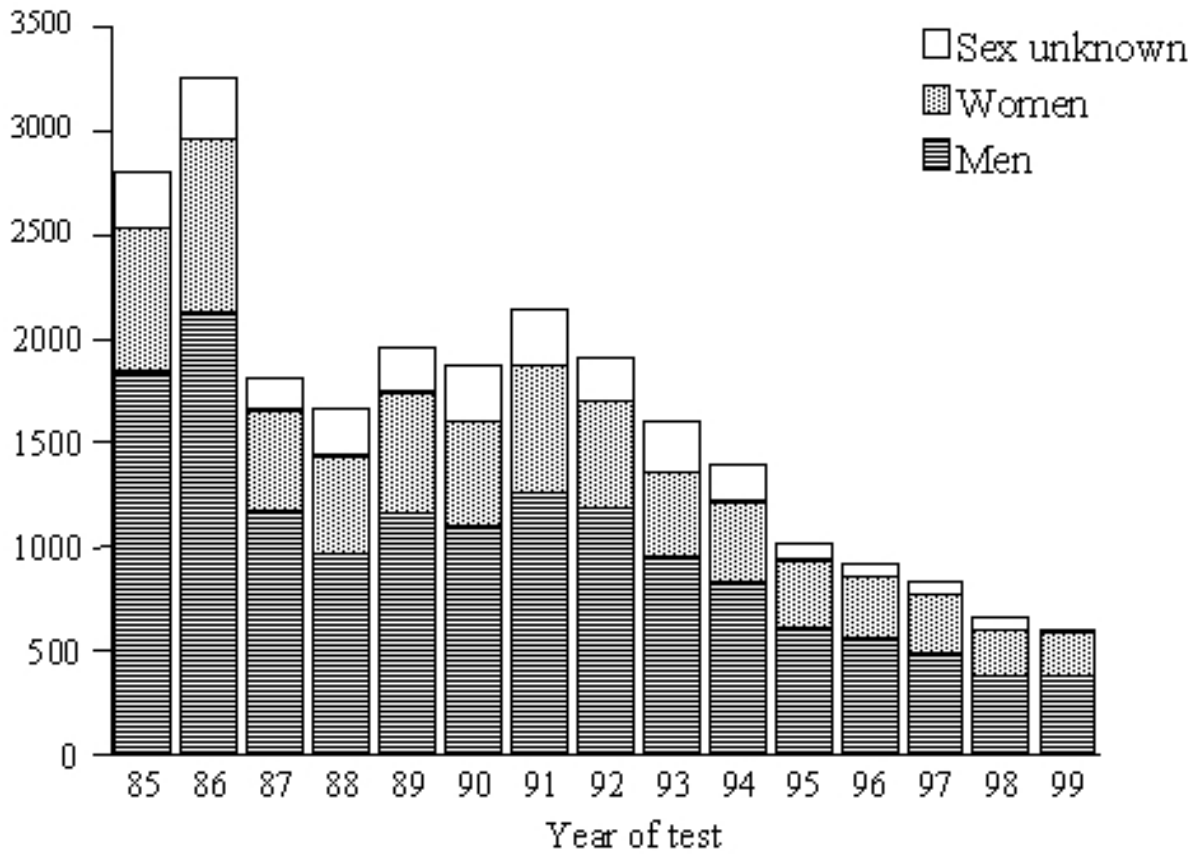
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## HIV in Switzerland

Number of positive HIV test results reported by confirmatory laboratories



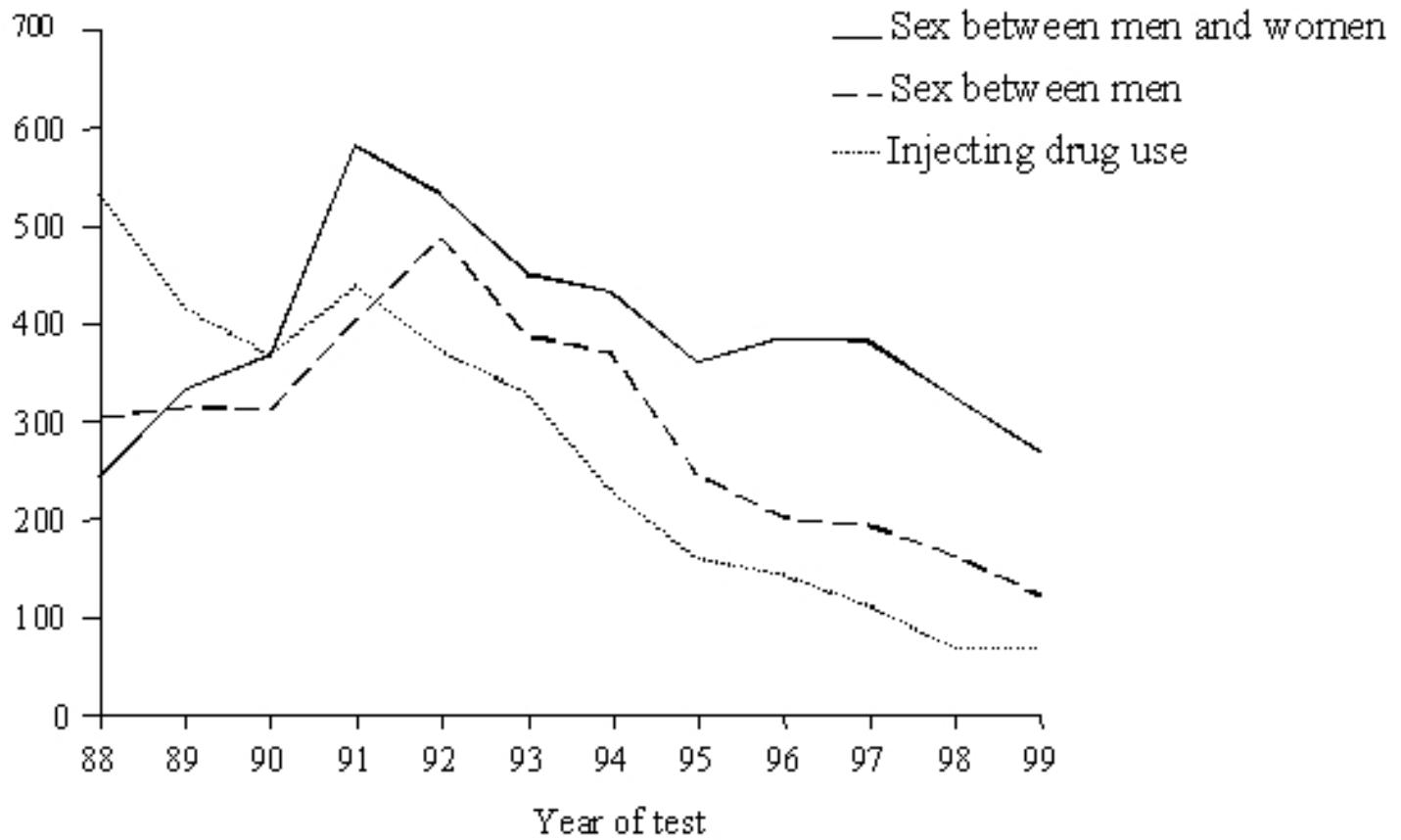
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## HIV in Switzerland

Estimated number of newly diagnosed HIV infections  
by transmission group and year of test

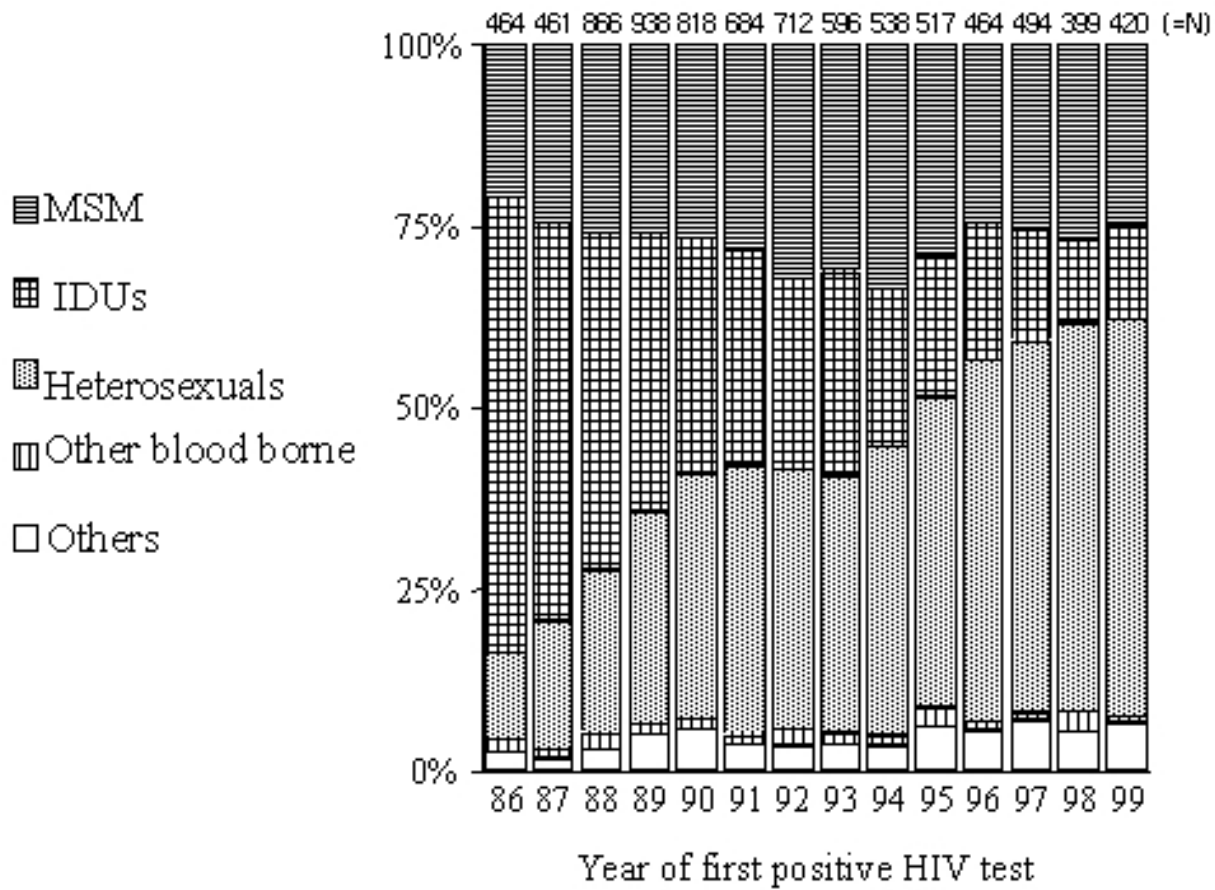


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## Heterosexuals replace IVDAs

