A History of HIV Treatment

The first reported occurences of HIV/AIDS were a long time before the crisis that emerged in the 1980s. With the earliest official death in the US from the disease recorded in 1969, medical reports were inconclusive and incidences were so few and far between that little further study was conducted. It was only on subsequent analysis after AIDS was formally named in 1982 and HIV in 1986 that it was realised. Though the stigma is still high, treatment has come a long way.
This timeline aims to document some of the most important events and advances in its progression.

1981

The first reports of HIV related illnesses appear in the USA.
Five young, previously healthy gay men in Los Angeles are diagnosed with a rare lung infection showing that their immune systems are not functioning.
At the same time there are reports of men elsewhere in the USA, being diagnosed with other rare illnesses.
By the end of the year there were 270 reported cases of severe immune deficiency among gay men - 121 of them had died.
Reports of a crisis begin to emerge.

1982

The first dedicated AIDS clinic is established in San Francisco.

The first AIDS service provider in the U.S., is founded in New York City. The Gay Mens Health Crisis Centre is solely community led.

1983

The first dedicated AIDS ward is opened in San Francisco General Hospital and fills up within days.

1987

The Food and Drug Administration approves the first antiviral drug Azidothymidine (AZT) for general prescriptive treatment.
The drug works by inhibiting the ability of the AIDS virus to duplicate inside body cells.
The effectiveness of the drug is later called into question by British and French medical research councils.
ACT UP was formed by Larry Kramer in New York City. They publically protested that year to demand greater access to experimental AIDS drugs and for a coordinated national policy to fight the disease.

Post-Exposure Prophylaxis (PEP) is a month long course of drugs which are given to someone who has possibly been exposed to a HIV infection. It is taken in the hope of stopping a permanent infection. PEP is not a 100% safeguard against infection but studies have shown it to be effective. The course of PEP must be started within 72 hours of exposure, after that PEP is much less effective and unlikely to work. PEP consists of taking a combination of three HIV medications daily, for 28 days.
The doses must be taken consistently at the right time every day for four weeks for it to be successful.

PEP

1988

After protests in the USA, the importation of unapproved drugs is approved by The Food and Drug Administration for persons with life-threatening illnesses, including HIV/AIDS.

ACT UP stages a protest at the New York Stock Exchange, Seven members chain themselves to the VIP balcony in protest of the cost of AZT. The group hung a banner that read, "SELL WELLCOME" which clearly referred to Burroughs Wellcome, the sole provider of AZT. At the time the drug cost patients $10,000 per year.
Following this incident, Burroughs Wellcome changed the price of AZT to $6,400.
Some healthworkers who are occupationally exposed to the virus begin to be given AZT as a precaution. This is known as Post-Exposure Prophylaxis **(PEP).**

1992

Combination drug therapies against HIV are introduced.
Zalcitabine becomes available in the USA, Canada and Austria for selected patients in combination with AZT.

A protease inhibitor is a type of drug that cripples the enzyme Protease. An enzyme is a biological catalyst in the body that speeds up chemical reactions in the cells. When a person is infected with HIV, the virus tries to reproduce itself. HIV uses the enzyme protease in the final replication process stages. By blocking Protease, the HIV creates copies of itself that are unable to infect new cells.

Protease Inhibitors

1994

A new type of **protease inhibitor** drug named Saquinavir is made available.
Highly active antiretroviral therapy **(HAART)** becomes possible.
Within two years, death rates from AIDS drop significantly in the developed world.

1995

Patients using combination therapy as their treatment method report a decrease in viral loads as well as higher **CD4 and T-Cell counts.**
Life expectancies of those diagnosed with HIV become significantly closer to normal mortality rates.

Viral Load essentially means the amount of HIV in the patients blood stream. When someone has a higher viral load - not only do they have a higher chance of spreading the virus but their CD4 Cell count will also fall faster, increasing their susceptibility to other illnesses.
CD4 cells are a specific type of white blood cell that fight against infections in the body. CD4 cells are created in the body. If an HIV patient is untreated, the CD4 cells are unable to reproduce and increase. They are therefore unable to destroy germs such as bacteria and viruses within the body.
T-Cells are a type of white blood cell produced in the bone marrow. T-Cells are important to the body's immune system as they respond to specific pathogens in a targeted and tailored way that destroys bacteria, viruses and parasites.
The T-Cells are essentially equipped to seek and destroy foreign pathogens in the body.

Viral Loads, CD4 Counts/ T-Cell Counts

1996

The first viral load test is approved, this measures the level of HIV in the blood.
The first **non-nucleoside reverse transcriptase inhibitor (NNRTI)** drug, Nevirapine is approved.
Dr. David Ho, an AIDS/HIV researcher calls for a "hit early, hit hard" strategy.

HIV is a retrovirus - meaning it is an RNA instead of DNA and needs to convert its RNA to DNA in order to replicate itself in the body. To do this it uses a compound called Reverse Transcriptase.
Reverse Transcriptase is only found in human cells with HIV. Both the NRTIs and the NNRTIs interact with the Reverse Transcriptase to stop it working. This stops HIV replicating, so the amount of virus in the body lowers. NRTIs function by imitating a DNA sub-unit, which in turn do not allow for more sub-units to attach. NNRTIs work by sitting in a binding site in the virus structure, thus actively creating a barrier to block the transcriptase from converting the RNA to DNA.

