Researchers discover biochemical weakness of malaria parasite -- vaccine to be developed

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Every year, 10,000 pregnant women and up to 200,000 newborn babies are killed by the malaria parasite. Doctors all around the globe have for years been looking in vain for a medical protection, and now researchers from the University of Copenhagen have found the biochemically weakness of the lethal malaria parasite, and will now start developing a vaccine to combat pregnancy related malaria.

The malaria parasite travels via the spit of an infected mosquito to the liver of the new host, where it spreads to the red blood corpuscles and starts to reproduce itself.

"Pregnant women and children below the age of five years are particularly vulnerable to malaria because of the parasite's survival mechanisms. The parasite has a protein hook designed to attach it to the placenta and this leads to amnesia of the mother who in worst case can die or deliver prematurely. This increases the maternal mortality - and infant mortality," explains Associate Professor Ali Salanti from the University of Copenhagen's Centre for Medical Parasitology who manages the project.

The body's immune system normally attacks any foreign body but since our spleen constantly filters our blood and removes ruined or deform blood cells, the body's natural defense does not need to check the blood. And the malaria parasite exploits this fact.

An infected red blood corpuscle is more stiff than in its normal state and

this would usually trigger the spleen to destroy the cell and parasite, but the malaria parasite has an advanced arsenal of protein hooks. With these hooks the parasite attaches itself to the inner side of the blood vessel and even if our immune system succeeds in defeating one hook, the parasite has 60 different hooks, which again differ from one malaria parasite to another.

Researchers have for years been looking for a vaccine which can attack the malaria parasite's specific placenta hook. This is tricky not least due to the fact that the parasite's hooks are long proteins which are difficult to produce artificially in the lab when developing of a vaccine.

After intensive research efforts, the researchers have now succeeded in identifying a fragment of the placenta hook (VAR2CSA) which not only is crucial for the parasite's ability to attach itself to the placenta, but also is possible to produce artificially for a vaccine.

"A vaccine must stimulate the immune system to quickly attack something foreign in the body. Therefore, it was a matter of finding the part of the placenta hook, which the parasite cannot manage without and which we could target a vaccine against," says Associate Professor Ali Salanti.

With a grant of 15 million DKK (approximately 3 million USD) from the Danish National Advanced Technology Foundation and close corporation with two Danish biotech companies, the researchers can now start developing the vaccine and take it through the first trials to test its safety.

Ali Salanti and his colleagues will collaborate with the biotech companies ExpreS2ion Biotechnologies and CMC Biologics A/S to develop a method for mass production of the vaccine.

Once this has fallen into place, the researchers can start up the clinical trials on animals and human beings. If the trials are successful the parasistologists from the University of Copenhagen and their partners will make a significant contribution in reaching the UN's Millennium Development goal number 4 and 5. These two goals encourage every country in the world to work on lowering global child mortality with two thirds and maternal mortality with three quarters.

Provided by University of Copenhagen