

DIVING MEDICINE ONLINE



Comprehensive updated information about diving and undersea medicine for the non-medical diver, the non-diving medical professional and an excellent reference source for the diving medical specialist.



HIV/AIDS and the Diver

Benefits of Diving

Studies have shown that sports participation benefit the HIV/AIDS person both mentally and physically. (See References below). Benefits actually include a delay in the progression of HIV morbidity among participants in the sports group. There can be improvement in cardiac capacity among participants; and a positive correlation between physical training and psychological parameters. Psychological tests show that sports activities cause a reduction in depression, fatigue, and anger, an increase in vigor and an obvious improvement in the quality of life of HIV-infected persons and AIDS patients.

Factors Adverse to Diving

- Physical Effects of AIDS

The AIDS-related complex (ARC) is a constellation of chronic symptoms and signs manifested by HIV-infected persons who have not had the opportunistic infections or tumors that define AIDS. These symptoms, signs, and laboratory abnormalities include generalized lymphadenopathy, weight loss, intermittent fever, malaise, fatigue, chronic diarrhea, leukopenia, anemia, immune-mediated thrombocytopenia, oral hairy leukoplakia, and oral thrush (candidiasis). A severe manifestation of ARC is the wasting syndrome (called slim disease in Africa), which is characterized by progressive weight loss $\geq 15\%$ body wt.

Neurologic symptoms often are the first manifestation of AIDS and commonly occur during its course. Neurologic disorders include acute and chronic aseptic meningitis, peripheral neuropathies with weakness and paresthesias, and encephalopathy with seizures, with focal motor, sensory, or gait deficits, and with progressive dementia. Infections, neoplasms, vascular complications, aseptic meningitis, and neuropathy are among the more prominent sequelae.

A serious neurologic complication is a subacute encephalitis caused by either HIV or cytomegalovirus. The gray matter exhibits nodular collections of microglial cells without other inflammatory infiltrates. Intranuclear and intracytoplasmic inclusions have been observed within the nodules. Small, poorly defined foci of perivenular demyelination are found in white matter. Memory loss, confusion, psychomotor retardation, myoclonus, seizures, and dementia progressing to coma are typical findings spanning weeks to months prior to death. Cortical atrophy on CT, CSF pleocytosis and elevated protein level, and a diffusely abnormal EEG are often, albeit inconsistently, found but are nonspecific.

Vascular complications: Nonbacterial endocarditis, usually with neoplasm or severe infection, can produce transient ischemic attacks and focal ischemic stroke. Cerebral hemorrhage can occur in thrombocytopenic states (eg, lymphoma, idiopathic thrombocytopenic purpura).

Aseptic meningitis: Rapid onset of headache, fever, stiff neck, and photophobia

may be associated with a CSF mononuclear pleocytosis, elevated proteins, slightly depressed glucose, and consistently negative cytologic studies and cultures. The episodes are transient but can be recurrent.

Peripheral neuropathy: Painful dysesthesias, moderate distal sensory loss (stocking-and-glove), depressed ankle reflexes, distal weakness, and atrophy can occur in varying degrees and can coincide with rapid weight loss from poor nutrition; no metabolic cause has been identified. A Guillain-Barré type of neuropathy has been reported. Myopathy similar to polymyositis may complicate AIDS or zidovudine therapy.

A few patients present with renal insufficiency or nephrotic syndrome, with symptomatic anemia, or with immune-mediated thrombocytopenia. HIV-associated thrombocytopenia occurs throughout the full spectrum of HIV infections, usually responds to the same interventions (corticosteroids, splenectomy, IV immune globulin) as idiopathic thrombocytopenic purpura, and seldom leads to bleeding.

- Effects and Side-effects of AIDS Drug Regimens

Every drug has certain effects and **possible side-effects** that vary significantly in each individual.

Multiple drug combinations are being used to suppress the AIDS virus, these medications also have **interactions** that might affect the diver with HIV/AIDS.

- Effects of AIDS-induced Opportunistic Infections and Tumor

AIDS is defined by the development of opportunistic infections and/or certain secondary cancers known to be associated with HIV infection, such as *Kaposi's sarcoma* and *non-Hodgkin's lymphoma*, especially *primary lymphoma of the brain* (see Table). Many patients are first seen with a life-threatening opportunistic infection or malignancy without the preceding symptoms of ARC.

Patterns of specific opportunists vary both geographically and between risk groups. In the USA and Europe, > 90% of AIDS patients with Kaposi's syndrome (KS) were homosexual or bisexual men, possibly because of an unidentified, sexually transmissible cofactor. Recently the incidence of KS has been diminishing. Most AIDS cases in the USA and Europe (about 60%) present with *Pneumocystis carinii pneumonia*, which is reported less frequently in Africa. *Toxoplasmosis* and *TB* are more common in tropical areas where the prevalence of latent infections with *Toxoplasma gondii* and *Mycobacterium tuberculosis* in the general population is high. Even in developed countries where background levels of TB are low, HIV infections have caused increased rates and atypical presentations of TB.

