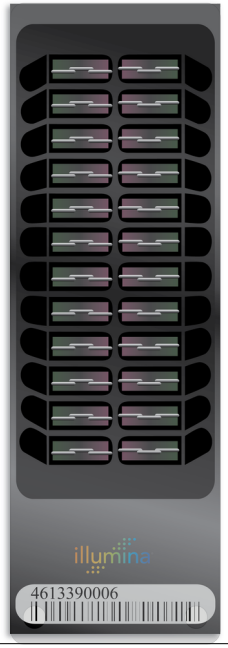
1. Genetic test to minimize chemo in early-stage breast cancer patients
2. Go over Lab 1
3. HIV/AIDS: background and history
4. Group projects

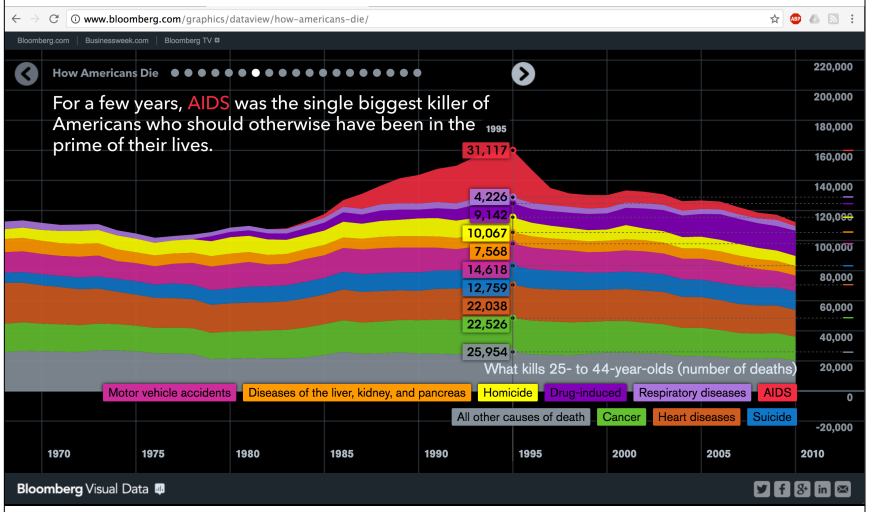
- Last time:
  - How are DNA samples collected?
  - Sample output
  - Exploring genome sizes, gene and protein content
- Remark: the process of collecting genetic data is not error-free — some procedures have higher rates of errors than others

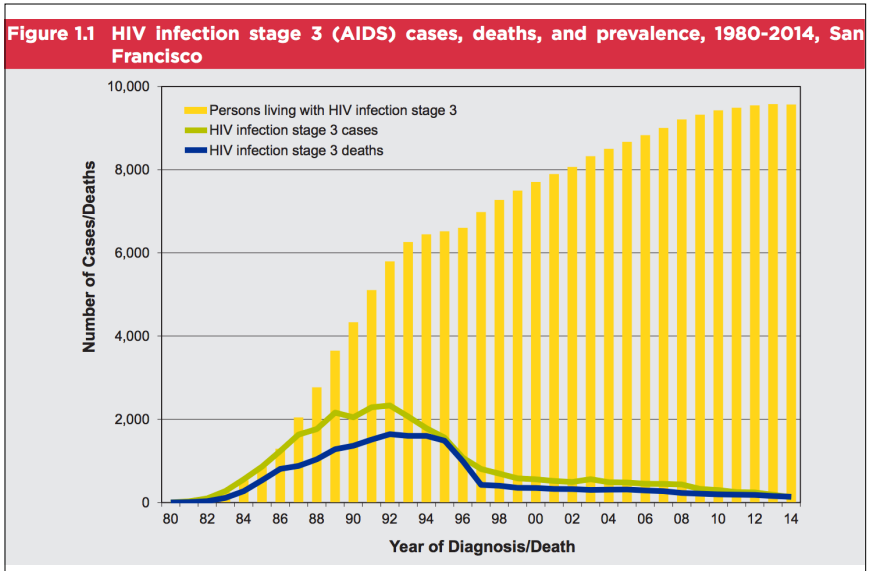


The Berlin patient and the Mississippi baby

An introduction to HIV/AIDs

HIV/AIDS at the population level





https://www.sfdph.org/dph/files/reports/RptsHIVAIDS/HIV-EpidemiologyAnnualReport-2014.pdf