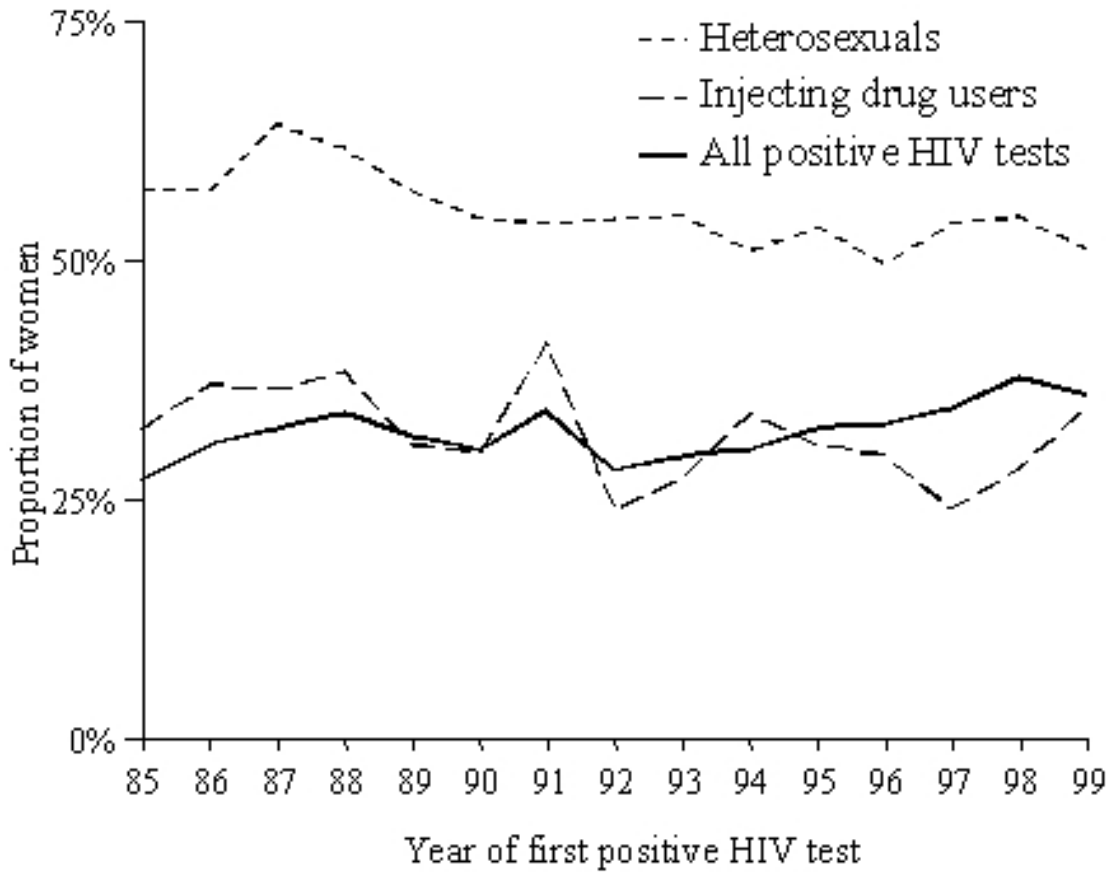


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## 25 to 40 percent are women



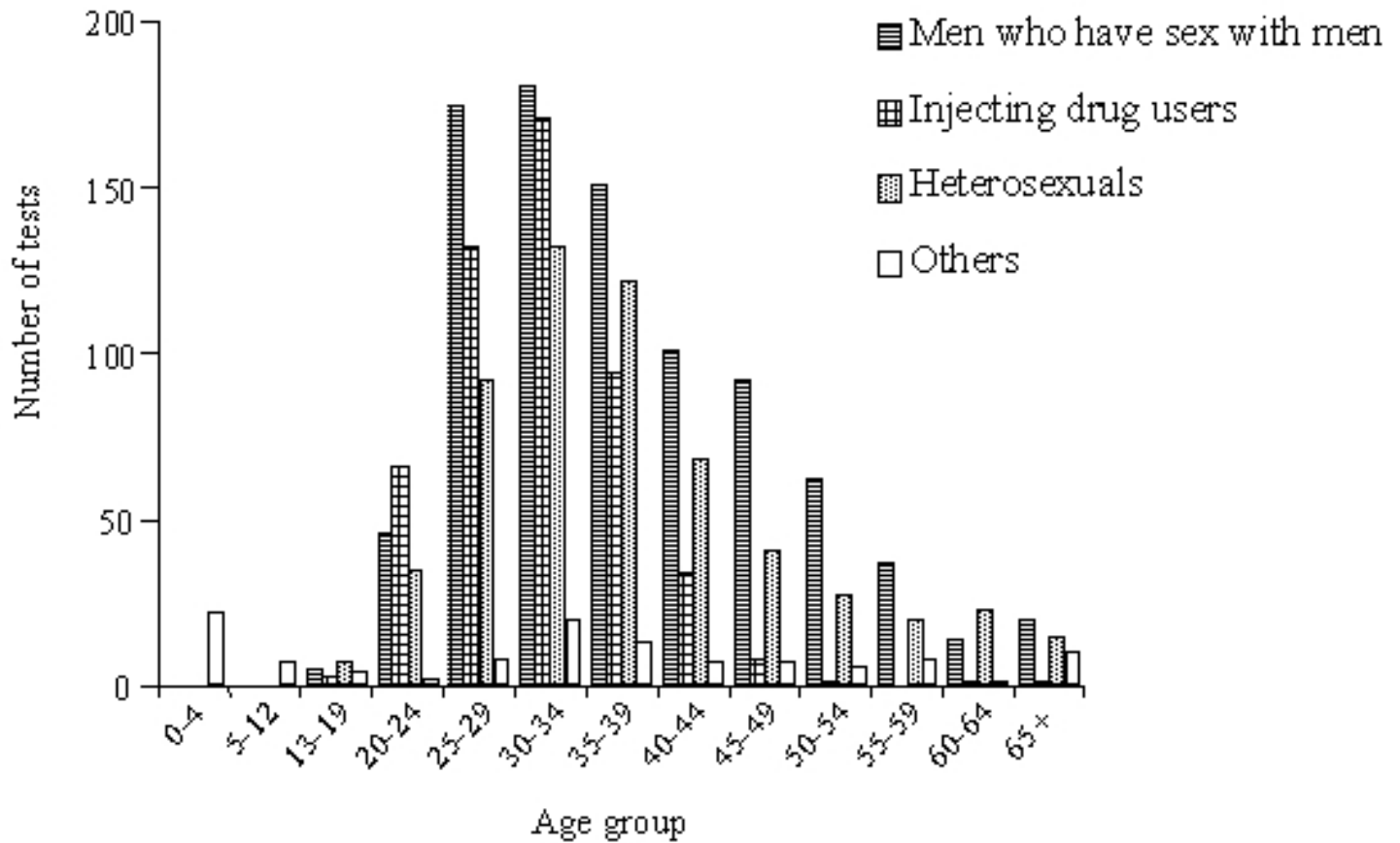
B. SFOFH March 2000

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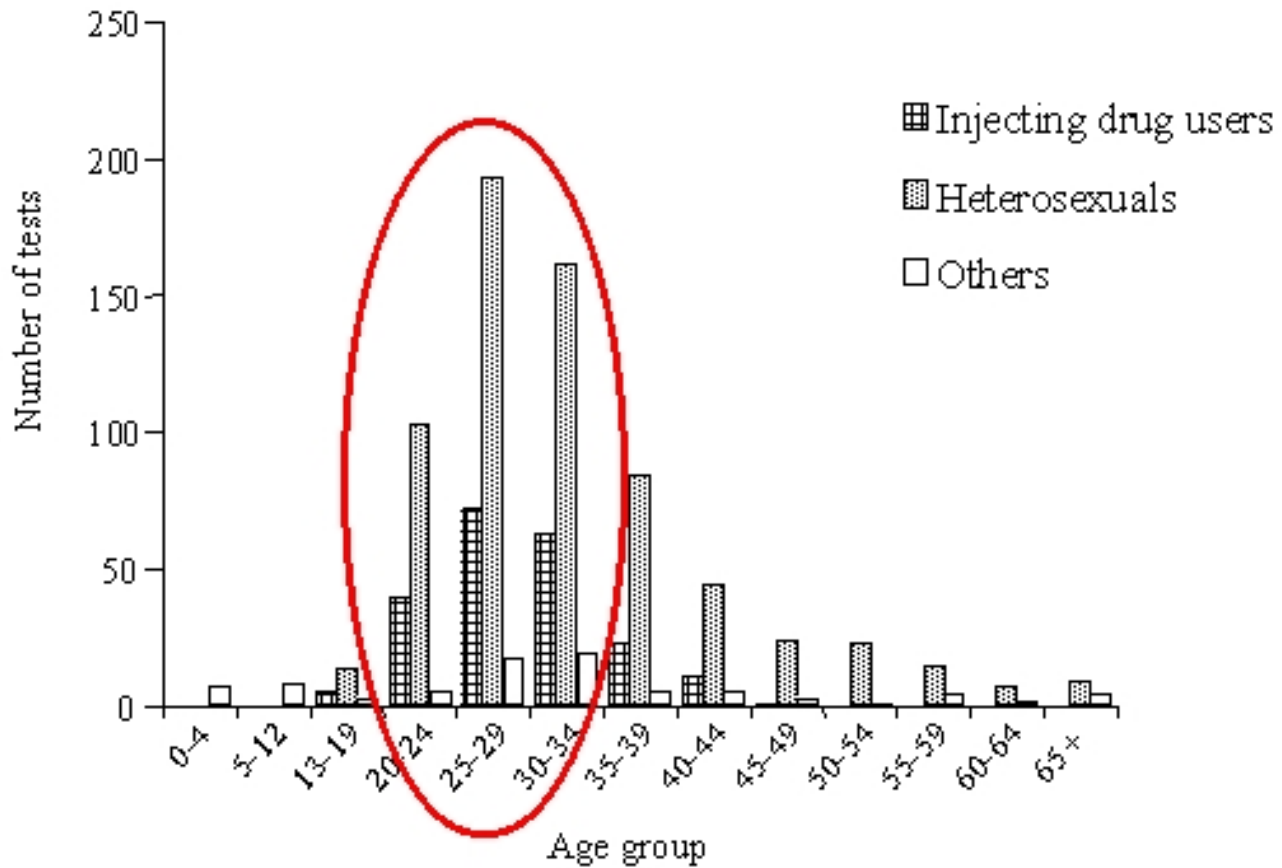
**Male age distributions by transmission group**  
(positive test results 1993-1997)



B SFORH April 1998



## Most HIV-positive women are between 20 and 34

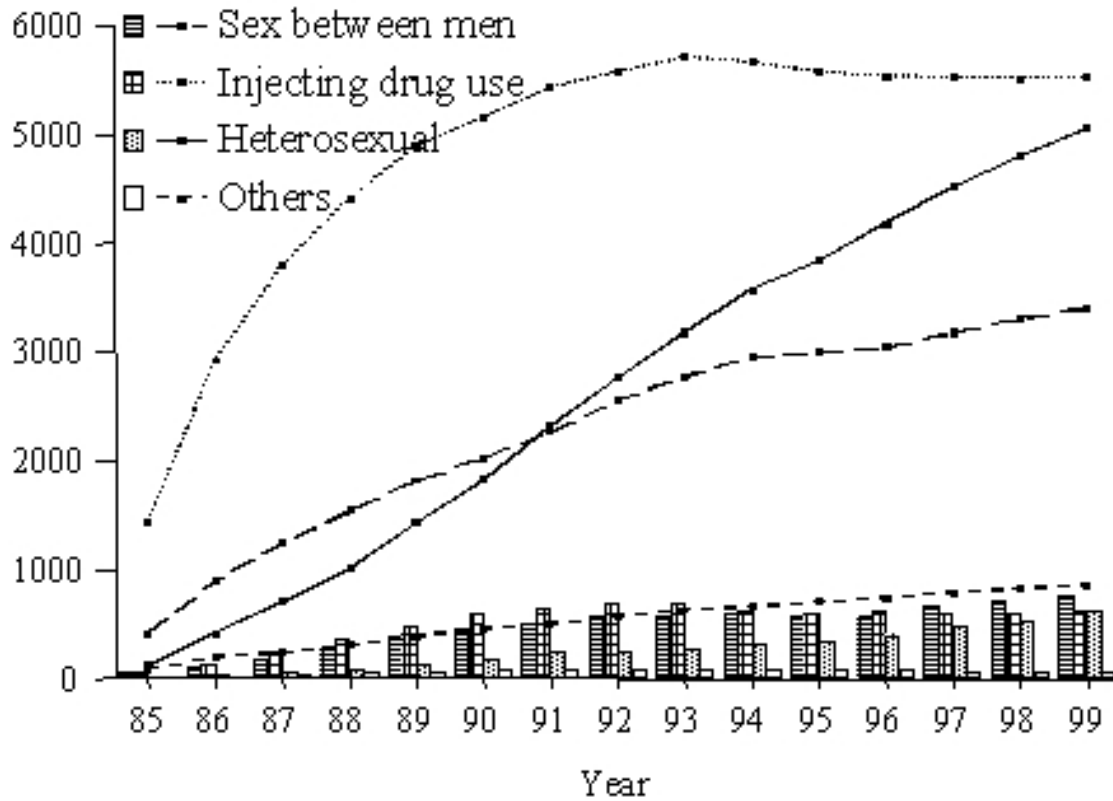


B SFORH April 1998

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## N of living HIV+ by group of transmission, 1985-1999 (persons living with AIDS included, bars)

