

Origins of HIV virus identified

Impact of the pandemic continues to worsen

By Barry Mason
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A recent article in the scientific magazine *Nature* explains that the main type of human immunodeficiency virus, HIV-1, which causes AIDS, originates in a subspecies of chimpanzees from equatorial West Africa. The February 4 report details the work carried out by a group of researchers at the Department of Medicine and Microbiology at the University of Alabama, Birmingham led by Feng Goa. Monkeys carry viral infections similar to HIV, called simian immunodeficiency virus (SIV).

The researchers carried out tests on tissue from a chimpanzee that died in 1985. The chimp, known as Marilyn, had been part of the US Air Force space travel research programme. Marilyn had been used to breed other chimps for the programme. They used biochemical techniques to amplify, sequence and analyse the genetic makeup of the SIV virus. They were able to show that its genetic makeup closely matched those of the three main strains of the HIV-1 virus, known as M, N and O.

It had been previously demonstrated that another HIV virus known as HIV-2, which is a milder form of HIV found mainly in West Africa, had its origins in a form of SIV found in Sooty Mangabey monkeys. But the source of HIV-1 had remained unknown. Whilst other chimpanzees have been shown to carry SIV viruses, they did not have a close genetic relationship to HIV viruses. Chimpanzees in Africa are found in several subspecies related to geographical origin. Marilyn belonged to the subspecies *Pan Troglodytes Troglodytes*, which is found in Gabon, Equatorial Guinea and Cameroon. The first recorded case of AIDS in 1959 occurred in a man living in Kinshasa just across the Congo River from Gabon.

The fact that the three strains of HIV-1 are all closely related to the SIM virus found in this subspecies of

chimpanzees suggests that the virus has crossed from chimp to man on at least three separate occasions. Hunters will kill and butcher chimps for meat and the virus could have been transferred via their blood. Chimps are closely genetically related to humans, sharing 98 percent of our genome (genetic makeup). This, together with the fact that although they carry the SIV virus they do not suffer devastating AIDS-type symptoms, may present an opportunity to understand the role the virus plays in humans and the possibility of finding a cure or control.

Although originating in West Africa, within a few years AIDS became a global pandemic. This area of the world has seen huge migrations from countryside to town. International travel and the commercial sex industry enabled the virus to become a world-wide disease. AIDS currently afflicts 35 million people across the globe. Whilst considerable progress has been made in controlling and treating the disease in countries such as America and in Europe, this is not the case in Africa. In America between 1996 and 1997 deaths from AIDS fell by 44 percent. In contrast, the figures for sub-Saharan Africa are mind-numbing.

The percentage of the adult population infected with HIV shows the enormity of the situation. In South Africa it is 13 percent, in Mozambique 14 percent, Namibia 20 percent, Botswana 25 percent and in Zimbabwe just under 26 percent--the highest figure in the world. In June 1998 the United Nations issued a comprehensive report detailing the incidence of the disease. It showed that of the 30 million people infected by HIV in the previous year, 21 million of them lived in sub-Saharan Africa. This area of the world accounts for 21 countries with the highest incidence of HIV infection.

The AIDS epidemic in sub-Saharan Africa is

comparable to the great plagues of mankind's history.

The Black Death of the Middle Ages killed 20 million people in Europe, representing a quarter of the population. The influenza epidemic of 1918-19 killed 20 million people. The percentage of the global population infected by HIV is about 1 percent, and about 0.76 percent in the United States. The countries of sub-Sahara Africa with the highest proportions of infection are also amongst the countries least able to cope with the devastating effects of the disease.

HIV has its biggest impact among adults aged 15 to 49, those who are the most sexually active. They are also the section of the population that is most economically active and has responsibility for child rearing. AIDS has orphaned millions. In 1997 1.6 million children lost at least one parent to HIV. From 1981, when the epidemic was first recognised, through the end of 1997, 8.2 million children lost their mothers because of AIDS. Children in Africa face a great risk of being born with the disease. In some African cities the infection rate amongst women tested at prenatal clinics is 70 percent.

AIDS is becoming one of the world's greatest killers. It strikes down as many people as malaria and is second only to tuberculosis. In 1997 5.6 million people became infected, whilst 2.3 million died from the disease. The tremendous strain AIDS places on the health services of poor countries means that the incidence of other diseases, such as malaria and tuberculosis, has increased.

The 1998 AIDS Conference held in Geneva named Zimbabwe as having the highest incidence of HIV infection, with an average of 26 percent of the population infected. In some parts of the country the infection rate is even higher. The tourist crossroads area of Victoria Falls has a 40 percent infection rate. Tuberculosis, malaria, cholera, other sexually transmitted diseases and preventable infections are also increasing, as are stillbirths and infant mortality. Tuberculosis is a disease closely linked with poverty. In 1986 there were 5,000 cases and in 1997, 35,000. The effect of growing poverty and instability, exacerbated by the AIDS epidemic, is swamping the health service. But in Zimbabwe there is less than \$10 per person a year spent on health needs.

In 1993 life expectancy in Zimbabwe was 61. It is estimated that by the end of the century it will have

dropped to 49. If the current pattern of HIV infection continues, UN officials say that by the year 2100 life expectancy in this country will be only 40 years.

In South Africa, HIV infection had been held in check under the isolation engendered by apartheid. Now it is seeing an explosive growth with the numbers infected doubling in the last three years, the highest increase in the world. Today there are about 3 million people infected, or approximately 12 percent of the population. Amongst women in their 20s the figure is 20 percent.

There has been limited success in reducing the rate of infection in some countries. In Uganda, for example, the 1994 rate of infection of 13 percent had been reduced to 9.5 percent by 1997. Even if the infection rate falls, however, there is very little that can be done for those with the disease. With per capita health spending at around \$10 per year, the combination therapy drugs that are beginning to have some effect in developed countries are unobtainable for the mass of the population. Dr. Peter Piot, head of the UN AIDS programme, expressed his concern over the widening gap in infection and death rates between industrialised and developing countries, which he said "shines the spotlight on the have-nots of the epidemic".

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