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Identifying and attacking the HIV virus's most dangerous parts may now be possible

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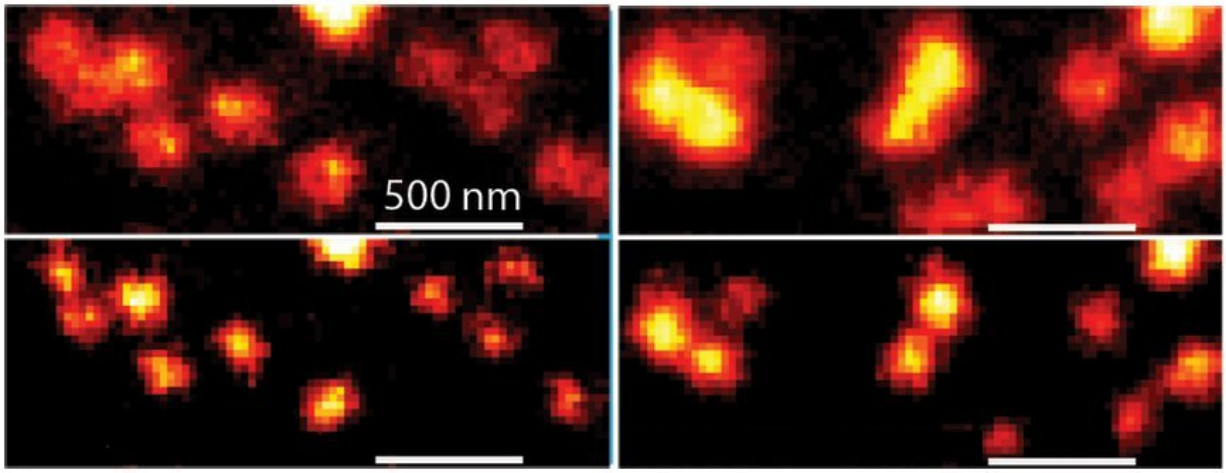

Individual HIV viral particles appear in two images recorded at low and high resolution using specially-engineered fluorescent proteins. They appear virtually indistinguishable, but by analyzing the direction of the emitted fluorescence, it is now possible to measure the molecules' rotation and tell which ones are mature and which ones are not. Credit: Ilaria Testa

A new method could make it possible to identify the most dangerous parts of the HIV virus, so they can be singled out for attack.

Researchers at KTH Royal Institute of Technology in Sweden created a method of illuminating viral molecules that blink on and off, enabling more accurate measurements of a virus's progressive growth than

currently possible. KTH researcher Ilaria Testa says the method makes it possible to track which molecules in the HIV virus are essential for growth.

"That knowledge could be put to use in finding therapies for HIV positive patients, since it can help identify which molecules to block to prevent the virus from growing," Testa says.

The research was reported last week in *Nature Biotechnology*. It was carried out at the Science for Life Laboratory (SciLifeLab) in Stockholm.

The key to identifying whether molecules are binding to other proteins is to measure how fast the molecules rotate. Just as larger objects usually rotate slower than the smaller ones, the more mass a molecule accumulates the slower it will rotate.

KTH researcher Ilaria Testa says the method improves upon a commonly-used form of fluorescence technique which can only measure fast rotation of molecules. But such techniques are blind to the typical, slower rotation of human proteins.

The researchers doped an HIV viral particle with specially-engineered fluorophones that switch themselves on and off so that they highlight the orientation of the molecule. With longer on and off states these fluorophones—or reversibly photoswitchable fluorescent proteins—enable the identification of slow rotation of growing molecules.

"We showed that the method can be used to identify HIV maturation state and to learn more about how viruses like HIV progress," Testa says.

More information: Andrea Volpato et al, Extending fluorescence

anisotropy to large complexes using reversibly switchable proteins, *Nature Biotechnology* (2022). DOI: 10.1038/s41587-022-01489-7