Research reveals 'Trojan Horse Trick' as the cause of a fatal fungal outbreak in humans

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New research from the University of Birmingham has uncovered the reason why a strain of fungus has evolved to cause fatal infections in the Pacific Northwest of America.

The fungus Cryptoccocus gattii is normally a very rare cause of human disease in the tropics. However, in recent years an aggressive strain of this fungus has spread across the Pacific Northwest of America, causing at least eight deaths and more than 200 infections in a single outbreak on Vancouver Island (VIO).

The research, published in the Proceedings of the National Academy of Sciences (PNAS), showed that the Vancouver Island strain of Cryptococcus gattii has dramatically increased its ability to replicate within human white blood cells called macrophages, which normally help defend against parasites.

Dr Robin May, who led the project with collaborators from Israel and the Netherlands explains: “By hiding inside these cells, the fungus is able to grow rapidly within infected people without being detected by the immune system and we think it is this ability that makes this particular strain of Cryptococcus gattii so dangerous”.

Further studies in the laboratory showed that the strain of the fungus involved in the Vancouver outbreak is able to modify its energy-generating compartment, called the mitochondrion, whilst growing inside human macrophages. The authors believe this adaptation allows the fungus to maintain its energy supplies and survive damage inflicted upon it by the macrophage.

Dr May adds: “The biological processes we see with the Cryptococcus strain on Vancouver Island seem to serve a dual purpose in helping the fungus survive in the human body but also in making it significantly more dangerous to humans and animals.

There is a strong possibility that the same mechanisms may be used by other pathogens to proliferate in the human body. This may explain why outbreaks of pathogens present in the everyday environment can suddenly occur and is certainly an area in need of further study.”

Article #09-02963: “The fatal fungal outbreak on Vancouver Island is characterised by enhanced intracellular parasitism driven by mitochondrial regulation” by Hansong Ma, Ferry Hagen, Dov J. Stekel, Simon A. Johnston, Edward Sionov, Rama Falk, Itzhack Polacheck, Teun Boekhout, and Robin C. May.

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