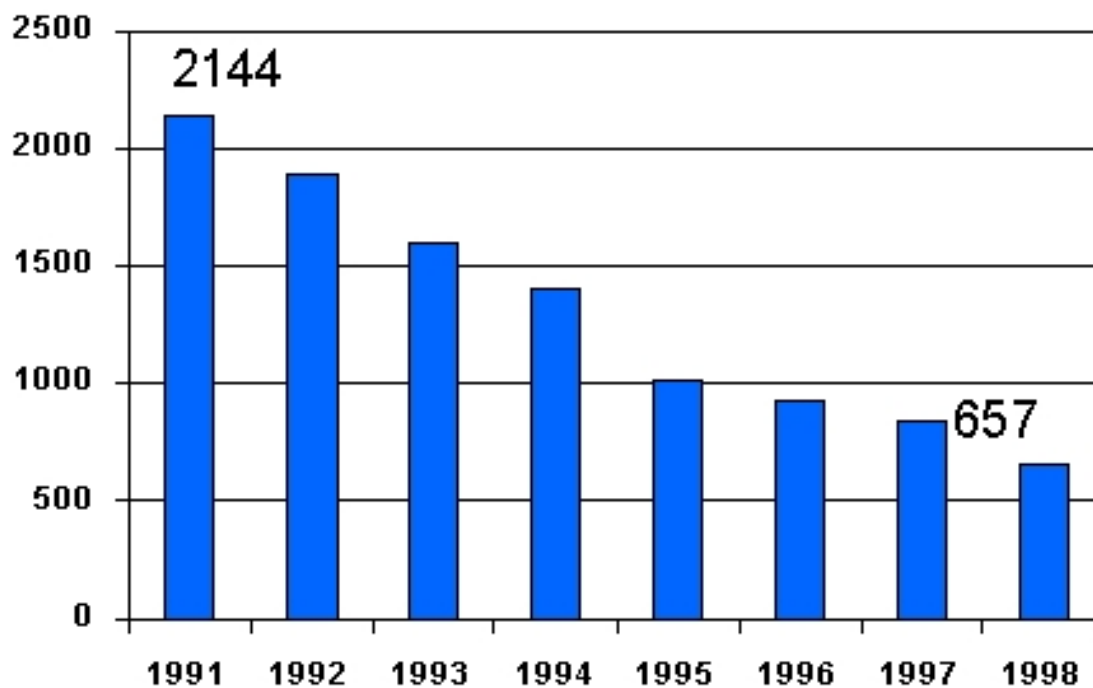


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# VIH: Nouveaux diagnostics



Source: M. Gebhart, OFSP, novembre 1999

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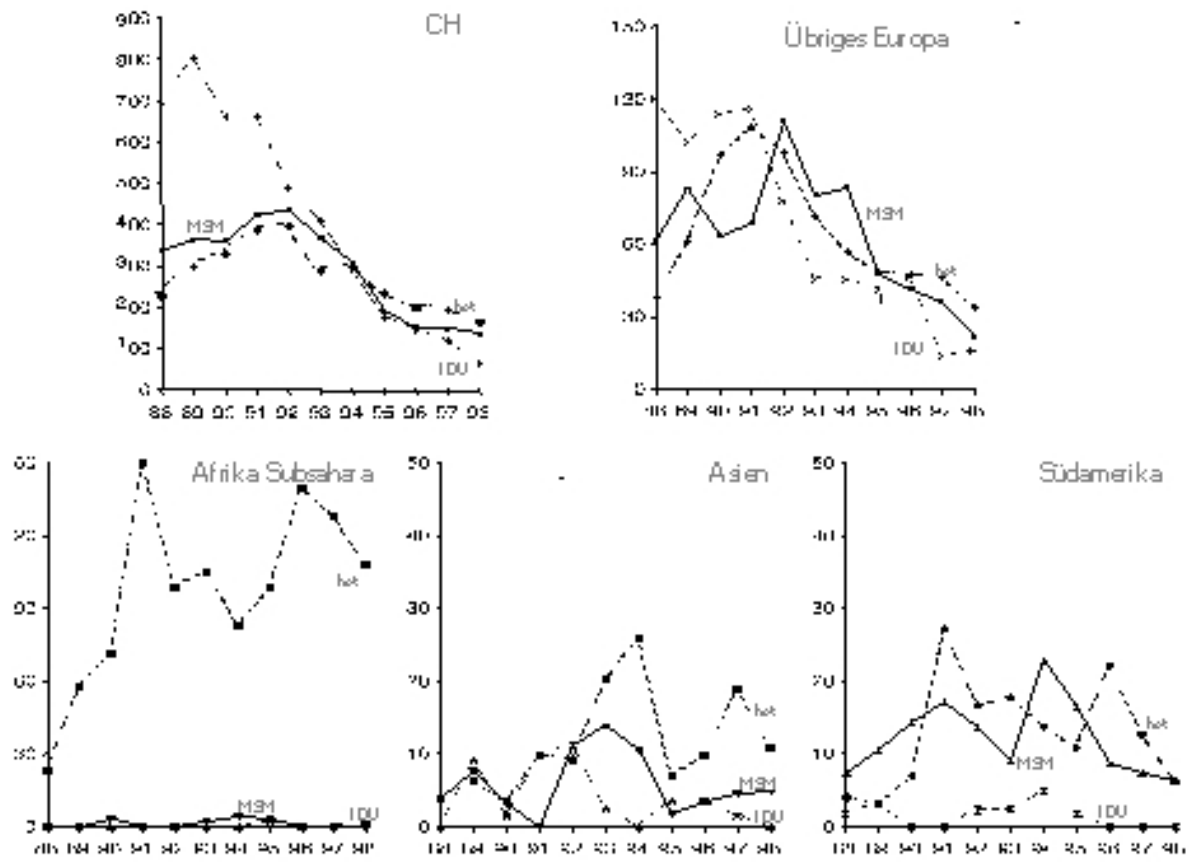


# AIDS/HIV in Switzerland mirrors the global HIV epidemic

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## Nouveaux diagnostics d'infection VIH, 1988-1998 selon l'origine des patients





## VIH: Nouveaux diagnostics

Catégorie en %	1991	1998	Diminution
Toxicomanes CH	650	50	93%
HSH CH	420	150	64%
Hétérosexuels CH	400	180	55%
Hétérosexuels africains	120	115	5%

Nouveaux diagnostics par 100000 habitants par an:  
Suisse environ 7, Africains (sub-Sahara) environ 700  
(1998)

Source: M. Gebhart, OFSP, novembre 1999

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# Hommes suisses infectés par voie hétérosexuelle

Nouveaux diagnostics entre 1996 et 1998

Catégorie de la partenaire	N	Pourcent
Toxicomane	60	23
Pays type 2*	85	33
Partenaires multiples	50	19
Prostituées	30	11
Partenaires stables HIV+	32	12

Source: M. Gebhart, OFSP, novembre 1999

\* pays avec transmission hétérosexuelle endémique (Afrique)

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# Femmes suisses infectées par voie hétérosexuelle

Nouveaux diagnostics entre 1996 et 1998

Catégorie du partenaire	N	Pourcent
Toxicomane	70	25
Bisexuels	10	4
Pays type 2*	60	21
Partenaires multiples	40	14
Partenaires stables HIV+	100	36

Source: M. Gebhart, OFSP, novembre 1999

\* pays avec transmission hétérosexuelle endémique (Afrique)

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- **The effects of treatment**

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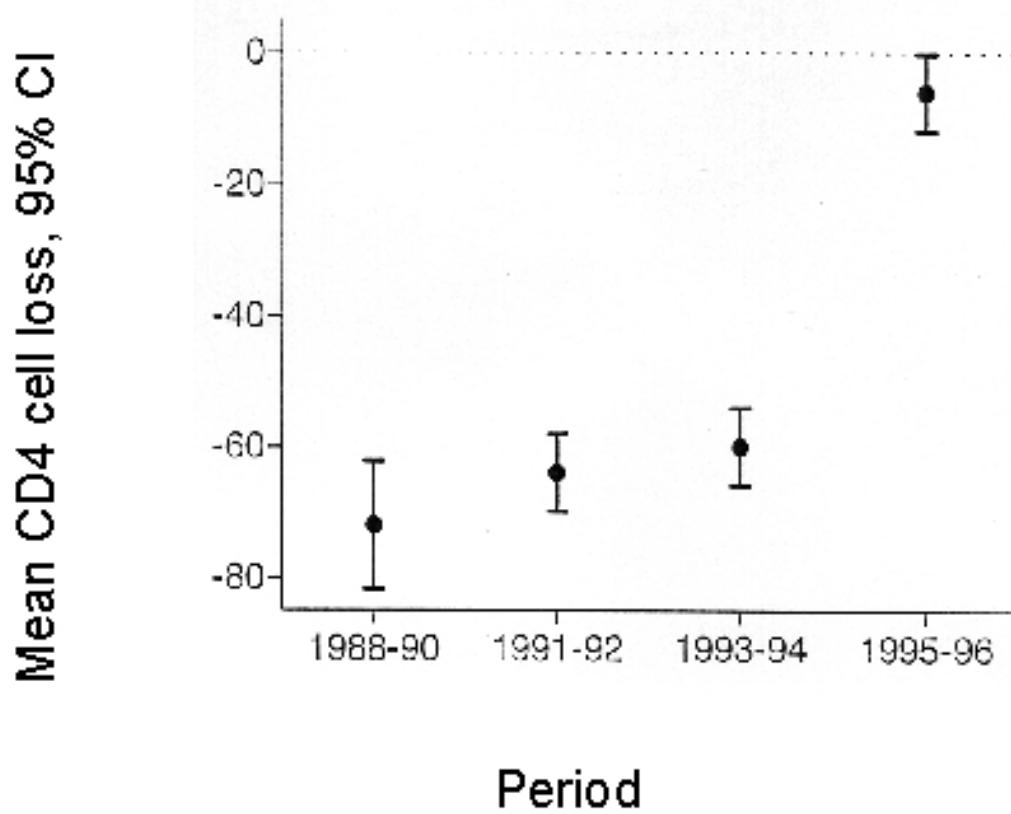
# The Swiss HIV cohort study

- Prospective cohort study of HIV-infected individuals
- Initiated in 1988
- 7 study centers in Switzerland
- 6-monthly follow up
- Clinical, epidemiological and treatments information
- >11000 patients followed up

