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Risk of transmission of blood borne infections in climbing

Intended for Physicians and Other Non-medical
Interested Persons

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Introduction

Blood borne infections such as hepatitis B, C (HBV, HCV) and human immunodeficiency disease (HIV) are major health problems globally. In 2008 there were 33.4 million people living with HIV and 2 million AIDS related deaths¹. Over 500 million people have chronic lifelong infections of HBV and HCV. In spite of antiviral treatments presently available for HCV and HBV, acute or chronically affected individuals are often left untreated as they are asymptomatic until liver disease morbidity and mortality occur after 10 to 20 years. Once symptoms develop, antiviral drugs can only slow down the damage done, not reverse it.

Immunisation against HBV exists, but not for HCV. The transmission risk of the HBV is known to be high among athletes in contact or collision sports, injecting drug users, those who live or visit endemic regions, and those giving first aid without appropriate protection². The number of blood borne infections transmitted is postulated to increase among athletes². This presents an important and new complex problem for sports medical practitioners and participants². The high profile media coverage of prominent sports persons around the 1990's³⁻⁵ that were affected by HIV and acquired immune deficiency syndrome (AIDS) helped shape future recommendations on blood borne transmission during sporting participation. Then, as now, the risk of HIV infection is greater away from sport-specific participation^{2,6}.

Climbing often involves travel to foreign and remote destinations, whether for competitions or personal pursuits. Sustaining cuts, abrasions or lacerations, typically on the fingertips in contact with holds, is a common occurrence in climbing⁷.

Therefore what is the risk of blood borne infections being transmitted to the climber following – i.e. whether seconding or in a competition? Other possible situations where blood borne infections may be transmitted include – sharing needles for drug use (including anabolic steroids) or tattooing, blood transfusion with contaminated blood, anyone administering first aid without appropriate precautions (i.e. latex gloves), and all forms of unprotected penetrative sexual intercourse. HBV and HCV share common transmission routes to HIV.

Method

A Pubmed (1966-2010) and Google Scholar search was performed. Search parameters used (including various combinations of words) were: “HIV”, “AIDS” “hepatitis”, “HBV”, “HCV”, “sport”, “athlete”, “rock climbing”, and “blood borne transmission”. The extracted studies were screened and relevant studies were further analysed. Most studies were case reports, expert opinions or consensus statements. The original UIAA MedCom statement from 1993 was also analysed⁸.

The possible routes of blood-to-blood transmission of HIV, HBV and HCV will now be considered.

Current understanding of HVB, HVC, and HIV

HCV infection is estimated to affect 2.2% of the global population, and is 10 times more infectious than HIV⁹. HVC tends to occur in those who have large or repeated exposures to infectious blood – injecting drug users, or those who received unscreened blood or untreated clotting factor products⁹. Sharing injecting needles just once can infect individuals. Any blood products or components that may have been received for medical care prior to 1989 would not have been screened for the presence of HCV.

HBV is transmitted by percutaneous and mucous membrane exposures to infectious blood and body fluids containing blood⁹. HBV is 50 to 100 times more infectious compared to HIV^{10, 11}. There are many reasons for this. The concentration of HBV in blood is significantly higher than for HIV^{2, 10}. More than 100 million infectious doses of HVB are present in a millilitre of blood, compared to HIV that has a few hundred or few thousand particles per millilitre of blood (AMSSM). HBV is more environmentally stable^{2, 10} and is also more resistant to simple detergents and alcohol; HBV can be stable on environmental surfaces for up to seven days². Immunisation against HBV exists, but not for HCV.

The number of new HIV cases globally has stabilised somewhat since 2000 with improvements in HIV education; and restrictions to those infected with HIV on entry, stay, or access to many countries¹². This reduced the spread of the HIV epidemic in some countries by 2008, but this reduction was countered by significant increases in places like the Russian Federation, the Ukraine and globally among young people aged 15 to 24¹². For every two people who take antiviral drugs, another five have become infected with HIV¹².

Transmission during sport

Sport-specific data was based primarily on case reports, consensus statements, and the opinion of experts. However, as climbers are part of the general population, research on blood borne transmissions in this group is ubiquitous. So on the one hand the theoretical and actual risk of infectious blood-to-blood transmission in sport becomes significantly higher if it is known that say one member of a climbing group is HIV or hepatitis positive. On the other hand, calculations for the risk of blood borne virus transmission in sport are very low for the randomly selected athlete.

Theoretically, the risk of blood-to-blood transmission in climbing is given if one climber leaves drops of blood on a handhold from a bleeding wound and another climber, having a skin laceration or bleeding wound comes into contact with this blood. Transmission may be facilitated by open skin injuries such as cuts and abrasions⁶. Climber's fingertips commonly have small tears in the skin⁷.

The HIV risk ratio behind this transmission route is rather small as the HIV virus dies fast if in contact with fresh air and there is sufficient time in between the two climbers gripping the same holds. This time gap will be less for bouldering than for competition and route climbing. Nevertheless a theoretical risk persists. In addition, relatively large amounts of infectious agents in blood are necessary to transmit effectively HIV or HCV; this reduces the potential risk of transmission if there should be any contact to contaminated surfaces during climbing. This is in sharp contrast to HBV, where

significant less viruses are necessary to cause infection in a non-immune person, and HBV is also more environmentally stable.

