

Bioengineering and World Health

Lecture Eleven



Summary of Lecture 10

- Difficulties associated with HIV vaccine:
 - Many forms of the virus
 - Virus mutates rapidly
 - Virus attacks the immune system
 - Need to stimulate cell & Ab mediated immunity
- HIV vaccines in trials:
 - Animal trials → Live, attenuated viral vaccines
 - Human trials → Subunit vaccines, only Ab response
 - Human Trials → Carrier vaccines, good Ab response, some CTL response
 - Early Human Trials → DNA vaccines

Ethics of Clinical Research

- Humans have not always treated each other humanely in the name of science
- Ethics of Clinical Research
 - Famous Case Studies
 - Codes governing ethical conduct of research:
 - Nuremberg Code
 - Belmont Report
 - Case Studies Revisited
 - Functions of the IRB
- Applications to current controversies

Case I: Tuskegee Syphilis Study

- Goal:
 - Examine natural history of untreated syphilis
- Subjects:
 - 400 black men with syphilis
 - 200 normal controls



Case I: Tuskegee Syphilis Study

- Experiment:
 - 1932:
 - Standard Rx: injection of compounds containing heavy metals
 - Treatment reduced mortality but heavy metals thought to cause syphilis complications
 - Treatment withheld from infected men
 - 1942:
 - Death rate 2X as high in treatment group
 - 1940s:
 - Penicillin available
 - Men not informed of this
- Study continued until 1972 when first publicized

Case I: Tuskegee Syphilis Study

- Consent Process:
 - No informed consent
 - Men misinformed that some study procedures (spinal taps) were free 'extra treatment'

Case II: Willowbrook Studies

- Goal:
 - Understand natural history of infectious hepatitis
- Subjects:
 - Children at Willowbrook State School
 - An institution for 'mentally defective persons'
- Experiment:
 - Carried out from 1963-1966
 - Subjects deliberately infected with hepatitis
 - Fed extracts of stool from infected persons
 - Injected with purified virus
 - Vast majority of children admitted acquired hepatitis

Case II: Willowbrook Studies

- Consent Process
 - Parents gave consent
 - Due to crowding, Willowbrook was at times closed to new patients
 - Hepatitis project had its own space
 - In some cases, only way to gain admission was to participate in the study

Case III: Jewish Chronic Disease Hospital Study

- Goal: Study rejection of cancer cells
 - Healthy patients reject cancer cell implants quickly
 - Cancer patients reject cancer cell implants much more slowly
 - Is this due to decreased immunity because of presence of cancer or is it manifestation of debility?
- Subjects:
 - Patients hospitalized with various chronic debilitating diseases
- Experiment:
 - Took place in 1963
 - Patients injected with live liver cancer cells

Case III: Jewish Chronic Disease Hospital Study

- Consent Process:
 - Negotiated orally, but not documented
 - Patients not told that cancer cells would be injected because this might scare them unnecessarily
 - Investigators justified this because they were reasonably certain the cancer cells would be rejected

Case IV: San Antonio Contraceptive Study

- Goal:
 - Which side effects of OCP are due to drug?
 - Which are by-products of every-day life?
- Subjects:
 - 76 Impoverished Mexican-American women with previous multiple pregnancies
 - Patients had come to a public clinic seeking contraceptive assistance.

Case IV: San Antonio Contraceptive Study

- Experiment:
 - Took place in the 1970s
 - Randomized, double-blind, placebo controlled trial
 - Cross-over design
 - All women were instructed to use vaginal cream as contraceptive during the study
 - 11 women became pregnant during study, 10 while using placebo
- Consent Process:
 - None of the women were told study involved placebo

Nuremberg Code: 1949

- Voluntary consent of the human subject is absolutely essential
- Experiment should yield fruitful results for good of society, obtainable in no other way
- Experiments should avoid all unnecessary mental and physical suffering
- No experiment should be performed if it is believed that death or disabling injury may occur

Belmont Report: 1979

- From Dept. of Health, Education & Welfare
- Statement of:
 - Basic ethical principles and guidelines to resolve ethical problems associated with conduct of research with human subjects
- Three basic ethical principles:
 - Respect for persons
 - Beneficence
 - Justice

Belmont Report: What is research?

- Clinical Practice:
 - Interventions designed solely to enhance well-being of an individual patient that have a reasonable expectation of success
- Research:
 - An activity to test a hypothesis
 - Permit conclusions to be drawn
 - Contribute to generalizable knowledge
 - Usually described in formal protocol that sets forth an objective and procedures to reach that objective

Respect for Persons

- All individuals should be treated as autonomous agents
- Demands that subjects enter into research:
 - Voluntarily
 - With enough information to make a decision
- Persons with diminished autonomy are entitled to special protection
 - Prisoners
 - Children

Beneficence

- Make efforts to secure patients' well-being
 - Do No Harm
 - Maximize possible benefits
 - Minimize possible harms
- One should not injure one person regardless of benefits that may come to others

Justice

- Who should receive benefits of research and who should bear its burdens?
- Some ways to distribute burdens & benefits:
 - To each person an equal share
 - To each person according to individual need
 - To each person according to individual effort
- 19th Century:
 - Poor ward patients were research subjects
 - Wealthy private patients received benefits of research
- Selection of research subjects must be scrutinized:
 - Are some classes are being selected because of easy availability, compromised position or manipulability.

Application of Belmont Report

- Informed Consent
- Assessment of Risks and Benefits
- Selection of Subjects

Informed Consent

- Information:
 - Research procedure, purpose of study, risks and anticipated benefits, alternative procedures, statement offering subject opportunity to withdraw at any time
- Comprehension:
 - Must present information in a way subject can understand
 - Must not be disorganized, too rapid, above subject's educational level
- Voluntariness:
 - Consent must be given voluntarily
 - Persons in positions of authority cannot urge course of action

Assessment of Risks & Benefits

- Research must be justified based on favorable risk/benefit assessment
 - Risk:
 - Possibility that harm may occur
 - Brutal or inhumane treatment of subjects is never morally justified
 - Risks should be reduced to those necessary to achieve research objective
 - Benefit:
 - Positive value related to health or welfare

Selection of Subjects

- Individual Justice:
 - Researchers must select subjects fairly
 - Must not select only potentially beneficial research to some subjects in their favor
 - Must not select only "undesirable" persons for risky research.
- Social Justice:
 - Distinctions be drawn between classes that ought and ought not to participate in research based on ability of that class to bear burdens
 - Adults before children

Case I: Tuskegee Syphilis Study

- Respect for persons
- Beneficence
- Justice
- 1997:
 - President Clinton formally apologizes to subjects of the study
 - <http://www.npr.org/programs/morning/features/2002/jul/tuskegee/>

Case II: Willowbrook Studies

- Respect for persons
- Beneficence
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Case III: Jewish Chronic Disease Hospital Study

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Case IV: San Antonio Contraceptive Study

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Role of IRB

- Work with investigators to be sure that the rights of subjects are protected
- Educate research community and public about ethical conduct of research
- Resource centers for information about Federal guidelines
- Not a police force

Real Controversies

- Egg Donation
 - <http://www.eggdonor.com>
 - <http://www.npr.org/templates/story/story.php?storyId=5035034>
- Life Threatening Situations
 - <http://www.npr.org/templates/story/story.php?storyId=1045001>
- Nevirapine
 - <http://www.npr.org/templates/story/story.php?storyId=4524733>
- Terminally Ill Patients