**DNA Vaccines And HIV / AIDS**

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**Problem Statement**

HIV / AIDS affects over 33 million people worldwide, with the greatest number of victims located in developing countries. Conventional drugs only ease symptoms and do not cure the disease. A DNA vaccination that knocks down the CCR-5 gene could offer a solution to the disease.

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**Over 33 Million People Live with HIV/AIDS Worldwide**

HIV is a retrovirus that infects T-cells which are central in adaptive immunity. It enters a cell by attaching to the CD4 receptor and the CXCR4 or CCR5 co-receptor. The HIV infection causes the body to lose cell immunity. The current treatment for HIV/AIDS, a triple cocktail which combines protease and reverse transcriptase inhibitors, costs about $10,000-$15,000 a year. However, the protease inhibitors increase the risk of cardiovascular disease and sudden heart failure in middle-aged HIV/AIDS patients.

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**Creating the Vaccine: Funding**

While the cost of delivering a DNA vaccine to a patient is cheap, the initial discovery cost of the vaccine is in the millions. In 2000, contemporary pharmaceutical companies estimated the cost of creating a new drug was $403 million. Two potential HIV / AIDS vaccine trials were scheduled, estimated to cost $140 million and $63 million dollars. In order to create a vaccine, additional funding would be needed from outside sources:

- The Bill and Melinda Gates Foundation
- Private foundations
- Universities and research centers
- National Institute for Health (NIH):
  - Estimated budget in 2008 is $2,905,219,000 with $596,195,000 allocated for AIDS/HIV research.

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**DNA Vaccines**

A DNA vaccine works by directly injecting DNA into the body, either the muscle or skin. Carrying the genetic information required, it begins producing antigens inside a host cell which will lead to a cell-mediated immune response. The plasmid DNA vaccine carries the genetic code for a piece of pathogen antigen and transcribes it to peptides. The cytotoxic CD 8+ lymphocytes bind to the peptides and induce the cell-mediated immune response.

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**Trial Areas: Lesotho and the United States**

United States • Developed nation • Unstable economic and politics minimized • Focus can be made on effectiveness of vaccine

Lesotho • 270,000 people infected with AIDS (23.2% of population)

**Assessment:**

- Determine if patients completed treatment and returned for follow ups
- Data Reason Name
- Housing Location
- Environmental factors that contribute to spread of disease
- Area in need of alternative distribution method
- Check HIV virus level
- Blood Test Results
- Dietary Habits
- Nutrition Level
- Clinical Visitation Dates
- Followed inoculation regiments (grace periods between treatments)
- Age
- Determine most susceptible population to target
- Gender
- Most treatment responsive age
- Check for gender specific side effects
- Economic Status (Income)
- Determine most susceptible population to target
- Determine price range affordable
- Family History (if Available)
- Determine potential genetic diseases
- Patient Health History
- Other diseases that could be attributed to death if occurs
- Allergies
- Cease distribution to patient to avoid hyperimmune response
- Prescriptions
- Determine if certain medications heighten vaccination response
- Determine if certain medications increase health risks

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**References:**