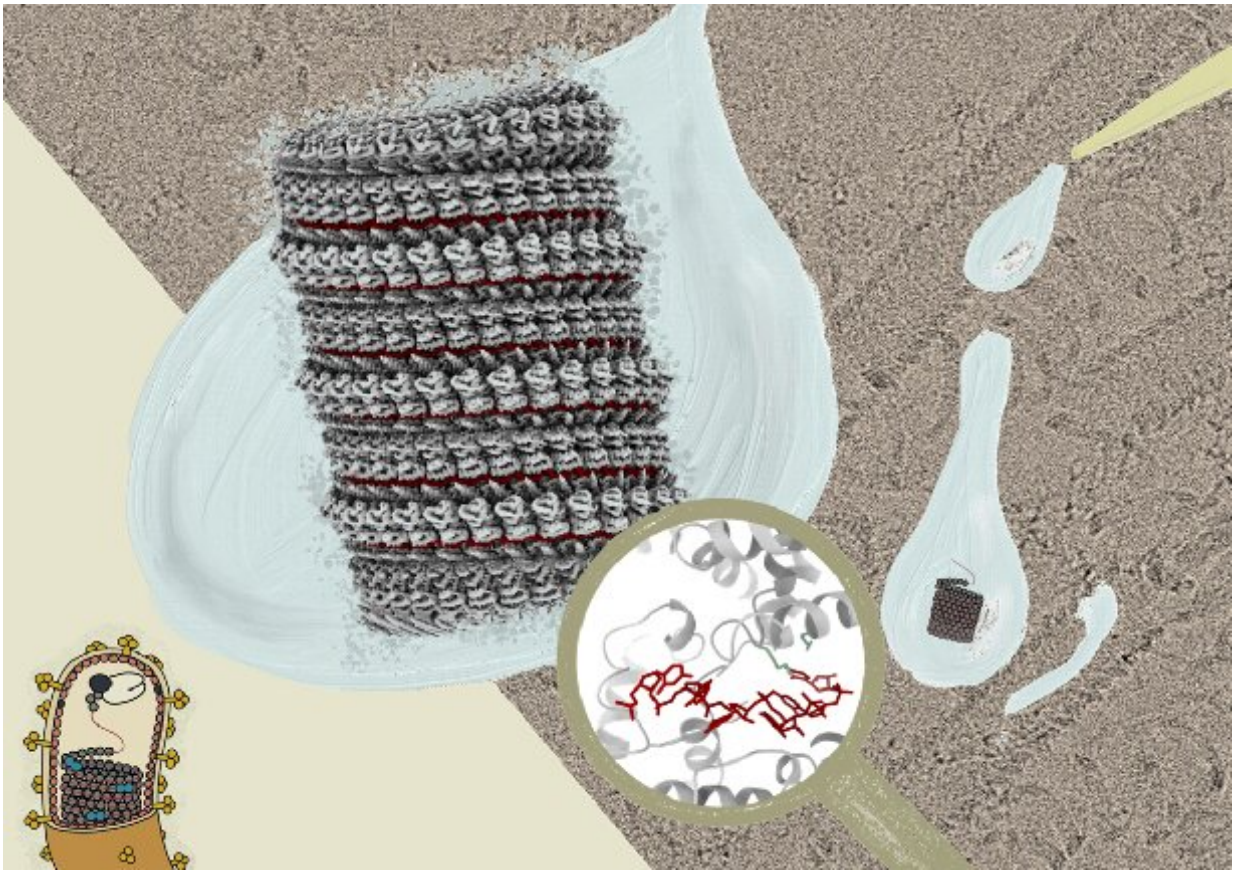
A new approach to fighting the Marburg virus

July 12 2022



Amino acid residues of MARV NP are involved in interactions with RNA. Credit: KyotoU/Takeshi Noda

A research team led by Kyoto University is attempting to take the Marburg virus by its horns using recently gained knowledge of its core

structure.

Results from a recent study suggest future drug development may be possible based on the targeting of nucleocapsid formation, which may inhibit the Marburg virus' ability to replicate.

"Amidst sporadic and repetitive outbreaks in Africa of both Marburg and Ebola viruses causing severe hemorrhagic fever, neither a specific treatment for Marburg disease nor preventative vaccines are available," says lead author Takeshi Noda, "but our results may greatly advance our understanding of the viruses."

Noda's optimism comes from the fact that helical nucleocapsids in infected cells are composed of Marburg viral genomic RNA and nucleoproteins, or NPs, that are structurally similar to those of the Ebola virus.

Although the exact mechanism of the helical nucleocapsid assembly during viral replication remains to be investigated, the research team has determined the key sites in the core structure that are critical for formation.

Using cryo-electron microscopy, the scientists captured helical NP-RNA complexes in mammalian cells, determining their three-dimensional structure at a near-atomic level. Mutational analysis was used to identify NP amino acids important for genome transcription and replication.

While the amino acid sequences of Marburg and Ebola NPs only shared 50% similarity, the remarkable similarity of their NP-RNA structures took the team by surprise.

"This discovery highlights the significance of the NP-RNA complex as a target of therapeutic research for the Marburg virus and others in the

family Filoviridae," concludes the author.

The research was published in *Nature Communications*.

More information: Fujita-Fujiharu, Y. et al, Structural insight into Marburg virus nucleoprotein–RNA complex formation, *Nature Communications* (2022). DOI: 10.1038/s41467-022-28802-x

Provided by Kyoto University