

This is your brain on Cryptococcus: Pathogenic fungus loves your brain sugar

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Highly dangerous *Cryptococcus* fungi love sugar and will consume it anywhere because it helps them reproduce. In particular, they thrive on a sugar called inositol which is abundant in the human brain and spinal cord.

To borrow inositol from a person's <u>brain</u>, the <u>fungi</u> have an expanded set of genes that encode for sugar transporter molecules. While a typical fungus has just two such genes, *Cryptococcus* have almost a dozen, according to Joseph Heitman, M.D., Ph.D., chairman of the Duke Department of Molecular Genetics and Microbiology.

"Inositol is abundant in the human brain and in the fluid that bathes it (cerebral spinal fluid), which may be why this fungus has a predilection to infect the brain and cause meningitis," Heitman said. "It has the machinery to efficiently move sugar molecules inside of its cells and thrive."

The findings on *Cryptococcus* genes were published online this week in the inaugural issue of *mBio*, a new open access microbiology journal.

This specialized brain attack likely occurred because these fungi adapted to grow on plants in the wild, which also are abundant in inositol, said lead author Chaoyang Xue, Ph.D., formerly a postdoctoral research associate in the Heitman lab and now an assistant professor at the Public Health Research Institute at the University of Medicine and Dentistry of New Jersey (UMDNJ). "In fact, this pathogenic yeast has more inositol



transporters than all other fungi we have compared it to in the fungal kingdom, based on what we know from genome research."

The team of researchers discovered that inositol stimulates *Cryptococcus* to sexually reproduce. "A connection between the high concentration of free inositol and fungal infection in the human brain is suggested by our studies," Xue said. "Establishing such a connection could open up a new way to control this deadly fungus."

Cryptococcus' love for <u>sugar</u> may also be a fungal Achilles Heel, Heitman said. "Now scientists may be able to target the fungi by developing ways to put them on the fungal equivalent of an Atkin's low-carbohydrate diet so they will stop multiplying." He said researchers could use the new findings to devise different types of strategies to block *Cryptococcus* infections.

These studies will be reported in the inaugural issue *mBio*, which will be launched in May by the American Society of Microbiology as an online journal that spans all areas of <u>microbiology</u>.

Provided by Duke University Medical Center

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