Host cell proteases can process viral capsid proteins

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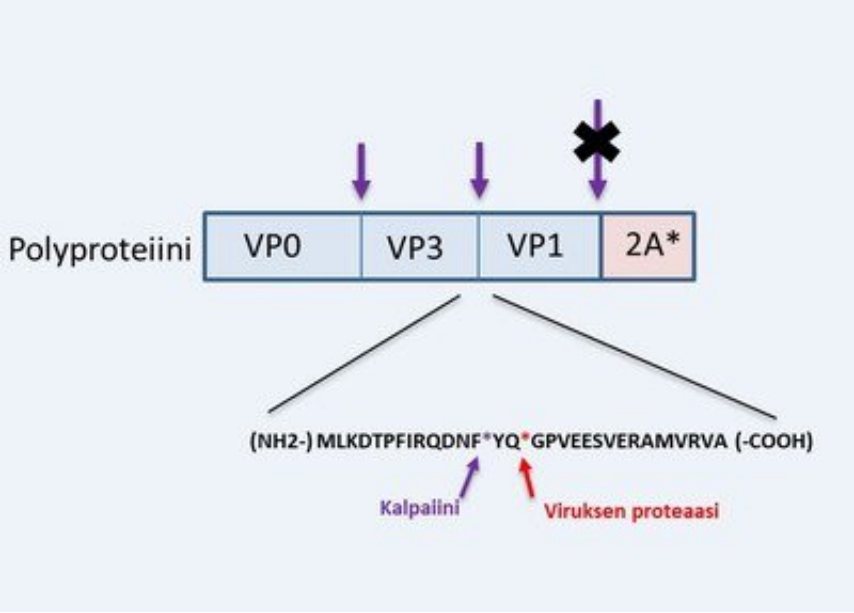

The research done at the University of Jyväskylä showed that calpain proteases can cut out viral capsid proteins from the larger polyprotein. Credit: Varpu Marjomäki/University of Jyväskylä

It has long been suggested that a cell protease could take part in enterovirus infection. However, the identities of such proteases have remained unknown. The work performed in the University of Jyväskylä shows, for the first time, that host cell calpain proteases can process enterovirus polyprotein in vitro. The research was published in *Viruses* in November 2019.

Enteroviruses are the most common viruses infecting humans. Although most of the diseases that enteroviruses cause are symptomless or mild, enteroviruses can also cause more severe diseases.

Calpains are common host cell proteases, ubiquitous in the cell cytoplasm. The group of Docent Varpu Marjomäki had shown earlier that inhibition of calpain proteases stops enterovirus infection very efficiently. Their new research sheds light on the mechanism of the inhibitory effect. The work suggests that enteroviruses have learned through evolution to take advantage of cellular resources for their own benefit.

"We showed that calpain proteases can cut out viral capsid proteins from the larger polyprotein, and thus have the potential to contribute to the assembly of new viruses," says Docent Varpu Marjomäki.

Virologist Dr. Marco Vignuzzi from Pasteur-Institute, Paris, says, "I consider this an outstanding observation and very significant first demonstration that will lead to significant advances in the field. It may very likely be that this mechanism of cleavage is also used by viruses in other viral families," Vignuzzi says.

According to Vignuzzi, the work is among the most interesting research that will be published this year in picornavirus research. This work was part of Mira Laajala´s dissertation at 22.11.2019 in Marjomäki´s group. Laajala showed further that calpain proteases have cross-reactivity against viral proteases, as well. Inhibition of calpain proteases thus offers a future possibility to develop antiviral therapies based on calpains.

More information: Laajala et al, Host Cell Calpains Can Cleave Structural Proteins from the Enterovirus Polyprotein, *Viruses* (2019). DOI: 10.3390/v11121106

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