CNS infections: The most common treatable neurologic illness is toxoplasmic encephalitis. Headache, lethargy, confusion, seizures, and focal signs evolve over days to weeks. CT findings include ring-enhancing lesions with a predilection for basal ganglia. Serologic tests for IgG antitoxoplasmal antibodies reflecting previous infection are almost always positive but do not always provide conclusive proof that the lesion is caused by *Toxoplasma* organisms. The CSF shows a mild to moderate pleocytosis and elevated protein content. Brain biopsy can be diagnostic. Treatment is with pyrimethamine and sulfadiazine (or clindamycin if the patient is allergic to sulfa). Prognosis is at best guarded, since recurrence is possible and other complications of AIDS are likely. Cryptococcal and tuberculous meningitides (*Mycobacterium avium-intracellulare*) also occur in AIDS. Progressive multifocal leukoencephalopathy and infections with *Candida*, *Aspergillus*, and gram-negative organisms occur less frequently.

Neoplasms: Primary CNS lymphoma is a frequent intracranial mass lesion in AIDS. It may be clinically silent or may produce focal signs consistent with its anatomic location. CT usually shows a contrast-enhancing mass that cannot always be distinguished from abscess or other lesions; in these cases, MRI may be more discriminating.

Systemic lymphomas in AIDS may involve the CNS. Kaposi's sarcoma rarely involves the CNS.

Adequate primary prophylaxis for fungal, mycobacterial, and toxoplasmal infections is desirable but has not yet been developed. Secondary prophylaxis is indicated to prevent relapses of *P. carinii* pneumonia, cryptococcal infections, toxoplasmic encephalitis, herpes simplex, and thrush.

FUNGAL PNEUMONIA PNEUMONIA CAUSED BY PNEUMOCYSTIS CARINII Etiology

Pneumocystis carinii, recently suggested to be a fungus rather than a parasite, is usually dormant in the host lung, causes disease when defenses are compromised, and may be transmitted from patient to patient. Nearly all patients have immunologic deficiencies, the most common being defects in cell-mediated immunity as with hematologic malignancies, lymphoproliferative diseases, cancer chemotherapy, and AIDS. Among patients with HIV infection, about 60% have *P. carinii* pneumonia as the initial AIDS-defining diagnosis, and > 80% of AIDS patients have this infection at some time during their course. These patients account for a large proportion of pneumonias in patients requiring hospitalization in areas where AIDS is epidemic.

Symptoms and Signs

Most patients have a history of fever, dyspnea, and a dry, nonproductive cough that may evolve in a subacute fashion over several weeks or acutely over several

days. The chest x-ray characteristically shows diffuse, bilateral, perihilar infiltrates, but 10 to 20% of patients have normal x-rays. Gallium scanning may be especially helpful in patients with typical symptoms and a negative chest x-ray. Arterial blood gases show hypoxemia, with a marked increase in the alveolar-arterial O₂ gradient, and pulmonary function shows altered diffusing capacity. Patients with HIV become vulnerable to *P. carinii* pneumonia when the CD4 helper cell count is < 200/ μ L.

Patients with CD4+ lymphocyte counts < 200/ μ L should be encouraged to begin primary prophylaxis for *P. carinii* pneumonia with trimethoprim/sulfamethoxazole, dapsone, or aerosolized pentamidine. The relative efficacy of these regimens is under study. Because the sulfonamides and sulfones appear to provoke adverse effects (eg, fever, neutropenia, skin rashes) in these patients more frequently than in persons with normal immunity, many of these patients must rely on aerosolized pentamidine.

Links

[Preventing and treating Opportunistic Infections in AIDS](#)

- Marine Environmental Hazards

There is little information available concerning the effects of immersion, pressure and cold water on a person with HIV/AIDS. Any assumptions would be interpolative at best. There have been anecdotal reports of benefits from hyperbaric oxygenation. However, there is considerable information available about specific [marine-associated infections](#) that would be particularly hazardous to an immunosuppressed individual.

Infections caused by a mixture of bacteria, some requiring O₂ and some not [aerobic and anaerobic] that cause necrotizing wounds can occur from injury, surgery or foreign bodies, and generally affect patients who have some underlying illness such as diabetes mellitus, poor circulation, or are immunosuppressed by medications or AIDS.

References

Title

Physical activity as a therapeutic measure for HIV-infected persons.

Author

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Source

Int Conf AIDS, 8(2):B224 (abstract no. PoB 3800) 1992 Jul 19-24

Abstract

OBJECTIVES: A participant-targeted therapeutic sports program is offered in the Cologne, Bonn. Aachen regions in Germany within the context of the medical model for HIV-infected persons, which is supported by the Ministry of Health. Goal of the program is to contribute towards improvement of HIV-infected persons' and AIDS-patients' mental condition and quality of life, as well as positively influence their latency in the long term. **METHODS:** The participants of the study are 42 HIV-Positives (14 asymptomatic patients, 6 patients at LAS stage, 10 ARC patients and 12 patients at AIDS stage). The sports group consists of 21 participants. A control group was anonymously paralleled to the sports group because of ethical reasons. The effects of the therapeutic sports program are objective on the basis of the following parameters: A. Immunological parameters (small blood picture, differential blood picture, lymphocytic subpopulation). B. Sports physiological parameters (in order to determine optimal training dosages, all sports group participants underwent bicycle ergometer tests at the beginning of the study. Blood pressure, ECG, pulse rate and lactate acid were taken as parameters. The bicycle ergometer is conducted every 6 months) C. Psychological parameters (standardized questionnaires) Training units comprise 90 minutes twice a week. Training contents are warming up, gymnastics, endurance training, games and a relaxation program. **RESULTS:** Interim results

