Malaria vaccine offers new mode of protection against disease

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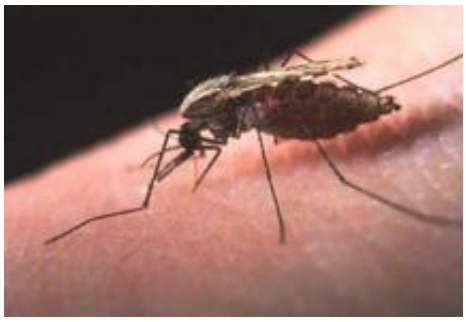

Malaria parasites carried by mosquitoes kill more than 660,000 people each year

(Medical Xpress)—A novel malaria vaccine developed at Oxford University has shown promising results in the first clinical trial to test whether it can protect people against the mosquito-borne disease.

The trial was carried out in Oxford by researchers led by Professor Adrian Hill of the Jenner Institute at Oxford University, along with colleagues from the biotechnology company Okairos.

Some of the adult volunteers were completely protected against malaria in this initial study of the vaccine's efficacy.

It's the first time that a vaccine has been shown to have a protective effect through a sufficiently high immune response involving cells called CD8 T cells.

It is CD8 immune cells that are seen to mount a protective response against malaria in similar studies in mice.

Every existing vaccine in use – bar one – generates antibodies. But there are two arms to the body's immune system for fighting infection: antibodies and T cells. And this vaccine aims to stimulate an immune response involving T cells.

CD8 T cells are important because they are the primary killer cells in the immune system. They can attack nearly all types of infected cells – in this case liver cells infected with the malaria parasite. But this first demonstration of a large CD8 response from a vaccine could be relevant for tackling other diseases too.

'The vaccine was found to work by inducing CD8+ T cells that target the malaria parasite in the liver,' explains Professor Hill.

'For years a wide range of technologies have been assessed trying to induce protection through the cellular arm of the immune system with CD8+ T cells. But this is the first time that this has been achieved for any vaccine type against any disease.'

The Phase IIa trial in Oxford involved 36 people in total, of which 14 healthy adults received two different virus-based vaccines with the same malaria antigen eight weeks apart.

Of those 14, three people were protected from the bites of malaria-infected mosquitoes. A further five had delayed onset of malaria, demonstrating that over 90% of the malaria parasites had been killed by the vaccine-induced immune response.

Importantly, the size of the CD8 T cell response in these volunteers correlated with the degree of protection from malaria, suggesting that a sufficiently high cellular immune response is protective.

Ten further volunteers received only one of the vaccines and there were 12 controls. None of these people saw any protection against malaria from mosquito bites on the arm. All volunteers were closely monitored for malaria symptoms throughout, and those getting the disease were treated rapidly with drugs.

The trial results are published in the journal *Nature Communications*. The study was funded by the Medical Research Council with support from the National Institute for Health Research and the Wellcome Trust.

The results of larger Phase IIb trials of the efficacy of the vaccine in Africa are expected in 2014. They will determine more about the efficacy of this malaria vaccine where it is needed most.

If results continue to be positive, Professor Hill thinks that the best protection against malaria may come from combining the Oxford-developed vaccine with another that targets the sporozoite stage of the malaria parasite's life cycle. One such vaccine developed by GSK is in late-stage clinical trials.

The GSK vaccine called RTS,S works by stimulating antibodies against the malaria parasites before they enter the liver. Those that reach the liver would be mopped up by T cells stimulated by the Oxford vaccine.

Professor Hill and colleagues are currently carrying out a study in the UK to test how the GSK and Oxford vaccines might work together.

Malaria kills more than 660,000 people each year, most of whom are children in Africa.

More information:
www.nature.com/ncomms/2013/131 … full/ncomms3836.html

Provided by Oxford University