



CCZ1, a promising roadblock for viral infections

Viruses are small infectious vehicles that enter human cells hijacking their machinery for replication. Marburg and Ebola viruses are two of the deadliest known viruses that can infect humans. Finding effective treatment options has been a concern for health specialists. Scientists from JLP Health in Austria in collaboration with researchers from Karolinska Institute in Sweden and the Institute for Molecular Biotechnology in Austria found a promising target structure, CCZ1, for potential therapeutic intervention. The study, published in *Nature Communications* on the 25th of October 2023, shows that CCZ1 is a key host cell factor for Marburg-, Ebola-, and SARS-CoV-2 virus infections, which when blocked or removed, decreases infection rates. Thus, CCZ1 provides a potential therapeutic target to ameliorate infections of several viruses.

The Covid 19 pandemic has made present how much a single virus can affect today's society. Like other organisms on the planet, viruses need to produce more of their own kind to make sure they survive as a species. However, on the contrary to other organisms, viruses cannot reproduce on their own and need to hijack non-viral systems in so called host species. The most relevant viruses for our society are the ones that use animals or humans as hosts for reproduction.

Viruses are like vehicles. They carry information which they transport into host cells by direct interaction with host cell surface receptors. Once the virus information is delivered to a cell, cellular machineries are hijacked for replication, wrapping, and secretion of new virus particles. Marburg and Ebola virus are two closely related viruses that infect humans leading to severe symptoms and potentially death. Currently, no effective treatment options are available, making the search for points of attack for therapeutic intervention a high priority.

In a recent study published in *Nature Communications*, Researchers from the Karolinska Institute, Karolinska University Hospital in Stockholm, Sweden, and the Institute for Molecular Biotechnology in Vienna, Austria in collaboration with scientists from JLP Health GmbH in Vienna, Austria, identified a key host cell factor, CCZ1, required for the replication of Marburg-, Ebola- and the SARS-CoV-2 virus.

Lead author on the study Vanessa Monteil suggests "this was an important find that can help with the development of antiviral therapies by targeting virus-host cell interactions."

CCZ1 functions as a traffic conductor for the virus within the cells in a specific process called endosomal trafficking. Endosomal trafficking creates pockets from the cells membranes that lead the virus to the needed cellular machinery for its replication. CCZ1 plays a pivotal role in this transport system and as such, when absent, perturbs efficient viral replication. Notably, this endosomal trafficking process is used by several viruses.

“It is striking that this cellular entry route is hijacked by such different virus classes such as Marburg and Ebola and SARS-CoV-2 on the other hand. This could be an interesting entry point for pan-antiviral interventions”, adds Moritz Horn, CSO of JLP Health.

To learn more about the study refer to: Monteil, V., Kwon, H., John, L. et al. Identification of CCZ1 as an essential lysosomal trafficking regulator in Marburg and Ebola virus infections. *Nat Commun* 14, 6785 (2023). <https://doi.org/10.1038/s41467-023-42526-6>

This story has also been chosen to be featured in the [Editors' Highlights webpage](#) from *Nature Communications*.

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JLP Health is a privately held biotech company based in Vienna, Austria, focused on the discovery of new drug target structures to develop innovative therapies for diseases with high unmet medical need. JLP Health has developed unique and unbiased screening approaches at unprecedented single amino resolution (structural biology by genetics) to identify molecular modes of action required for the activity of anti-cancer drugs. Besides the oncology focus, this platform technology is applied to uncover host cell factors essential for viral infections. Moreover, JLP Health continues to uncover molecular mechanisms of natural substances via its genetic screening capabilities with the goal to develop rational treatment options based on fundamental understanding of drug actions.

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