PRESS RELEASE

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Published in Science journal: how trypanosome inhibits immune response.

ULB scientists have shown how the trypanosome parasite manages to inhibit the immune response of its host. Trypanosome causes sleeping sickness in humans, as well as nagana: a disease that decimates cattle populations in sub-Saharan Africa. Their findings have been published in an Express Online exclusive from the prestigious journal, Science.

African trypanosomes are parasites responsible for sleeping sickness in humans, and they also infect bovid populations, damaging cattle farming in sub-Saharan Africa. This organism’s extraordinary ability to change its surface coating makes it impossible to develop a vaccine, and current treatments are dangerous and relatively ineffective against the advanced stages of infection.

The Molecular Parasitology Lab (Institute of molecular biology and medicine, IBMM - Science Faculty) at the Université Libre de Bruxelles (ULB) has been studying the trypanosome for several years now.

Under the guidance of Professor Etienne Pays, ULB scientists have shown that humans have developed an unusual immune system response to combat these parasites: an anti-trypanosome serous defence known as apoL1. The Lab recently discovered that when trypanosomes appeared that were resistant to this defence mechanism (and therefore able to infect humans and cause sleeping sickness), a significant number of Africans shut down their apoL1 gene, gaining the upper hand on the parasites. Remarkably, these apoL1 mutations were found to cause chronic kidney disease, thus explaining the high prevalence of this illness amongst individuals of African origin.

In a new article published in Science on 14 June, the Molecular Parasitology Lab establishes new advances: it shows how in the first stages of infection, trypanosomes successfully inhibit the host’s spontaneous immune response. Macrophages, a type of blood cell, produce the inflammatory protein TNF-a that in turn provides this innate immunity. However, when attacked by macrophages, the trypanosomes spontaneously produce a molecule (cyclic AMP) that prevents the
macrophages from producing TNF-α. This enables other trypanosomes to escape the effects of TNF-α, penetrating the host's first line of defence.

What is interesting here is the "altruistic" behaviour displayed by the parasites: those trypanosomes killed by the macrophages help their relatives successfully infect the host. Another new discovery: the enzymes within the parasite (adenylate cyclase) that produce cyclic AMP become active in conditions of elevated stress, in particular when the trypanosome is dying. This means that the enzymes remain inactive until the trypanosome is attacked. The system seems to act like a time bomb, detonating only once inside the cell that has captured the parasite!

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Photographs of the trypanosome combating macrophages within the liver of an infected animal are available upon request from com.recherche@ulb.ac.be


This research is conducted in collaboration with:

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