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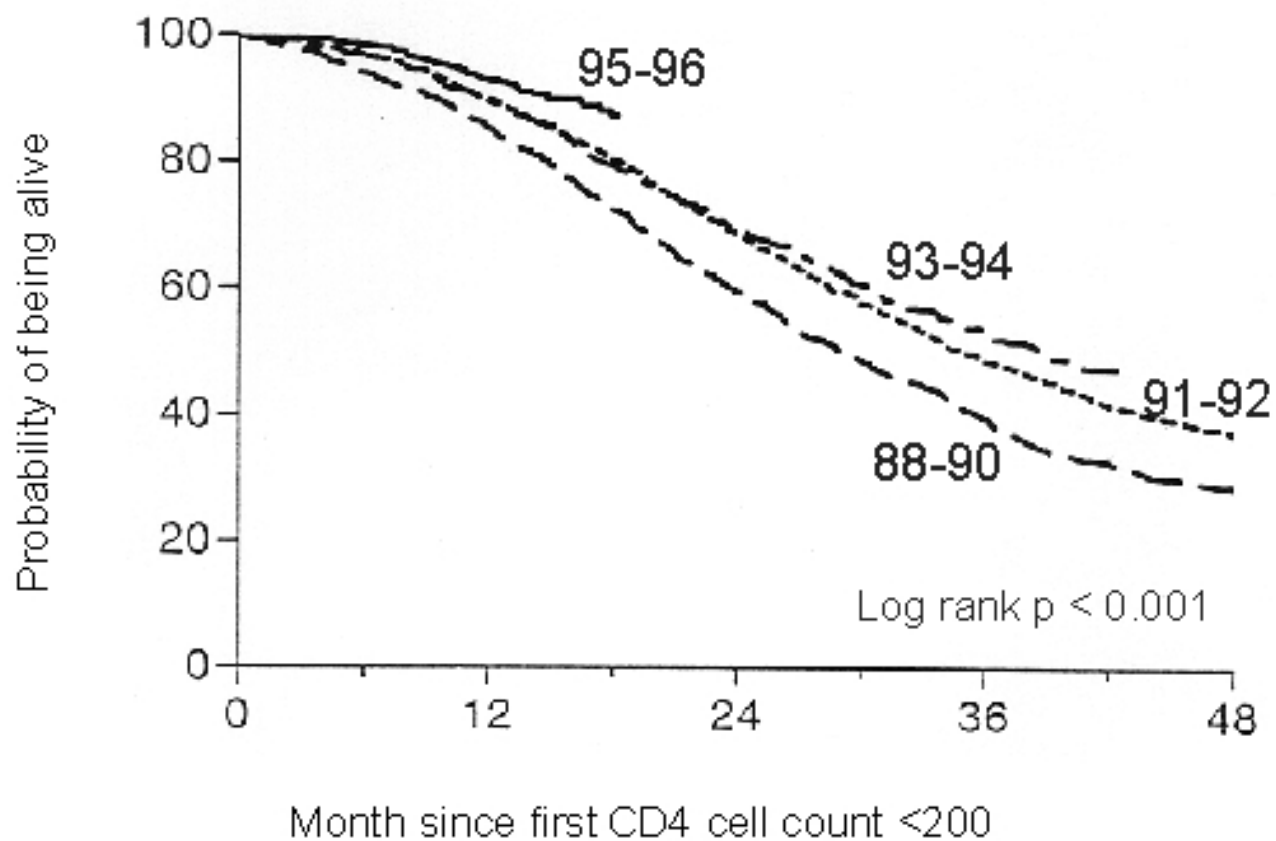
# CD4 T lymphocyte cells lost per year in 4 time periods, 1989-96



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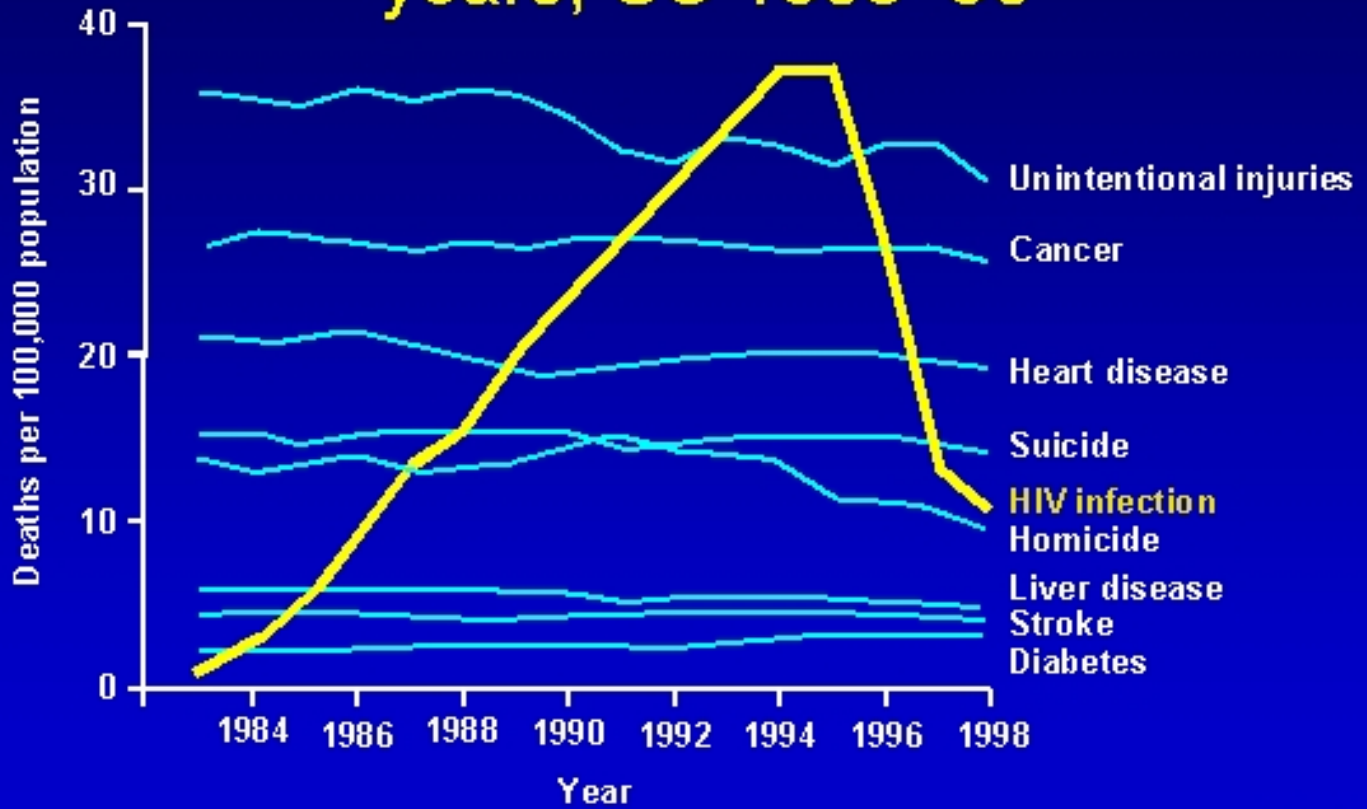
## Estimates of progression to death from first CD4 cell counts < 200, 1988-1996



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## Death rates in persons aged 25–44 years, US 1983–98



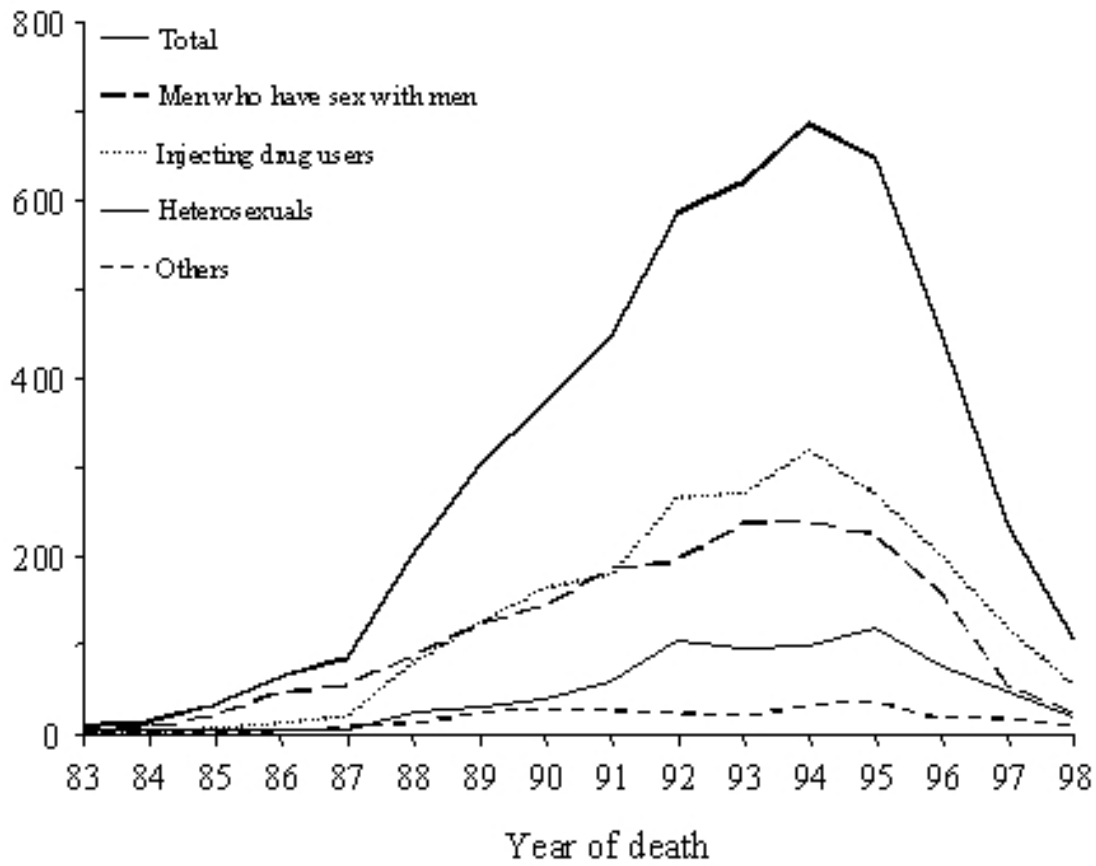
CDC Data

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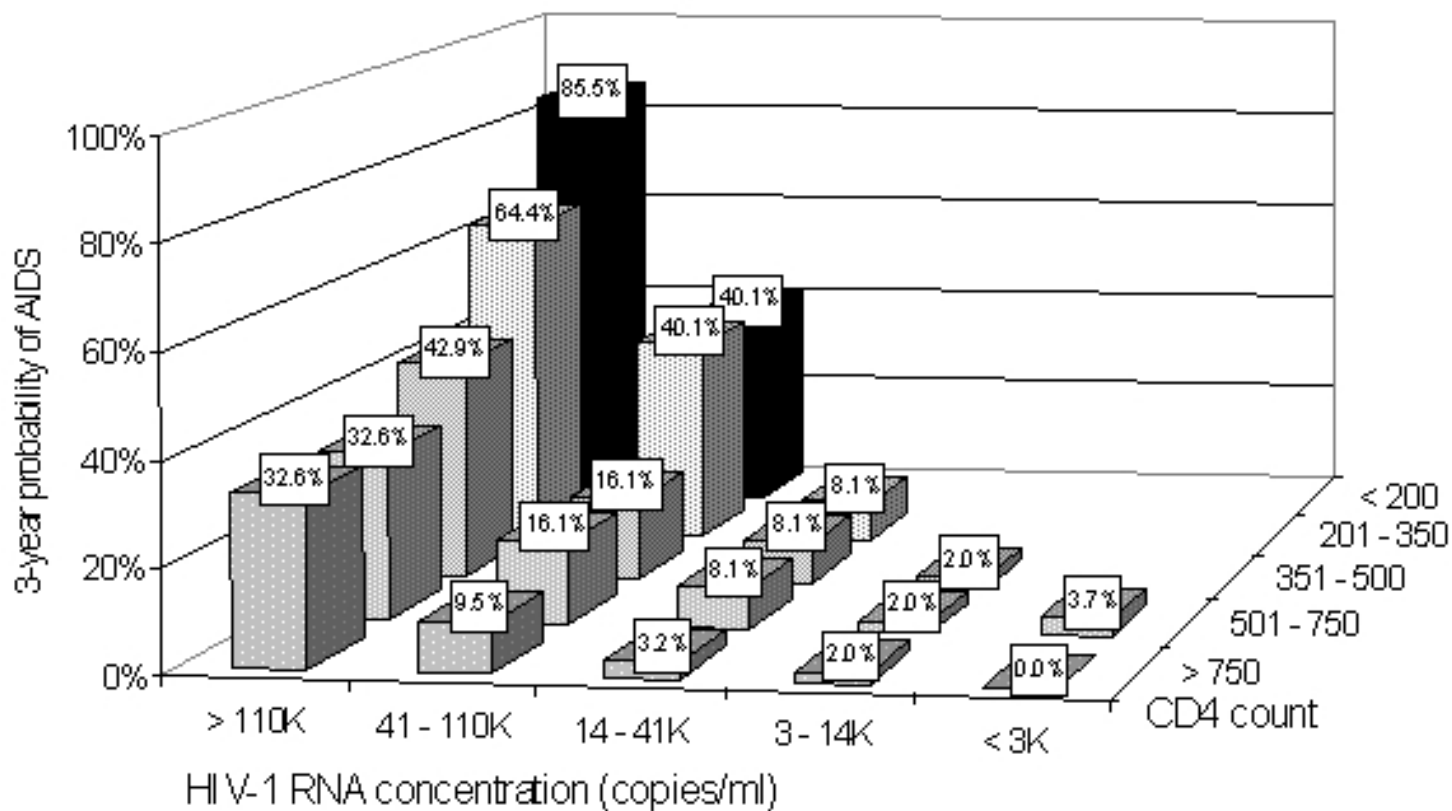
## AIDS in Switzerland

