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Edition

The hunt for an HIV vaccine

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Anyone following the current Swine Flu epidemic will have noticed the speed at which a vaccine was developed and distributed to those at risk, so why is a HIV vaccine still eluding us? Since the 1980s discovery of the human immunodeficiency virus (HIV) as the cause of acquired immunodeficiency syndrome (Aids) – millions have since been infected and died. The international scientific community has dedicated decades of research and funding, still a viable vaccine has yet to be developed. Why the difficulty?

Two major HIV vaccine clinical trials have failed almost completely, both demonstrating little effect on HIV despite encouraging theories. The problem stems from the unique biology of the HIV virus itself: it is able to escape the immune system. At a particular stage of infection it infects cells but doesn't reproduce further; it is quite literally hiding from the immune system, potentially for many years. This is the reason that, despite there being effective anti-HIV drugs, treatment is life-long. When HIV does multiply – by hijacking the cell's replication machinery itself – the process is error prone and this creates a lot of random changes in the HIV genes. This, combined with the high rate of replication, allows HIV to further escape recognition by the immune system. What's even more devastating is that HIV actually attacks cells of the immune system themselves – so any vaccine that aims to enhance the immune system, as most do, may paradoxically accelerate HIV infection and Aids progression.

These features (amongst numerous others) make developing a HIV vaccine tricky. But all is not hopeless! A recent trial in Thailand used both the earlier failed clinical trial drugs in synergy with some success. However, the numbers of test subjects involved were small and the trial has been viewed as controversial. Nonetheless, it is the first sign of a successful vaccine and was declared to be "safe and modestly effective" by the Aids Vaccine 2009 meeting in Paris earlier this October.

It has been suggested that conventional strategies should be abandoned in favour of focusing research efforts into simian immunodeficiency virus (SIV), which is related to HIV). Although SIV infects non-human primates it does not always lead to Aids, thus it might hold the key to a successful HIV vaccine. To pinch the words of Churchill: "this is not the end. It is not even the beginning of the end, but it is, perhaps, the end of the beginning."

