Chapter Sixteen

Science, Technology, and Global Health

The Need for New Products

Characteristics of new technologies must reflect the following:

- Most important target groups are poor people
- Quality of care and injection safety is often low
- Many low- and middle-income countries have poorly organized health systems

The Need for New Products

- Diagnostics : specific, sensitive, inexpensive, easy to use, and noninvasive
- Drugs : safe, effective, inexpensive, and able to be used for many years without becoming susceptible to resistance
- Vaccines : safe, effective, inexpensive, include several antigens, and require only one dose to confer lifelong immunity

Ideally these products would also be easy to transport, heat stable, and not require refrigeration

The Need for New Products

Gaps in current technology:

- Effectiveness of TB vaccine is “limited”
- Drugs for TB, malaria and HIV are susceptible to resistance
- There are no vaccines for HIV, malaria, or any of the NTDs
- HIV drugs can control, but not cure the infection

The Potential of Science and Technology

- Sequencing the genome of pathogens could help improve the development of vaccines and drugs and reduce resistance
- Improvements in technology will facilitate the development of new drugs
- New technologies can assist in the design and manufacture of new vaccines
- Genetic modification of plants could lead to more nutritious and disease resistant crops (but is not always welcome)

Constraints to Applying Science and Technology to Global Health Problems

- For-profit sector does not believe it could make a sufficient profit from products for low- and middle-income countries
- Costs of research and development on new products are very high
- Number of firms engaged in vaccine production is small

Enhancing New Product Development

Means of reducing the risk of developing new products enough that the for-profit sector might be interested:

- Push Mechanisms : reduce risk and cost of investments
- Pull Mechanisms : assure a future return in the event that a product is produced

Figure 16.1: Some Ideal Characteristics of Diagnostics, Vaccines, Drugs and Delivery Devices

Diagnostics: Affordable; specific and sensitive; provide quick and easy-to-interpret results; easy to store and transport; heat stable

Vaccines: Affordable; safe and effective; require few doses; confers lifelong immunity; easy to transport and store; heat stable

Drugs: Affordable; safe, and effective; not easy for pathogens to become resistant to; require small doses over a limited period; easy to store and transport; heat stable

Delivery devices: Affordable, safe, and effective; not invasive; easy to transport and store; heat stable

Product Development Partnerships

- Public-private partnerships created to overcome limitations of the private sector
- Many of these public-private partnerships are product development partnerships (PDPs)
- Examples of PDPs include Aeras, Malaria Vaccine Initiative, International Partnership for Microbicides and the International AIDS Vaccine Initiative