In sports in general a theoretical risk of blood borne infections from bleeding injuries to skin lacerations or mucous membranes is reported but is generally considered as being extremely low^{2, 3, 5, 6, 10, 13-15}. This risk may be higher in sports with direct contact and martial arts^{2, 15}. Sports with partial physical contact as in ball sports (e.g. soccer, hockey, etc.) are at a moderate risk, and sports that require little physical contact such as gymnastics and tennis are at lowest risk^{2, 16}. Climbing is in between these last two groups, as physical contact is small but on the contrary small skin lesions on the hands leaving blood traces on handholds are frequent¹⁷.

The calculated HIV transmission risk in sports is small, less than one potential transmission in one million games². Brown et al.¹⁴ calculated the risk of HIV transmission for each professional football player to be less than 1 per 85 million game contacts. There are no confirmed reports of HIV transmission during sport². Torre et al.¹⁸ reported one case of seroconversion after a bleeding injury in soccer. Nevertheless this report was later suggested not to be able to confirm the transmission^{2, 4, 5, 10}, which on the other hand is in general difficult in sport transmissions¹⁹. These data provide strong presumptive evidence that sports-related transmission of HIV is very unlikely¹⁵.

A theoretical risk of HBV transmission in sports is between one transmission in every 850 000 to 4.25 million games and one transmission in 10 000 to 50 000 games²⁰. Once infected by HBV and/or HCV and symptoms develop, drugs can only slow the damage down, not reverse it. A vaccination exists for HBV and is nowadays a standard vaccination for children and students in many countries and should be recommended for all athletes^{5, 6}.

The HCV infection rate in the athlete population is much smaller, and no vaccination exists. The infection risk is less than the risk for HBV, but substantially higher than the risk of infection by HIV⁵. The primary transmission route for HCV is through parenteral injections with contaminated (used) equipment with drug abuse and sharing of the equipment as the highest risk, but not through blood contact via contaminated surfaces of sports equipment⁵. Other differences exist among these viruses. The concentration of HBV in blood is higher than for HIV, and HBV is more environmentally stable^{2, 10}. HBV is also more resistant to simple detergents and alcohol and can be stable on environmental surfaces for at least seven days², which undermines the recommendation of HBV vaccination in athletes⁶.

As a climber is not likely to know if anyone in their climbing group is infected with HIV, HBV, and/or HCV, any incident involving blood should assume these infections may be present, and appropriate care should be taken to wash, clean and dress the wound.

Person to Person contact

The climbing community tends to be general well built in body shape and also interested in new adventures and travelling. This may go along with a high sexual activity, secondary increasing the risk for sexually transmitted diseases (STDs) in the climbing community (with HIV included). Nevertheless there is no firm evidence that

transmission of blood borne infections among athletes through sexual activity is more common than for the general population ².

Also body to body contact of injured and infected climbers and rescue personnel needs to be considered. The rescue team personnel should be generally informed about the risks from viral diseases and blood contagiousness, and should therefore be acquainted with the appropriate prevention procedures and measures. Among the most important precautions are hand-washing, safety clothing and hand wear, sterilization, disinfecting and appropriate support information. The utmost importance should be focused on the experience and handling of cannulae, sharp and/or pointed instruments, and appropriate disposal containers ^{3, 8, 10, 15}.

Other transmissions

Also other transmission routes reported in athletes included are drug abuse, doping injections, blood transfusions and others ^{2, 4-6}. Hepatitis C is especially acquired more rapidly after initiation of injections (steroids, doping) than is the case in other viral infections ⁵. Nevertheless, these transmission routes do not differ much from those affecting the general population. Athletes are not at a higher or lower risk in comparison to the normal population.

Conclusion

In summary it can be concluded that the main pathways of transmission of blood borne infections in athletes are similar to those experienced in the general population, and not through sports. The greatest risk to the athlete for contracting any blood borne pathogen infection is through sexual activity and parenteral drug use, and not in the sporting arena ¹⁰. The transmission risk in climbing is even smaller if compared to contact sports ⁵.

A prompt and appropriate treatment of bleeding wounds is essential, as well as covering skin lacerations and wounds up to complete healing ¹⁰. During the sports event, early recognition of uncontrolled bleeding is the responsibility of officials, athletes, and medical personnel. Participants with active bleeding should be removed from the event as soon as this is practical. Bleeding must be controlled and the wound cleansed with soap and water or antiseptic ¹⁰. Climbing holds with blood stains need to be cleaned and brushed, if necessary with antiseptic or disinfectant. They need to dry out before re-use.

Mandatory HIV, HBV or HCV testing or widespread screening is not recommended ^{10, 15}, voluntary testing is recommended for all high risk athletes in the same way as for non-athletes ^{2, 3}. Even if the International Federation of Sports Medicine and WHO does not recommend immunisation against HBV for athletes ²¹, it should be considered for climbers ⁶, especially in the sense of travel medicine. Climbers, especially competitions climbers, travel frequently as World Cup Competitions are held at worldwide venues.

HIV and HBV positive climbers should not be banned from climbing or climbing competitions ⁸. It seems that moderate intensity exercise is not harmful to patients

with HIV^{3, 10, 13, 21}, and a HIV infection alone is not a reason to prevent athletes from continuation of their sports^{2, 4, 5, 10, 13, 21}. The risk of transmission from infected athletes to other athletes is very low, the focus should be put on preventive activities and education^{2, 6, 10}.

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History of this recommendation paper

This paper will update the UIAA's 1993 Medical Commission's consensus statement⁸ regarding the risks of blood borne infection transmission and preventative recommendations. The version presented here was approved by written consent in lieu of a live meeting in May 31st, 2010