

Designer nano luggage to carry drugs to diseased cells

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For the first time, scientists have succeeded in growing empty particles derived from a plant virus and have made them carry useful chemicals.

The external surface of these nano containers could be decorated with molecules that guide them to where they are needed in the body, before the chemical load is discharged to exert its effect on [diseased cells](#). The containers are particles of the Cowpea mosaic virus, which is ideally suited for designing [biomaterial](#) at the nanoscale.

"This is a shot in the arm for all Cowpea mosaic virus technology," says Professor George Lomonosoff of the John Innes Centre, one of the authors on a paper to be published in the specialised nanotechnology scientific journal, *Small*.

Scientists have previously tried to empty virus particles of their genetic material using irradiation or chemical treatment. Though successful in rendering the particles non-infectious, these methods have not fully emptied the particles.

Scientists at the John Innes Centre, funded by the BBSRC and the John Innes Foundation, discovered they could assemble empty particles from precursors in plants and then extract them to insert chemicals of interest. Scientists at JIC and elsewhere had also previously managed to decorate the surface of virus particles with useful molecules.

"But now we can load them too, creating fancy chemical containers,"

says lead author Dr Dave Evans.

"This brings a huge change to the whole technology and opens up new areas of research," says Prof Lomonosoff. "We don't really know all the potential applications yet because such particles have not been available before. There is no history of them."

One application could be in [cancer treatment](#). Integrins are molecules that appear on cancer cells. The [virus particles](#) could be coated externally with peptides that bind to integrins. This would mean the particles seek out [cancer cells](#) to the exclusion of healthy cells. Once bound to the cancer cell, the virus particle would release an anti-cancer agent that has been carried as an internal cargo.

Some current drugs damage healthy cells as well as the cancer, leading to hair loss and other side effects. This technology could deliver the drug in a more targeted way.

"The potential for developing Cowpea mosaic virus as a targeted delivery agent of therapeutics is now a reality," says Dr Evans.

The empty viral particles, their use, and the processes by which they are made, are the subject of a new patent filing. Management of the patent and commercialisation of the technology is being handled by PBL.

More information: "Cowpea Mosaic Virus Unmodified Empty Virus-Like Particles Can Be Loaded with Metal and Metal Oxide."

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