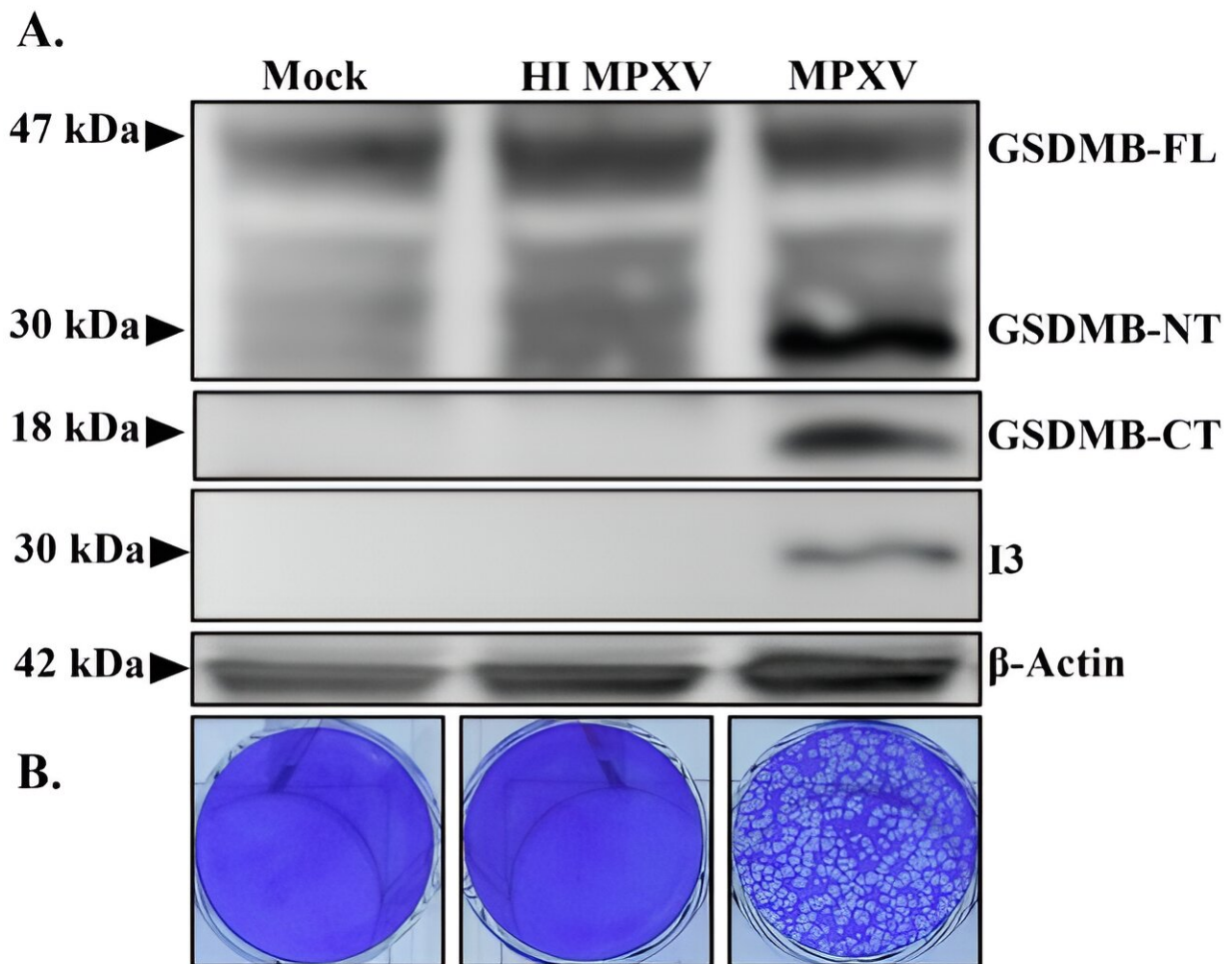


Researchers investigate how the mpox virus infiltrates brain cells

February 16 2024, by Gillian Rutherford



Effect of heat inactivation (HI) on the infectivity of MPXV. A) Human astrocytes were infected with HI or non-inactivated MPXV at an MOI 10 for 24 hr. B) Number of infectious particles in Mock, HI MPXV and MPXV was determined by plaque assay in BSC-40 cells. Credit: *Proceedings of the National Academy of Sciences* (2024). DOI: 10.1073/pnas.2315653121

A multidisciplinary team at the University of Alberta is seeking to understand how monkeypox (mpox) virus may be causing neurological symptoms in people affected by the global outbreak of mpox disease, declared by the World Health Organization in 2022.

In [newly published research](#) in the journal *Proceedings of the National Academy of Sciences*, the team used laboratory experiments to infect human brain cells with the mpox virus. They found mpox virus infiltrated the astrocytes—a type of cell responsible for normal brain function—triggering an extreme immune response.

"Astrocytes are the most abundant neural cells in the brain," explains first author Hajar Miranzadeh Mahabadi, a postdoctoral fellow in medicine and holder of a Canadian Institutes of Health Research HIV Trials Network fellowship. "We found that monkeypox virus can efficiently infect these cells and can induce a kind of brain cell death we call pyroptosis."

"We were looking at the potential of the virus to infect brain cells and see what consequences that infection might have on the cells," says co-investigator Ryan Noyce, assistant professor of medical microbiology and immunology, noting further study is required using samples from human patients, animal models and various strains of mpox. "Our findings shed light on the possibility of monkeypox virus infiltrating the brain and infecting cells in some instances."

Understanding a global outbreak

More than 80,000 people had been infected by mpox virus by the time the outbreak was declared, according to Health Canada, and there are currently about 1,500 confirmed cases in Canada. The virus is

transmitted by skin or sexual contact or respiratory droplets, and this outbreak has mainly affected men who have sex with men.

Common symptoms include a rash, fever and aching muscles, but [neurological symptoms](#) such as headache, mental confusion and seizures have increasingly been observed, suggesting inflammation of brain tissue.

"The extent of monkeypox virus cases, particularly those associated with neurological complications, highlighted the urgent need to understand the potential effect of [monkeypox virus](#) in the central nervous system," says Miranzadeh Mahabadi, noting this is the first study to examine [brain cells](#) exposed to mpox virus.

The research team identified a potential avenue for treatment when they were able to reduce cell death in mpox virus-infected cells by treating them with [dimethyl fumarate](#), a compound approved in Europe for psoriasis and used to treat multiple sclerosis in the United States and Canada.

Noyce notes there are now two antiviral treatments approved for mpox disease and there is also a vaccine available in Canada for preventing disease in vulnerable populations.

Miranzadeh Mahabadi plans to continue her research on mpox and the brain, and to examine why mpox disease seems to be more severe and has a higher mortality rate among people who also have HIV.

More information: Hajar Miranzadeh Mahabadi et al, Monkeypox virus infection of human astrocytes causes gasdermin B cleavage and pyroptosis, *Proceedings of the National Academy of Sciences* (2024). [DOI: 10.1073/pnas.2315653121](https://doi.org/10.1073/pnas.2315653121)

Provided by University of Alberta

Citation: Researchers investigate how the mpox virus infiltrates brain cells (2024, February 16)
retrieved 29 April 2024 from

<https://medicalxpress.com/news/2024-02-mpox-virus-infiltrates-brain-cells.html>

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