Reported AIDS-associated deaths  
by patient group and year of death



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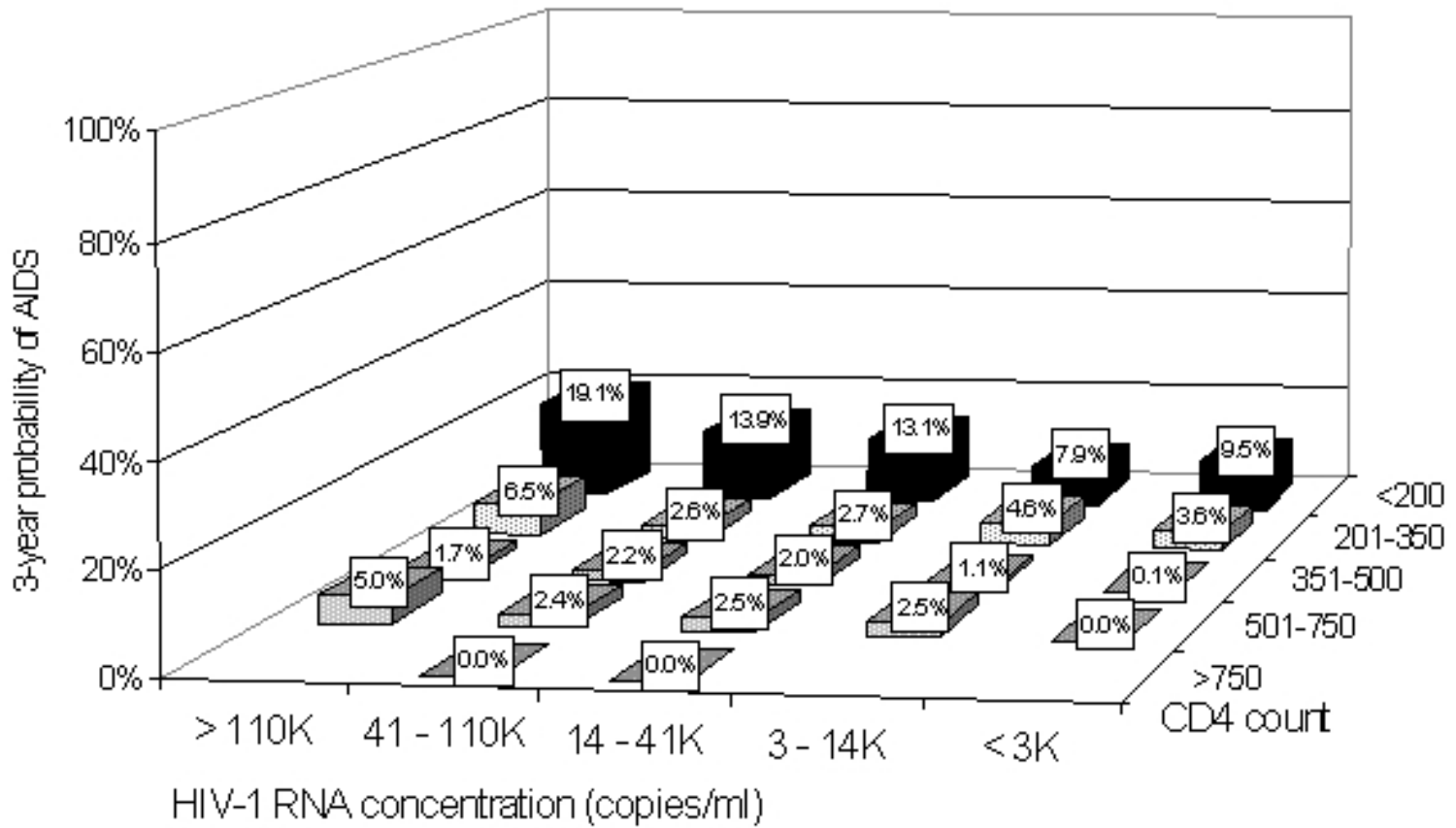
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## Multicenter AIDS Cohort, before HAART\*

\* Mellors JW et al. Ann. Int. Medicine 1997;126:946





## Swiss HIV Cohort, with HAART

Diapositive 38 sur 58



# Conclusions

In developed countries,

- Treatment and prevention work
- Proper treatment decreases transmission through lowering VL
- N of HIV+ ↑
- Percent women ↑
- Most of these are 20 to 34
- Many will want to have children

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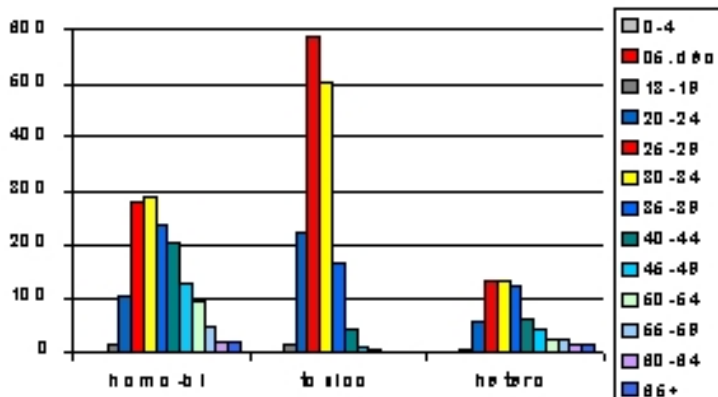
END

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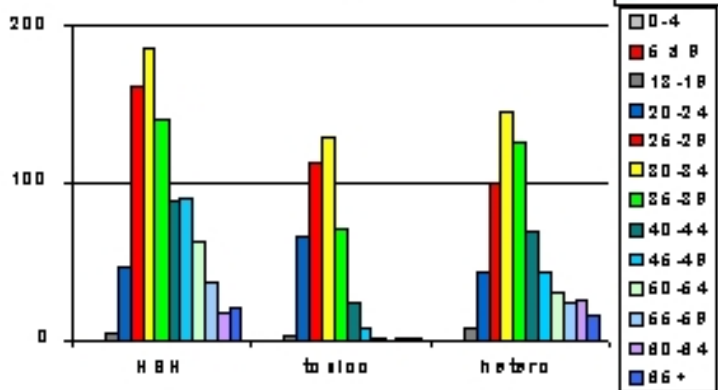


