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The HIV Positive Crew Member

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by

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Definition

The acronym, HIV, stands for human immunodeficiency virus (The U.S. strain is referred to as HIV-1, the West African strain, HIV-2). The presence of HIV in an individual is determined through HIV antigen antibody blood tests. The person whose blood is positive for HIV may have no symptoms until the virus cripples the immune system sufficiently to allow various microorganisms to begin assaulting and modifying the functions of different body systems.

History

HIV remained unknown and therefore, no tests for it existed, until the disease it produces, the acquired immunodeficiency syndrome (AIDS) was recognized in the early 1980s (7). The transmission of the virus from person to person may be by transfusions with HIV contaminated blood, injections of blood products from HIV injected blood, unprotected sexual activity with HIV infected persons, or through the sharing of unsterilized HIV contaminated needles (2.4). Other means of transmission have been reported, including unsterile medical

procedures. Currently, no documentation of HIV virus spread by daily social or casual work activities have been accomplished (1).

Clinical Course

The HIV infected individual may proceed for five years or more with no obvious symptoms that the virus is present (6). During this period, studies have shown that the virus has been slowly attacking and destroying certain white blood cells, specifically the "T lymphocytes" and "macrophages" (the T is for the thymus gland, the designated origin of T lymphocytes). Both of these are types of cells that neutralize a wide variety of infective agents. Among the T lymphocytes is a subset referred to as the "helper T cells". These helper T cells assist virus aspects within the highly complex total body immune system to become active in fighting invading infectious agents (including those agents often present normally in the body, but continually held in check by the immune system).

The normal count of helper T lymphocytes is in the range of 1000 cells per cubic millimeter of blood. The HIV begins to assault and remove helper T lymphocytes shortly

after viral introduction into the body, and within about one year the helper T lymphocyte level may be down to 800 cells per cubic millimeter. Within five to seven years, the number may be down to 400, and certain bacterial skin infections may begin appearing due to the body's weakened immune response. The chicken-pox viral infection, shingles, may occur as may a herpes type of shingles (or neuroradiculitis) and by the seventh year the fungus mouth infection thrush may be present, as may an advanced form of athlete's foot. These conditions are referred to as the aids related complex, or ARC.

Subsequently, about the eighth year, tuberculosis may be found, followed by various unusual types of pneumonia. The brain may become infected with toxoplasmosis, a type of parasite. Other types of bacterial, fungal, viral and parasitical infections may occur. Mental symptoms known as "AIDS dementia complex" may appear. Repeated headaches may also occur as the brain and its tissues become involved. The breakout of tuberculosis or these other infections define the stage of the infection as AIDS. Death often occurs within one to two years of onset of the AIDS condition, and no case of arrest of the condition has been documented, even with current treatment (although the rapidity of deterioration may be slowed with treatment).

Prevention

In regard to an individual crew member's actions, prevention is best practiced by avoiding indiscriminate sexual relationships or any sexual relationship with an infected person. If indiscriminate sexual relationships are not avoided, or should one's "significant other" be infected, the use of condoms will minimize (but not necessarily prevent), infection of the non-infected partner.

Treatment

Various specific treatments exist for the HIV diagnosed state. Among these are the drugs zidovudine (AZT), pentamidine, aerosolized pentamidine, alpha interferon, SMZ-TMP, ganciclovir, and HOE-602 (available in Germany in the near future). These drugs have potential adverse side effects and none are curative. Individually, in sequence or in some combination, the drugs may significantly slow the progressive march of the immunologic injuries produced by HIV.

Certification

The problem for the certification authorities concerns what to do with an asymptomatic, HIV positive crew member. The question arises about six or so times per

year in the United States. Since HIV screening is not routinely accomplished, however, a certain number of individuals in this category will remain uncounted and unknown (although in some cases the individual may be aware of an infection through privately conducted tests).

The topic of HIV positive results in a symptomatic civilian crew member (usually self-reported by the crew member, but sometimes found as an incidental result in screening tests) has arisen so recently that formalized, generally agreed upon, approaches, are still under discussion, development and debate by the various regulatory authorities and other aviation organizations. A total prohibition of flight duties in regard to asymptomatic civilian cockpit crew members who are HIV positive and not taking medication has not been instituted by the U.S. regulatory authorities (8). If medication is being taken, or if an ARC or AIDS diagnosis is made, the affected civilian is currently denied medical certification. Note that the civil regulatory authorities have removed air traffic controllers from their control work stations, if it is learned that an individual is positive for HIV, irrespective of whether or not symptoms exist, and without consideration of whether or not antiviral treatment is being taken. This decision is currently receiving further attention through various appellat procedures.

In the United States there are reportedly a number of non-cockpit crew members who continue their work although positive for HIV, but who remain without signs or symptoms for active disease.