of the sports study available to date in regard to the immunological parameters indicate a delay in the progression of HIV morbidity among participants in the sports group. In contrast to this, a definite deterioration in the measured parameters could be observed in the anonymously paralleled control group. The results of the bicycle ergometer tests showed an improvement in cardiac capacity among participants in the sports group after six months. A positive correlation between physical training and psychological parameters could be observed. The items depression, fatigue, vigor and anger of the standardized psychological test POMS show that sport is an obvious factor to improve the quality of life of HIV-infected persons and AIDS patients.

CONCLUSIONS: The final conclusion is that, aside from the primary target variables in the sports medical and immunological sectors, an open program for a target group in danger of isolation can bring about a change in feelings towards life through interacting psychosocial effects in which contact readiness, pleasure and frequency, along with conversations and exchange of experiences play a decisive role.

Title

The effects of a physical activity program on HIV-positive men and women.

Author

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Source

Int Conf AIDS, 8(3):126 (abstract no. PuB 7467) 1992 Jul 19-24

Abstract

ISSUE: Until now the effects of physical activity on people's immune-system seem to be largely unexplored. Only in the field of high performance sports this question has been recently studied by sports-scientists. Based on success of sport therapy in the treatment of multifarious clinical pictures the assumption is obvious that physical activity could be

important also in the treatment of HIV-infections in the meaning of prolonged stabilization of the immune-system. By the side of physiological effects a considerable influence on mental health is attributed to being engaged in sports. So for example regular physical activity decreases stress-evoked states of tension and leads to a more well-balanced state of mood. The positive psychoneuroimmunological influence of these effects on different clinical pictures (e.g. see cancer research) is empirically proved and is therefore also assumed for HIV-infections.

DESCRIPTION OF PROJECT: For a period of six month 33 HIV-infected men and women took part twice a week in a sport-program carried out by two sportspedagogues. The specific treatment-program is based on health-oriented forms of training and sport-games and took also into consideration requests and suggestions of the participants. Immunological data are collected at four different dates. Also psychological data are explored. The same data are collected simultaneously in a control-group of 15 HIV-positive men and woman being not involved in physical activity. **RESULTS:** The results show a increase in immune-parameters, coping-ability, wellbeing and a decrease in anxiety. In the same time immune-parameters in the control-group decrease.

CONCLUSIONS: The reasonable benefits of physical activity for HIV-infected people indicate that sport-treatment-programs should be integrated as a measure of secondary prevention of HIV-infections.

Title

Study finds extremely low risk of HIV infection in football.

Source

AIDS Policy Law, 10(8):12 1995 May 5

Abstract

According to researcher Dr. Lawrence S. Brown Jr., of the Addiction Research and Treatment Corp. in New York, the chance of a professional football player becoming infected with HIV on the field is less than 1 in 85 million. The study provides further evidence to those who say there is no medical or public health reason for routine testing of athletes for HIV, or denying HIV-infected athletes

from competing in sports. Researchers observed 11 National Football League (NFL) teams during 155 season games in 1992 and found 575 bleeding injuries. Using computer models based on environmental variables, researchers calculated the risk of HIV transmission to be infinitesimally small. The researchers also contend that the calculations used in their study overestimate the risk for HIV transmission, and that direct contact between the bleeding injuries of two players is almost impossible.

Consequently, the real risk of transmission may be considerably less than that calculated. The study suggests that athletes are more likely to become infected through unprotected sexual intercourse or injection drug use than by contact sports.

Title

HIV infection in athletes. What are the risks? Who can compete?

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Source

Postgrad Med, 92(7):73-5, 79-80 1992 Nov 15

Abstract

The activities of athletes and personnel who provide their medical care may place them at slightly greater risk for infection with human immunodeficiency virus (HIV) than their nonathletic peers. At this point, there is no reason to disallow participation of athletes who are HIV-infected. Thus, sports physicians need to assume that they are at risk for accidental exposure to HIV and use appropriate precautions. Most important, physicians can educate athletes, coaches, and trainers to practice "safe" athletics and medical care to minimize the risks of exposure to and transmission of HIV. Testing for HIV can be encouraged for athletes who may be at risk and should be done for any athlete who specifically requests it.

Physicians should encourage further study to clarify the specific issues and

risks of HIV infection created by athletic competition and prepare to deal with the changing knowledge about HIV and AIDS.



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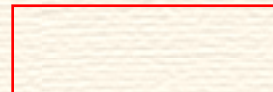
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