Polioviruses Found to be Transmitted in "Packages"

A Bruno Byte
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“When I look back, it seems so obvious that viruses would want to be transmitted together.”

From Nihal Altan-Bonnet
N.I.H.

We have found that poliovirus, Coxsackie virus (causes foot and mouth disease in children) and rhinovirus (a cause of the common cold) are transmitted as clusters inside vesicles (like little balloons). The viruses are clustered and packaged within membrane-bound vesicles inside the cells where they are replicating.

This form of transmission is highly advantageous for the viruses. Pound for pound, viruses clustered inside vesicles are much more virulent than equal numbers of free viruses. We think this is due to several factors. The membrane cloak keeps the clusters together all the while they transit through the GI tract. Remaining intact as they pass through the GI tract, the packets are able to deliver a high dose of virus simultaneously into the intestinal cells.

We also think the membrane cloak around the clustered viruses protects the viruses from being seen by the immune system of the gut. Free virus particles become diluted and even inactivated by enzymes and antibodies as they are transiting through the GI tract. When some do eventually reach the intestinal cells, they are too few in number to infect the cells efficiently and fight off the immune system. But, once vesicles reach the upper intestines, they are taken up by cells and the viruses are transferred *en masse* into the cell that took up the vesicle. So that cell suddenly becomes infected by *many* virus particles simultaneously, and people get sick faster and stay sicker for longer.

The multiple virus particles within a cell then start to band together and rapidly replicate, compensating for each other’s deficiencies, to churn out viral progeny that are then released in vesicles into the blood stream as well as back into the gut. The vesicles released into the gut make their way into stool and eventually to *another* susceptible person via the oral-fecal route. The vesicles appear to be highly stable under a variety of harsh environmental conditions, so people may come in contact with them over a longer period of time and may get more easily infected as the vesicles carry multiple virus particles for delivery.

Also, RNA viruses (such as polioviruses) are known to carry many mutations within their genetic

material (RNA). Some of these mutations can be quite deleterious for the virus, preventing it from replicating in another cell. It's possible that when they are delivered in multiples into a cell from a vesicle, these viruses interact in a way that lessens the effects of the mutations carried by individual virus particles. Of course, mutations could also lead to much more rapid emergence of traits that cause resistance to drugs and vaccines (and make the oral polio vaccine strains virulent once more).

https://www.researchgate.net/blog/post/traveling-together-in-packets-is-what-makes-some-viruses-so-infectious

The Encyclopedia of Polio and Post-Polio Sequelae
contains all of Dr. Richard Bruno's articles, monographs, commentaries and "Bruno Bytes"
https://www.papolionetwork.org/encyclopedia.html

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