Timeline

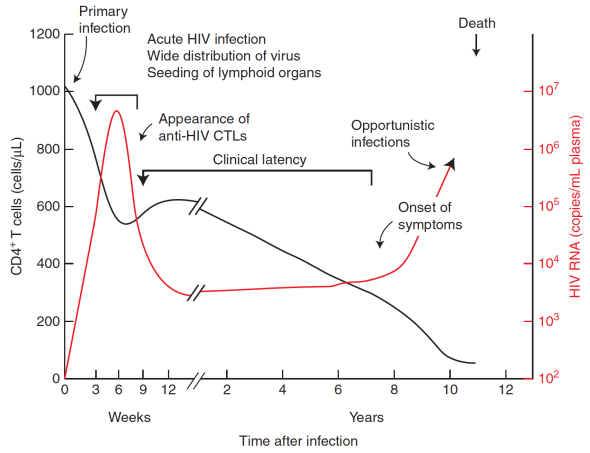
- 1981 — first patients with AIDS (acquired immunodeficiency syndrome) identified

https://www.cdc.gov/mmwr/preview/mmwrhtml/june_5.htm

- 1984 — Evidence that AIDS was caused by a virus, HIV (human immunodeficiency virus)
- 1985 — blood banks screened for HIV
- 1987 — first antiretroviral drug (AZT) becomes available
- 1995 — first combination drug therapy HAART becomes available
- 2007 — first (and only) reported case of cure (Berlin patient)
- 2013 — toddler 'functionally cured' (Mississippi baby), relapsed in 2014
- 2014 — PrEP (pre-exposure prophylaxis) is available for at-risk populations
- **Today — no vaccine, no cure, but HIV is no longer fatal and prevention strategies are available**

HIV/AIDS at the individual level

HIV infection



Coffin and Swanstrom, Cold Spring Harb Perspect Med 2013;3:a012526

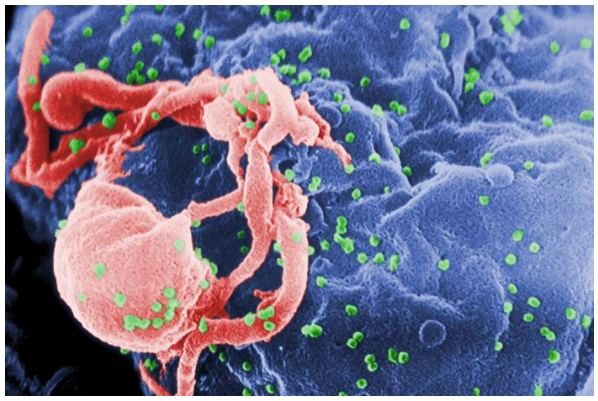
- Timothy Ray Brown (the Berlin patient)
  - developed leukemia after being on ART for 11 years
  - received two bone marrow transplants (from donor whose T cells did not have HIV-dependent co-receptors)
  - has not had detectable levels of HIV since

- Mississippi baby
  - born in 2010: mother diagnosed with HIV at time of delivery
  - baby started on ART at 30 hours of age, continued until 18mo, stopped for unknown reasons
  - at about 23mo (2012), no detectable virus, made headlines, 'functional cure' **<20 copies/mL**
  - at about 4 years (2014), virus detected

10,000-16,750 copies/mL

- ten minute break

HIV at the cellular level



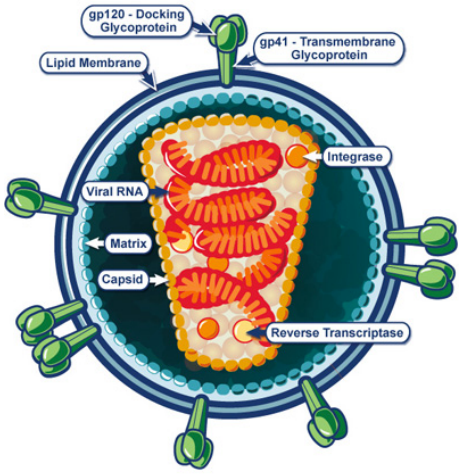
HIV (green) emerging from infected T cell

retrovirus

RNA virus

lentivirus

'slow' virus



HIV life cycle

- https://www.youtube.com/watch?v=odRyv7V8LAE

Group projects

- Pre-proposal due at the beginning of class Oct 11.
- You must have met with me in person before this date to discuss your project.
- Turn in written description of proposed work:
  - background
  - aims
  - potential challenges (if any)