NRTIs vs NNRTIs

1997

The U.S. Centers for Disease Control and Prevention (CDC) reports a decline in AIDS deaths in the United States. A 47% reduction in AIDS-related deaths in the U.S. is attributed to **HAART**.
The FDA approves Combivir, a combination of two antiretroviral drugs, which means people living with HIV have to take just one pill a day.
Though for ethical reasons, no formal trial was carried out, a case control 'study2' of healthcare workers from France, Italy, the U.K. and the U.S. concluded that PEP reduced the risk of becoming infected by 81%.

Highly Active Antiretroviral Therapy is a daily combination of medications which are prescribed on the needs of the patient. Factors such as the particular HIV strain, the viral load, the CD4+ cell count are all taken into account when the respective combination of drugs prescribed. HAART works to keep the viral load of the patient low, which in turn delays or prevents any symptoms or the progression of HIV into AIDS.

HAART

2001

Some major pharmaceutical companies begin to offer reduced price medications to developing countries after the generic manufacturers lead the way.

2007

The first available **CCR5 receptor antagonist** Maraviroc, is approved by the FDA as an antiviral drug for the treatment of AIDS.
The Brazillian government breaks international law by violating a Merck and Co. patent (issuing a "compulsory license") and produces its own generic versions of the drug Efavirenz.

PrEP

The iPrex study which is held accross nine cities in Brazil, Ecuador, Peru, South Africa, Thailand and the USA is conducted using 2499 men and transgendered women who have sex with men.
The participants were split into two groups, some were given a placebo pill and the others were given daily antiretrovirals. The results find that on average there is a 43% reduction in HIV infections in the group taking the antiretrovirals compared with the placebo group. The reduction of infection accross the group given the drug included all participants, which included participants who did not take the daily pill consistently. Subsequent analysis of the data suggests that 99% protection is achievable if the drugs are taken consistently every day.

A CCR5 receptor antagonist is a type of antiretroviral drug that prevents a HIV infection by binding itself on the surface of the CD4 cell called the CCR5. The CCR5 receptor is one of the early entry points for HIV. By preventing attachment to the CCR5 receptor, HIV is unable to enter and infect the host cell. It's important to note that not all HIV does this and the medication is therefore not appropriate for all cases.

CCR5 Antagonists

Pre-exposure-HIV Prophylaxis (PrEP) is a daily pill that is used to prevent HIV infection. It is taken to prevent someone who doesn't have HIV from contracting it when they are or could be exposed regularly to the virus.
The pill itself is an anti-retroviral drug which is also taken by those who already have the virus as medication against it. PrEP mostly consists of the drug Truvada, it is taken once a day at the same time and should be taken consistently. The more gaps in the consumption the less chance it has of working.

PrEP

2011

The British HIV Association (BHIVA) releases guidelines on the administration of **PEP** following possible sexual exposure to HIV as it becomes widely available in British sexual health clinics.
Previously it was only commonly available to health professionals and few selected sexual health clinics.

2012

The antiviral Truvada is approved by the FDA for **PrEP.**

2014

The World Health Organization (WHO) releases its guidelines on **PrEP.** They state that they "strongly recommend men who have sex with men to consider taking antiretroviral medicines as an additional method of preventing HIV infection."

2016+

The rate of HIV drug development has been relatively fast in comparison to other new disease areas making HIV today completely manageable if treated properly and regularly.
New diagnoses, where access to medication is available can expect a near normal life expectancy with UNAIDS reporting that newly diagnosed HIV people now live on average 19 years longer than in 2001.
Unfortunately the reality is for many parts of the world, due to the high cost of the drugs, access to this treatment is not currently possible.
The majority of the world's HIV-positive population are in Africa: between 24 million and 28.7 million HIV-positive people live in sub-Saharan Africa.
Though, the number of AIDS-related deaths has fallen by 48% in sub-Saharan Africa since 2000.
Research into the development of cures and vaccines against HIV are yielding some promising results, though anything solid will still be a long way off.
With an announcement on the availability of PrEP by state healthcare systems in parts of Europe expected in late 2016, prevention, regular testing and treatment seems to be the best method in controlling the disease.

www.nytimes.com/1981/07/03/us/rare-cancer-seen-in-41-homosexuals.html
www.thehealthwell.info/node/553652
www.ncbi.nlm.nih.gov/pubmed/10513653
www.niaid.nih.gov/news/QA/Pages/iPrExQA.aspx
www.avert.org/professionals/history-hiv-aids/overview
www.aids.gov/hiv-aids-basics/hiv-aids-101/aids-timeline/
www.tht.org.uk/sexual-health/About-HIV/Post-exposure-prophylaxis
www.tht.org.uk/our-charity/Facts-and-statistics-about-HIV
www.drugabuse.gov/publications/research-reports/hivaids/what-haart
www.aidsmap.com/Viral-load/page/1044622/
www.webmd.com/hiv-aids/cd4-count-what-does-it-mean
www.theguardian.com/society/2015/feb/24/daily-pill-truvada-cuts-spread-of-hiv-by-86-study-shows
www.prepster.info
www.iwantprepnow.co.uk/#/prep-on-the-nhs/yzcca
www.nytimes.com/2011/05/31/health/31aids.html
www.nytimes.com/1987/03/21/us/us-approves-drug-to-prolong-lives-of-aids-patients.html
Glanz Veronika, 2013. History Of Aids.