Plagues and People & The Economist
Exploring AIDS Origins & Predicting Viral Epidemics

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Plagues and People Sans AIDS information

• Book © 1976

• AIDS first identified & named 1981-1982
  – Forced people to examine this text for insight into past epidemics

• Preface © 1998

• Preface included because information about a new plague emerged - AIDS
Man Aids AIDS

• 1976 scientists & doctors believed science lessened effects of viruses & germs
  – Advances in medicine, antibiotics, public health measures
  – **Smallpox Eradication**
• Mcneill argues man’s interventions accelerated evolution of pathogens
  – Antibiotic resistance
  – Selection for more virulent strains
Rejection of purported AIDS Origin

• AIDS discovered in 1980 as a zoonosis recently transmitted from African monkeys to humans
  – Discovered HIV 2 was similar to virus in African monkeys
• HIV 1 substantially different, seemed unlikely that recent jump to humans took place
HIV as long standing infection

• 1989 Grmek (historian of medicine)
  – environmental and cultural factors enable certain diseases to have a stable presence in a society
  – a new environmental or cultural factor can establish dominance of a disease, allowing it to replace another.
• Grmek proposed HIV was long standing, widespread human infection.
  – Not recognized b/c of infrequent and diverse symptoms
    • 1868 first observed AIDS symptoms with Kaposi’s skin cancer in Vienna
    • 1930 doctors saved samples of strange infections, some revealed evidence of HIV
  – Divergent HIV-1 strains in different regions recombined to form global form, as most viable strains outcompetes less efficient strains
Human Behavior & AIDS

Emergence 1970s

- Increased spread due to changing human behaviors favoring viral transmission
  - Injectable drugs, cheap syringes
  - Gay liberation
    - 1978  4.8% San Fran gay population HIV positive
    - 1994  73.1% San Fran population HIV positive
- 1998 US increased awareness of transmission → future behavior changes → disease contained
  - Will still exist in poor & reckless youth
- 1998 Sub-saharan Africa, among general population → uncertain of disease containment
  - Emergence associated w/ migration from countryside to urban areas
  - Demographic not affected by AIDS
    - Slower population growth rate but it is still rather high,
  - In 1998 unsure of the affects of HIV in Africa due to it’s long incubation period
Restoration of Balance

- Virus changes due to chemical attacks and recombination will result in dominant strain capable of outcompeting others
- Air travel allows for accelerated disease homogenization as it spreads successful infectious strains worldwide
- Race- Science & technology alter natural balance of pathogens w. drugs, etc.
- Pathogens respond in order to maintain balance, becoming increasingly virulent
- Epidemics will become endemic and less lethal infections will recombine, evolve, and arise as new challenges facing humans
Economist – Virus Forecast

- AIDS kills > 2 million/yr
- Virologist Nathan Wolfe advocates for program that will examine unrecognized diseases in Africa
  - If such program existed in 1970, AIDS wouldn’t have had such devastating impact
  - Utilize foresight to test effective drugs/interventions in advance
Wolfe’s GVFI

- Global Viral Forecasting Initiative (GVFI)
  - Pilot project, 6 sites in Africa & Asia
  - Global network capable of forecasting epidemics
  - Project began 10 yrs ago, collected viruses in Cameroon
    - Most human viruses with known origins come from animals
  - Utilized Cameroonian hunters to take blood samples from their prey
  - Screen blood for unknown viral genes indicating new species
  - Will monitor humans in order to match illnesses w/ unknown causes with viral database
Why Monitor?

- Continual low level interchange of viruses btw species
  - True for humans esp. hunters & farmers who have constant contact w/ animals
- Wolfe hopes to monitor rare forms of viruses “viral chatter” before virus is capable of human to human transmission
  - Focused on retroviruses
  - “Foamy viruses” jump from wild animals to humans
    - Already found 3 foamy viruses that jumped from wild monkeys to Cameroonian hunters
      - Good news – cannot spread between people
      - Bad news – SIV began as foamy virus and now we have HIV
Why Monitor? (cont)

• 2 new members of HTLV group have moved from monkeys to humans
  – HTLV-1 (human T-cell lymphotropic virus type 1)
  – found 10 yrs ago & has spread worldwide
  – Not as common as HIV
  – 5-10% of infected have symptoms (one of which is leukemia)

• Some viruses have recombined in Cameroonian hunters
  – Could facilitate human to human transmission
  – Remain cognizant HIV -1 was a product of recombination
Project Expansion Ideas w/ increased funds

• Expand scope
  – Examine animal markets, ie. China’s wet markets the origin of SARS
    • Will test animals, customers, shop owners for viruses

• Recognizes emerging disease hot spots are located in tropics
  – Tropics remain primary threat and area of focus
Goals of GVFI

• Creation of a database of potential viral threats
• Find commonalities in viruses in order to uncover characteristics linked to the virus becoming pandemic
  – Would enable a rough prediction of outbreaks and an increased emphasis on preventative measures