# New HIV model suggests killer T cell for vaccine

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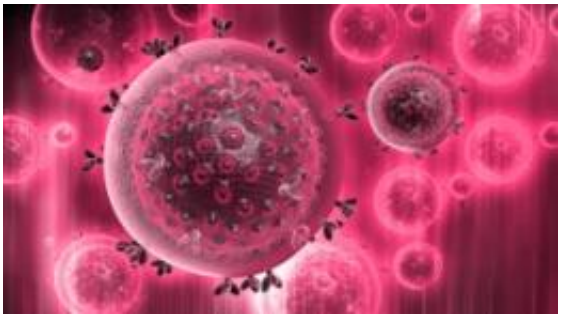

Digital illustration of HIV virus

Limited success in modelling the behaviour of the complex, unusual and unpredictable HIV virus has slowed efforts to develop an effective vaccine to prevent AIDS.

A new improved modelling system, developed by Chinese researchers, which attempts to incorporate more of the virus' random behavioural dynamics, suggests that a particular type of T cell could be useful in the development of an AIDS vaccine.

New research published today, Thursday 29 April, in New Journal of Physics, describes how physicists and biologists from Xiamen University have been able to incorporate random patterns in the virus' mutation, and the way the virus responds to antibodies, into their model.

Gratifyingly, they have found that the new model, and the projections made by the new model for development of disease, mirror real-life, clinical behaviour of the virus.

Clinical trials show that the HIV virus behaves quite normally during the acute first phase of human infection, normally 2-6 weeks after HIV enters the host body, during which time the strength of the virus increases and our immune systems deploy killer T cells, CD4+ T cells, to battle against it.

Outwardly, we would experience flu like symptoms and would, when we started to feel better, imagine that we are over the infection but this is not so with the HIV virus which somehow avoids total annihilation and manages to spend years rebuilding strength, slowly chipping away at our immune system.

Researchers suspect that HIV's ability to avoid annihilation has to do with its own mutating properties and its ability to preferentially target CD4+ T cells, the master regulators of our immune system.

The model-makers from Xiamen University have created a simulation which takes a wider range of variables into consideration and while they are in agreement that both HIV's mutating and T-cell targeting ability are crucial to the virus' devastating success rate, they have found a possible chink in the virus' armour.

To date, no models have been able to discern between the behavioural patterns of two different types of T-cells, both of which are involved in our internal fights against HIV.

These are CD4+ T and CD8+ T cells. Patterns emerging from these new models now suggest that CD8+T cells could be used to stimulate a stronger response against the virus.

This particular type of T-cell does not appear to be as preferentially targeted by HIV as its counterpart and also appears to be more actively involved in putting the virus down during the first acute phase of the infection.

As the researchers write, "We assess the relative importance of various immune system components in acute phase and have found that the CD8+ T cells play a decisive role to suppress the viral load. This observation implies that stimulation of a CD8+T cell response might be an important goal in the development of an effective vaccine against AIDS."

**More information:** Paper: iopscience.iop.org/1367-2630/12/4/043051

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