

EPO doping helps combat cerebral malaria

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Almost 3.3 billion people, half of the world's population, risk being infected with malaria. Despite having effective means against malaria, the WHO reports 250 million cases of malaria each year and more than 700,000 related deaths. Researchers at the University of Copenhagen have now discovered that EPO, the doping drug known from professional cycling, can significantly reduce cerebral malaria related deaths.

When more than 700,000 people die from malaria each year it is due to two grave complications, which the malaria parasites manage to cause before they are eliminated by malaria drugs: [Cerebral malaria](#) and serious [anemia](#). These two complications are the cause of almost every malaria-related death, with children between one and five years old being especially vulnerable. Cerebral malaria is responsible for half of all malaria related deaths.

At the University of Copenhagen, the research team [Pathogenesis](#) from the Centre for Medical Parasitology (CMP) is working on ways to supplement the current malaria treatment with new medical preparations. The researchers are therefore investigating why these two complications have lethal consequences and how we can prevent this from happening. The researchers have, among other things, discovered that the doping drug EPO reduces cerebral malaria related deaths remarkably among test animals. The team is now working on ways to test this and other treatment strategies.

"EPO is an active molecule in the brain where it can protect the brain

cells from damage and disease," explains Doctor Jørgen Kurtzhals, associate professor at the CMP.

EPO is naturally produced in the kidneys from where it sends signals to the bone marrow to produce more red blood corpuscles. But it is also produced in a number of other tissues for example the brain.

"We still do not have a treatment against cerebral malaria and we lack understanding of how the disease emerges, even though the parasite does not cross the blood-brain barrier and remains in the path of blood" says Kurtzhals.

Researchers have found that children with high levels of EPO in their cerebrospinal fluid have less risk of dying from brain malaria.

"Our laboratory team has studied whether we can treat mice, which are infected with cerebral malaria, with EPO and the results are striking. The risk of dying drops from 100 percent to nearly 0," says Kurtzhals, who also points out that EPO does not remove the parasite from the blood.

"It is still necessary to treat a malaria infection with the current drugs, but EPO can be part of the treatment because it protects the brain while the malaria drugs kill the parasite."

Doctor Jørgen Kurtzhals and his group are now working behind the microscopes to understand the exact molecular mechanisms, which enable EPO to protect the brain from damage of brain malaria. Other laboratories around the world are now testing EPO on malaria patients.

"We know EPO increases the number of red blood cells and their content of the red protein hemoglobin, and this increases the amount of oxygen that can be transported to the body's tissue and cells. This is the

effect some athletes and professional cyclists abuse by increasing the outcome of each breath. But besides this effect, EPO also increases the level of hemoglobin in other cells, and this could be the reason why it protects [brain cells](#) against brain malaria," says Kurtzhals

The Pathogenesis team at CMP focuses on how to improve the handling of malaria, while the world awaits an effective vaccine. The group's work ranges from basic research in parasitology and pathogenesis to clinical trials with new drugs.

Provided by University of Copenhagen

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