# Age au moment du diagnostic

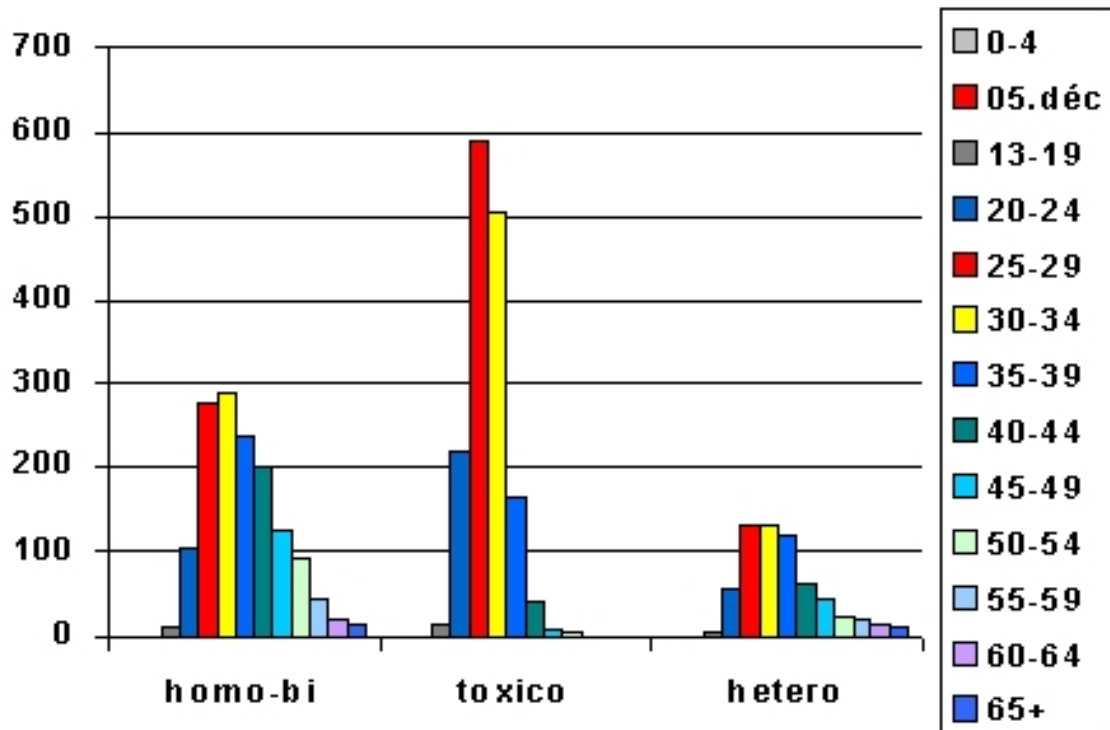
≤ 1993

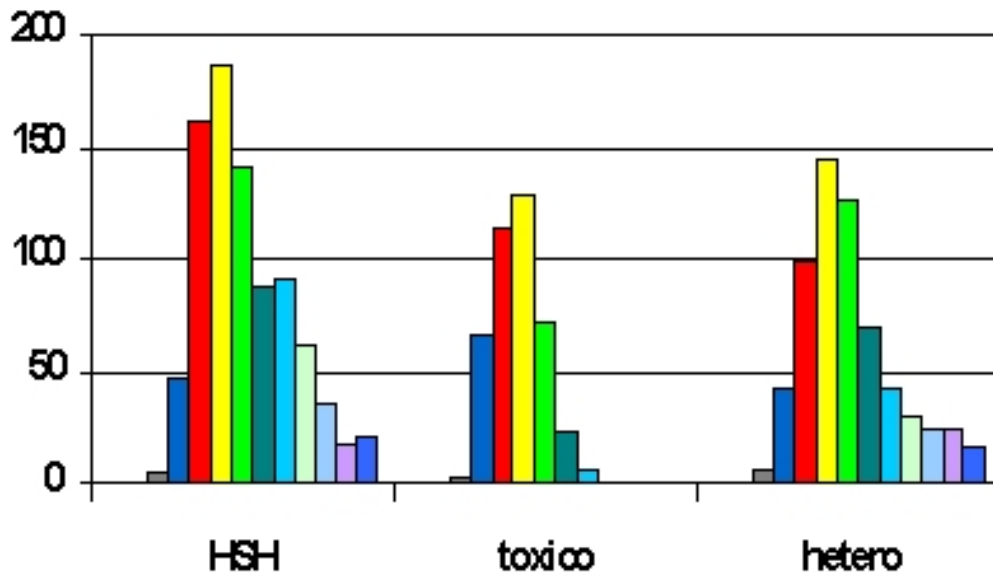


> 1993



Source: M. Gebhardt, BAG 11/1999

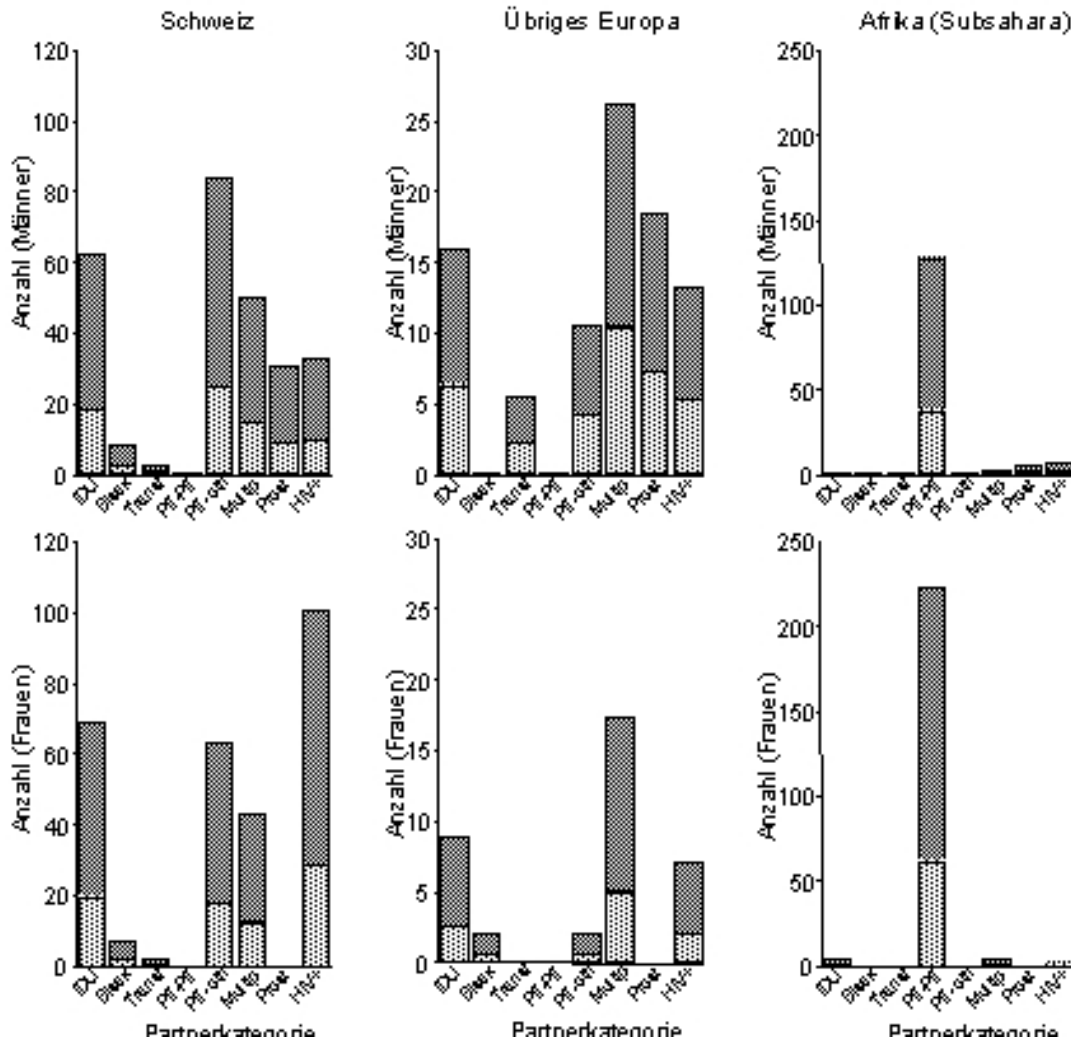






Positive HIV-Testresultate, Hererosexuelle Transmissionsgruppe, Schweiz 1996-1998.  Verteilungen nach Partnerkategorie, getrennt nach Herkunft und Geschlecht der getesteten Person.

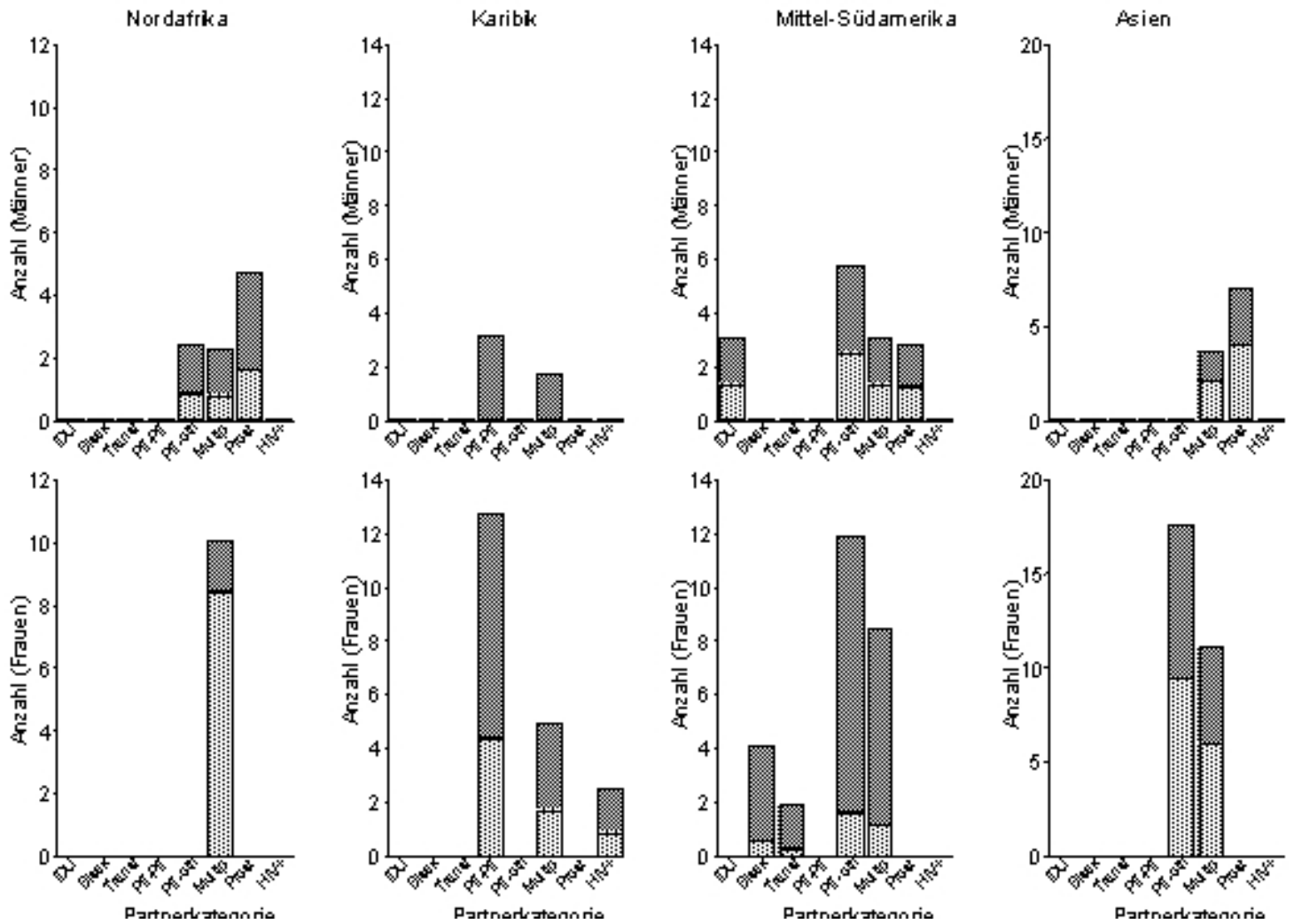
Proportional angelegte Meldungen mit unbekannter Partnerkategorie



- Partnerkategorien:
- IDU Injizierende Drogenbenützer
  - Blex Bisexuelle Männer
  - Transf Transfusionsempfänger
  - PII-P11 Getestete Person und Partner aus Partner II-Land
  - PII-P11 Nichter Partner aus Partner II-Land
  - Post Prostituierte
  - Multip Gelegenheitspartner
  - HIV+ HIV-positiver Partner mit unbekanntem Ausbreitungsweg



Positive HIV-Testresultate, Hererosexuelle Transmissionsgruppe, Schweiz 1996-1998. Proportional angestellte Menge in % (bekannt) über Partnerkategorie

