A Vaccine for HIV

by JEFFREY LI AND JONATHAN NG

McMaster University professor of pathology and molecular medicine, Dr. Ken Rosenthal, is leading breakthrough research into the development of a vaccine against HIV (Human Immunodeficiency Virus), the world-wide killer virus responsible for AIDS (Acquired Immunodeficiency Syndrome). He has successfully developed a mucosal vaccine for an HIV equivalent in mice that may be applicable to humans in the coming years. As the disease responsible for the death of 3 million last year and about 21.8 million since the beginning of the epidemic (AVERT, 2002), AIDS has established itself as a formidable opponent. Through these findings, Rosenthal and his colleagues are providing a glimmer of hope for ending the epidemic. Join us as we delve into the immunology behind the potential AIDS vaccine of the future.

HIV Basics

One of the most common modes of HIV transmission occurs through sexual contact. Infected semen or vaginal fluid containing the virus may enter the system of an uninfected person through the mucous membrane, the protective tissue layer lining the mouth, vagina, and rectum (The Body: New Mexico AIDS InfoNet Fact Sheet, 2002). After gaining access to the bloodstream and lymphatic system, HIV binds to cells that are recognized by its outer glycoprotein complex, gp120. The deadliness of the virus is a result of gp120's high affinity for the cell-surface protein, CD4, found on immune system cells (lymphocytes) that help defend the body against pathogens and other foreign agents. Of the several targets, CD4 T cells are one of prime importance. These cells are responsible for helping B cells of the immune system to produce antibodies and activating macrophages that defend the body against intracellular bacteria and other pathogens (Janeway, 1999).

How the Vaccine Works

Under normal circumstances, the immune system responds to HIV infection by increasing production of HIV antibodies and cytotoxic T lymphocytes that target and destroy infected cells. Despite this response, however, the defense is usually unable to eliminate HIV. The aim of Dr. Rosenthal’s vaccine is to boost the immune system so that it is capable of a powerful initial response to infection that will control the virus at manageable levels. Following the same principles of vaccines of the past, the vaccine introduces an antigen into the body that mimics natural disease exposure, in this particular case it is a whole killed envelope-deprived virus. Following antigen exposure, the body responds by producing antibodies that fight against the infection and stores this defensive ability in immunological memory. This allows the immune system to respond rapidly and effectively to the real disease when it strikes (Janeway, 1999).

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Evaluating the Effectiveness of Complementary and Alternative Medicine

BY SEAN PARK

The dramatic increase in the use of complementary and alternative medicine (CAM) in the Western health care setting has caused much debate. Critics of CAM therapies view research in this field to be scientifically unverified, and as such, not effective or safe to administer to patients. Proponents of CAM, however, argue that the evidence-based medicine model that conventional medicine uses focuses too heavily on the randomized controlled trial (RCT) as a source of evidence.

In recent years, much debate and frustration has arisen over the basis, development and delivery of health care, particularly in the Western hemisphere. Key to this debate is the relationship between conventional and unconventional medicine. Unconventional medicine, commonly referred to in many journals as Complementary and Alternative Medicine (CAM), is a very general term given to a wide array of therapies. Some have defined these therapies as “medical practices that are not in conformity with the standards of the medical community” or as interventions that are not generally available in hospitals or not usually taught at medical schools (Eisenberg et al., 1993).

The authors that formulated this definition for a study on unconventional medicine in the US analyzed the prevalence of some of the following therapies in the US population (Eisenberg et al., 1993):

**UNCONVENTIONAL THERAPIES**

- Relaxation techniques
- Prayer
- Massage
- Imagery
- Spiritual healing
- Herbal Medicine
- Megavitamin therapy
- Self-help groups
- Energy healing
- Biofeedback
- Hypnosis
- Homeopathy
- Acupuncture

While a number of these therapies have been in existence for much longer than conventional medicine, their increased use in developed nations has sparked great debate. The issue of CAM use is particularly prominent in the US as conservative estimates of 1997 out-of-pocket spending on CAM therapies reached $27 billion with annual visits to CAM therapists exceeding visits to US primary care physicians (Beyerstein, 2001). Assailants of CAM are now arguing that many, and in some cases all, CAM therapies are scientifically unfounded and carry false promises about safety and efficacy (Beyerstein, 2001). What is the basis for this argument and how will it affect the future of CAM?

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