In the medical certification area, a primary concern relates to the possibility of higher central nervous system invasion by the virus. Depending upon the specific site of invasion, various higher nervous system functions can become increasingly impaired. Studies are under way wherein certain relatively simple and rapidly administered cognitive and psychomotor tests can be administered to persons who are HIV positive. These tests can be given between the times of the required periodic proficiency and simulator tests, the latter serving as cognitive and psychomotor tests in their own right. Test performance degradation can surface as an early sign of impairment by the invasion and infection of the central nervous system function by the virus or other organisms. If test scores do not fall below the criteria set for non-impaired, healthy crew members, the individual could conceivably be allowed to continue flight duties for a given period of time prior to subsequent tests of function.

Specific Tests of Cognitive Functions In HIV Positive Persons

A battery of tests of cognitive functions was given to (a) 769 HIV-1 seronegative persons (the controls), (b) 727

asymptomatic HIV-1 seropositive persons and (c) 84 symptomatic HIV-1 seropositive persons (5). This was a cross sectional "snap shot" study at one point in time. The tests were the trailmaking test, the digit span subtest, the controlled oral word association test, the grooved pegboard test, the symbol digit modalities test and the Rey auditory learning test. All of the subjects were homosexual/bisexual men enrolled in the Multicenter AIDS Cohort Study (MACS). The measures included tests of attention, memory, and psychomotor speed. The authors found significant impairment in the performance of symptomatic HIV-1 seropositive men in contrast to that of HIV-1 seronegative men. Asymptomatic seropositive men did not differ significantly from seronegative men on any of the neuropsychological tests. The authors conclude that neuropsychological abnormalities in asymptomatic HIV-1 infected gay men are low and no different than those in seronegative controls.

A longitudinal cognitive function study of 238 asymptomatic healthy HIV-1 infected gay men was accomplished utilizing the MAC (9). The control group was 170 uninfected homosexual/bisexual men. Semiannual tests that have been shown to be sensitive to HIV encephalopathy were given over a 1.5 year period (digit span, symbol digit modalities test, Rey auditory verbal learning test, controlled oral word association test, and the grooved pegboard test). Each subject had four visits. No evidence of decline in test performance occurred over this time in the HIV-1 infected group compared with seronegative controls. The investigators concluded that a gradual cognitive decline does not occur during the early asymptomatic states of HIV infection.

The Future

For the long term, prevention is the solution to the HIV problem and the inevitable ARC and AIDS follow-on. In the short-term, civil cockpit crew members with HIV antigen that is being treated and those with symptoms of ARC or AIDS, will lose medical certification. The U.S. military services are disqualifying all crew members with HIV, ARC or AIDS (3).

A continuing question for attention is the HIV positive asymptomatic individual receiving treatment. A judgement that considers the treating drug effects and the health status in general, is required on an individual basis by the responsible authorities. ♦

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Aviation Environment." *Aviation, Space and Environmental Medicine*. 59 (7). pp 683-4

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About the Author

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Fatigue Knows No Superman

The Mk I Human Being is the glue that holds the aviation system together, and fatigue is a foe that can take it apart.

by

John H. Enders

President, FSF

Achilles was finally slain in the tenth year of the Trojan Wars by Paris, whose arrow was guided by Apollo with mortal effect. Perhaps Achilles was suffering from battle fatigue and became careless.

We each are an Achilles, to a great extent. This may be the purpose of allegorical tales — to allow us a little distance to look at ourselves critically in the interest of self-improvement. We can and do accomplish great and wonderful things, but we are, each of us, vulnerable somewhere and sometime.

A growing body of human factors research relating to fatigue and its effects is a welcome support to the operational record and anecdotal experience. We now know much more about how the human body reacts to fatigue, and valuable research done in Europe, the United States, the Far East and Australasia have exposed many myths of machoism that have plagued safety in aviation since its beginnings.

There are no supermen where fatigue is concerned. A substantial amount of research now reveals that cognitive and motor skill mistakes occur when a fatigued person attempts to perform complex tasks or make decisions. In some respects, a pilot may be his or her own worst enemy in failing to perceive the onset of hazard-enabling fatigue.

More is being discovered about transmeridianal flight across multiple time zones and its effects on human per-

formance. At the same time, we are learning about some techniques which may be helpful in reducing these effects. Professionalism and self-discipline are a part of the picture. Off-duty activities before flight duty should be conducted with regard to the type of mission — night flight, transmeridianal, or an intense series of local flights with many landings in bad weather, for example. Adequate crew rest is important. The advent of two-crew operations in the larger air transport aircraft heightens the importance of this situational awareness which should be part of every pilot's behavior.

Corporate pilots and emergency medical service (EMS) crews have a special problem, not unlike that of military aviators on standing alerts. Crews standing 12-hour shifts are in questionable states of alertness should an alarm suddenly be sounded in the eleventh hour.

Economically-minded managements must buy into safety programs and show strong commitment to safe operations. The people who inspect and maintain aircraft must likewise operate in top physical and mental states of alertness. They are, after all, the people who are responsible for presenting the pilot with an airworthy aircraft.

It is important that we take care of the Mk I Human Being, because he or she is the glue that holds the rest of the marvellous aviation system together. We must never lose sight of the Duty of Care. ♦

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