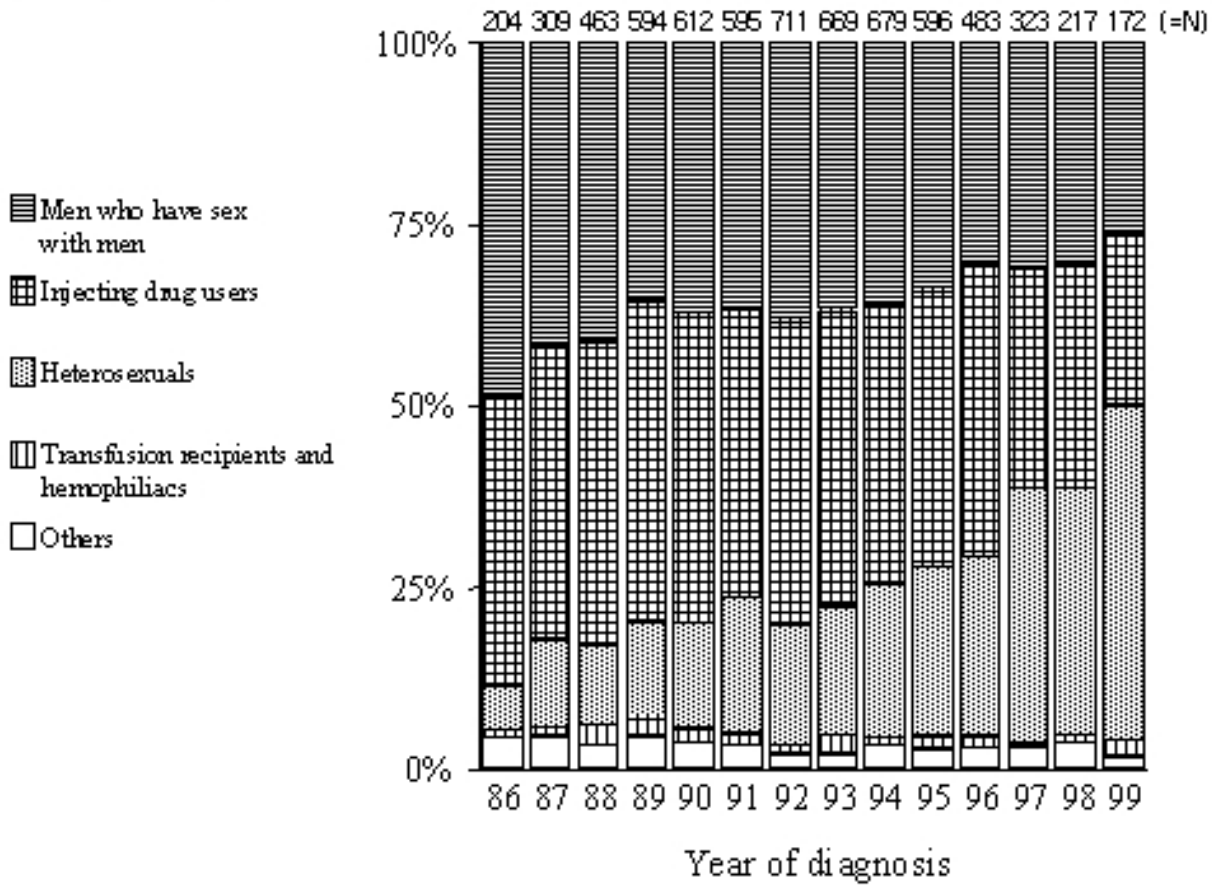






## AIDS in Switzerland

Distribution of main patient groups  
by year of diagnosis

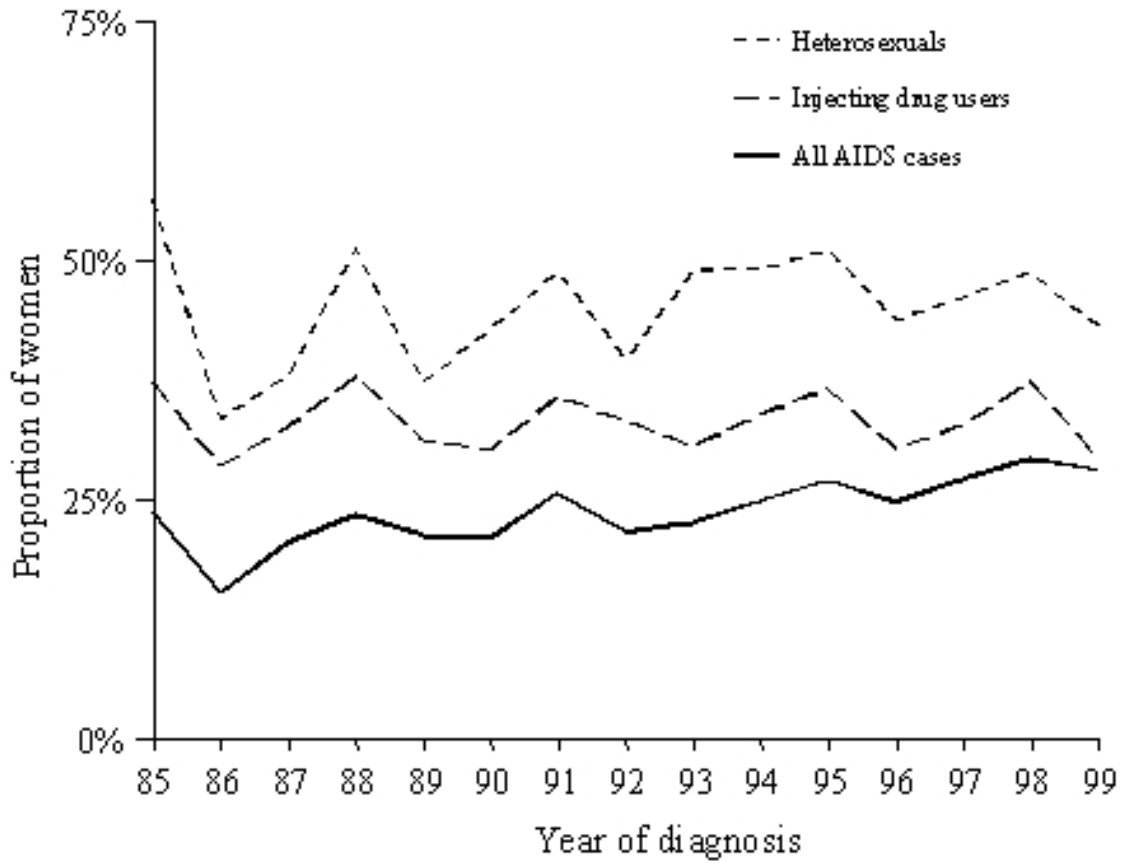


B. SFOH March 2000



## AIDS in Switzerland

Proportion of women 1985 - 1999



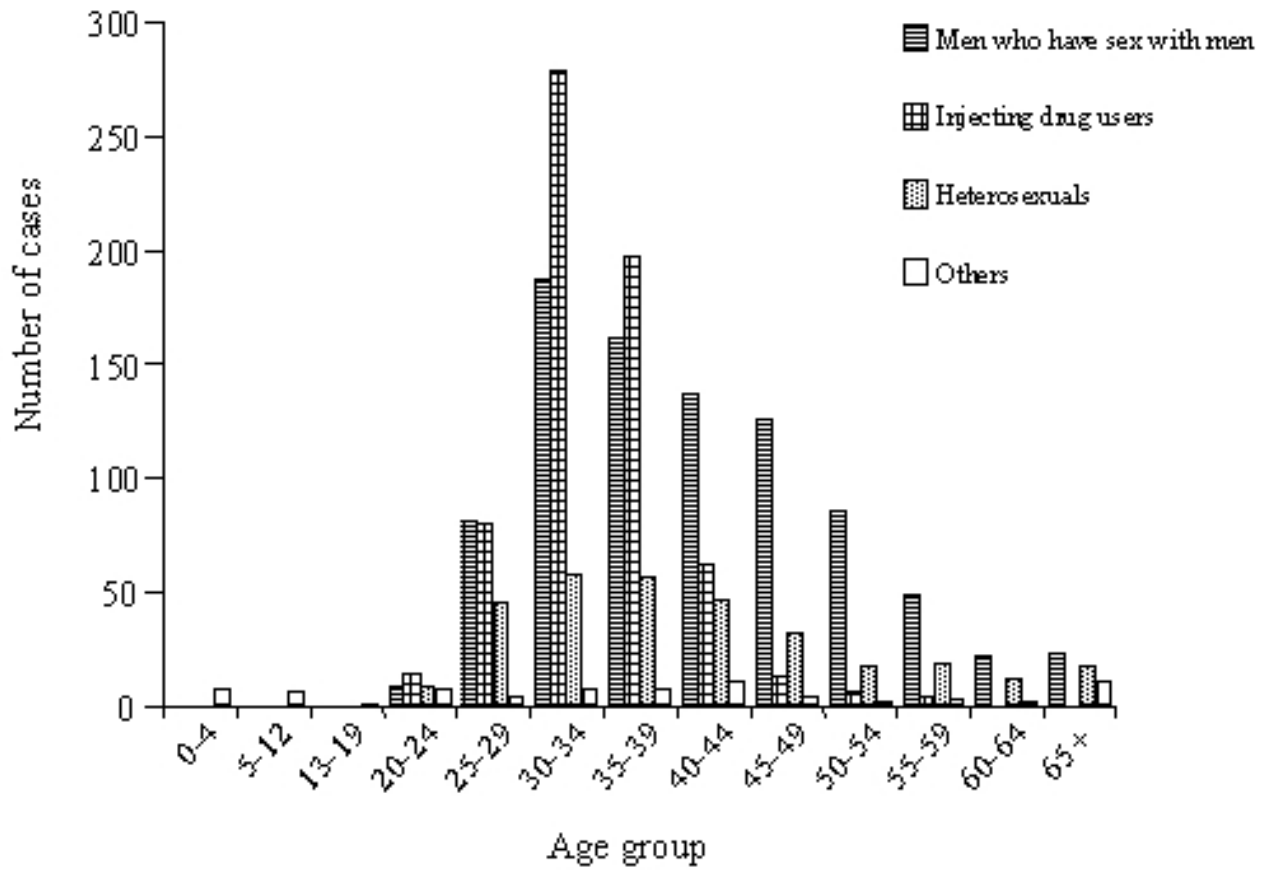
B. SFOH March 2000

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## AIDS in Switzerland

Male age distributions by patient group  
(cases diagnosed 1993-1997)



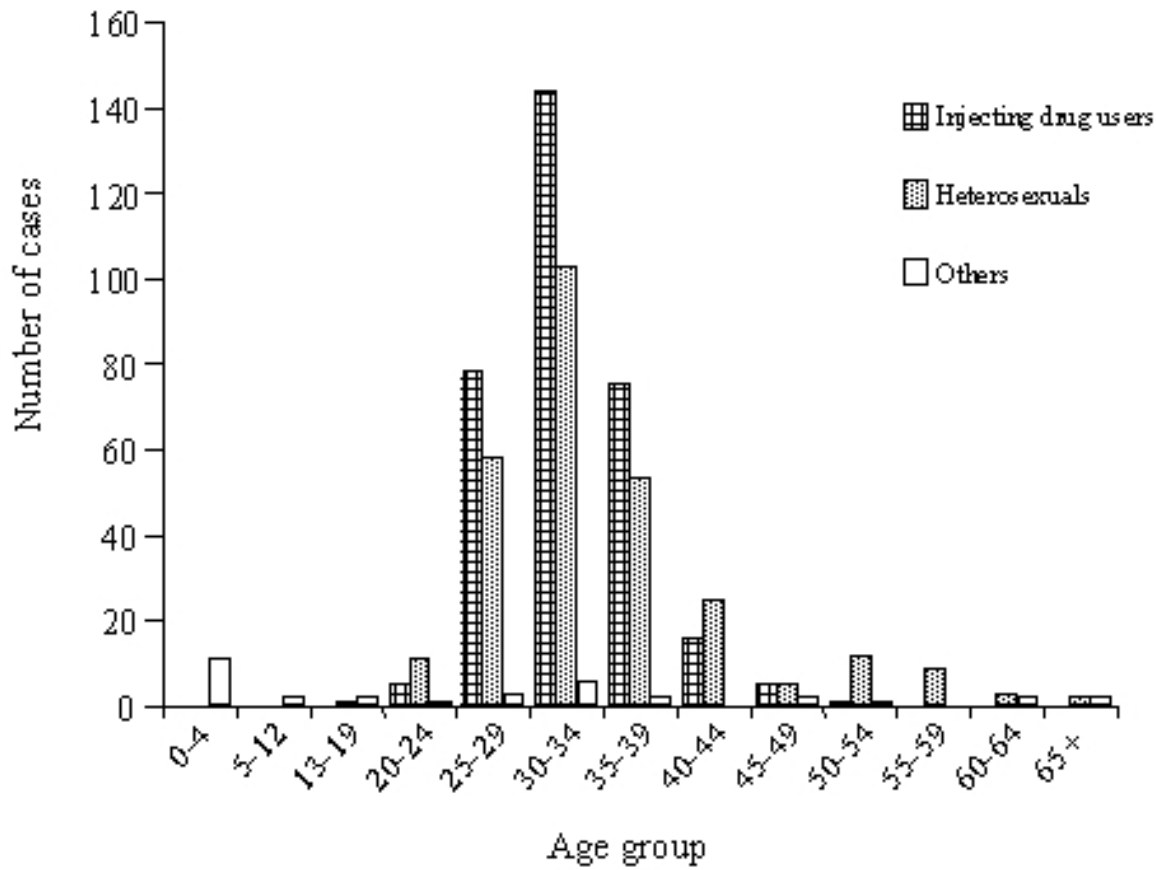
B SFOPH April 1998

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## AIDS in Switzerland

Female age distributions by patient group  
(cases diagnosed 1993-1997)



B SFOPH April 1998

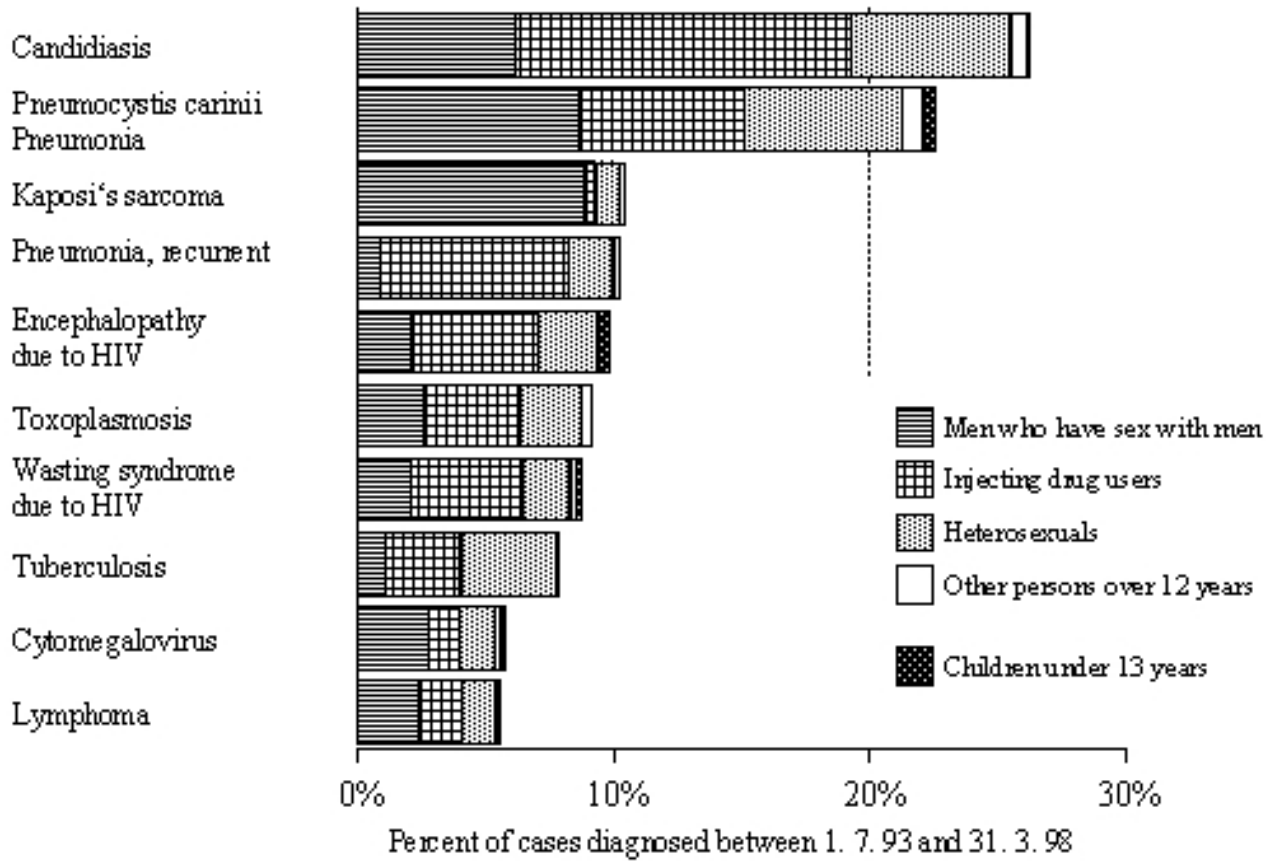
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## AIDS in Switzerland

Relative frequency of main AIDS defining diseases

(N=2264)



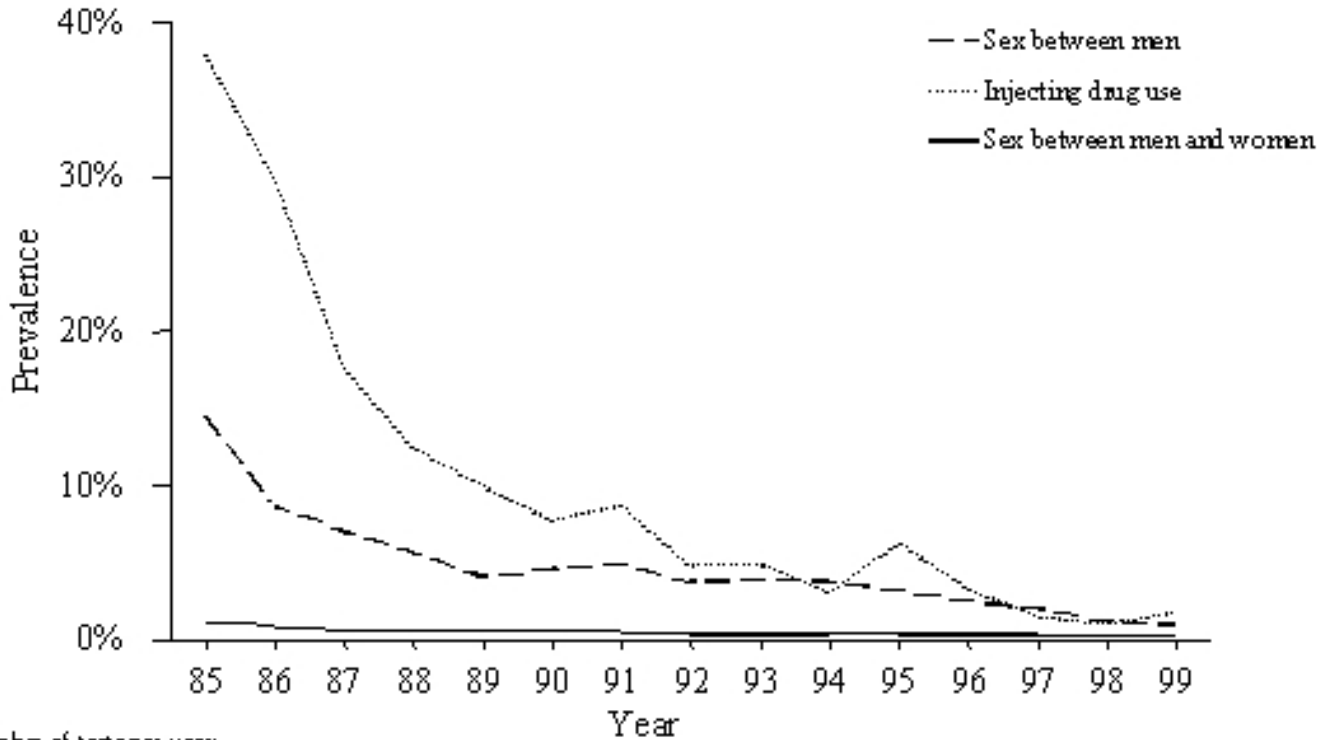
B SFOPH April 1998

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## HIV in Switzerland

HIV prevalence among persons attending anonymous test sites by reported risk of HIV transmission



Number of tests per year:

Sex between men	913	819	1068	652	740	834	885	915	1056	991	846	872	851	793	857
Injecting drug use	256	238	341	251	192	170	174	170	187	201	177	184	145	111	119
Sex between men and women	1428	1876	7735	6262	6403	6957	7138	9774	10889	11984	11561	12184	11124	10226	9635

B SFORH April 1998

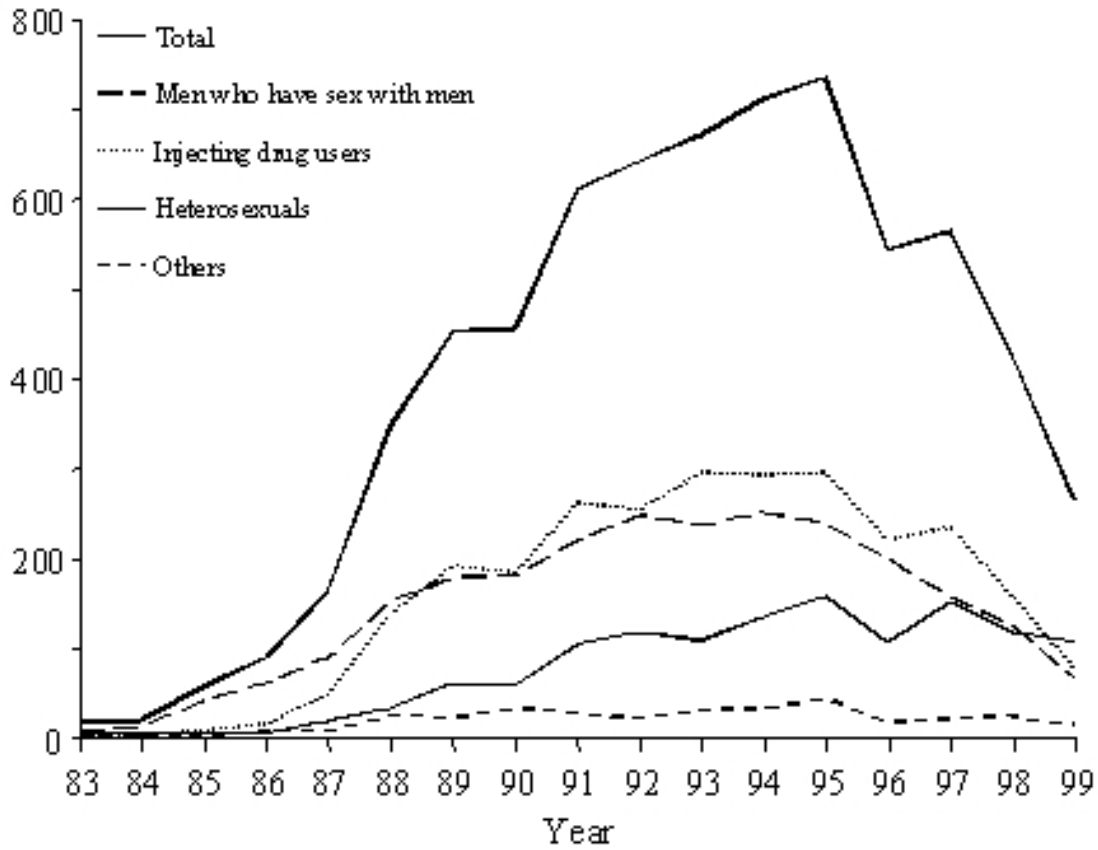




## AIDS in Switzerland

Physician reports 1983 - 1999

by patient group and year of report



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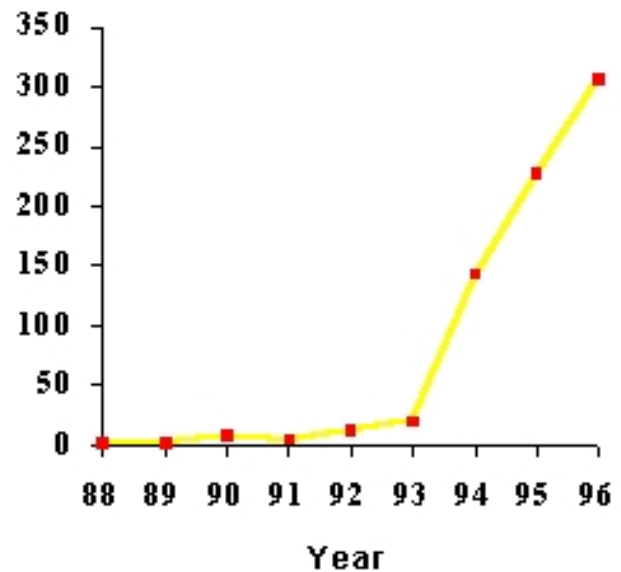




## AIDS in Central & Eastern Europe

- The epidemic is younger
- Incidence is much lower
- There are significant increases (Ukraine, Russia)
- Major role of IVDU

AIDS cases in  
Ukraine, 1988-96



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## Conclusion (3)

**95% of HIV infected patients  
have no access to treatment!**

Diapositive 55 sur 58



## HIV-1 strain sub-types, transmissibility and virulence

- 10 HIV subtypes identified:
  - A: Africa
  - B: Europe, USA, Homo, IVDU (Thailand)
  - C: India, Sexual transmission
  - E: Sexual transmission in Thailand
- Significance?

Transmission and virulence depend on many factors such as disease stage, viral load, susceptibility, type of contact, ...

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# Past



# Present



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## Conclusions (2)

AIDS Surveillance reflects impact of patient care, access to screening and treatment

But it does not reflect

- actual incidence of HIV infection and
- short term prevention efforts

HIV surveillance is increasingly important

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