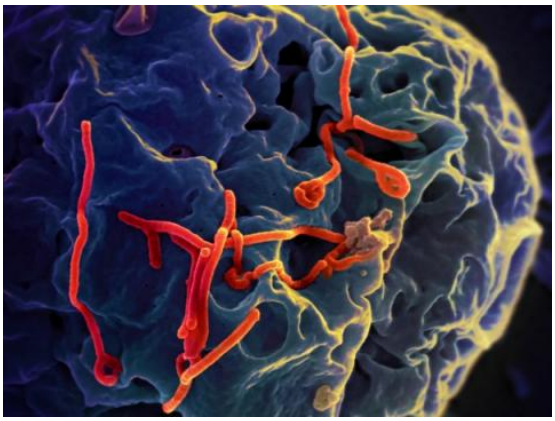
AWESOME stories

FUTURE of EBOLA



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From America's National Institute of Allergy and Infectious Diseases (NIAID), this image depicts the worm-like Ebola virus (in red). License: CC BY 2.0

What does the future hold for Ebola research?

Have scientists learned anything useful about the virus which gives us hope for a future vaccine?

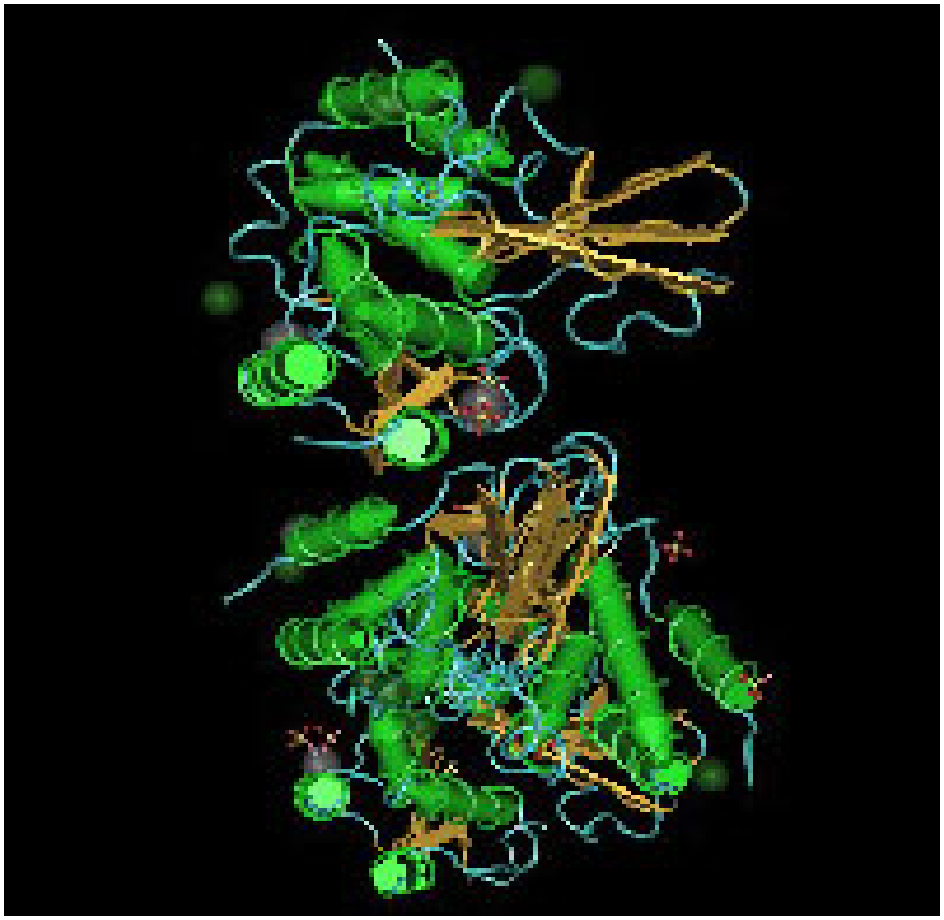
Is it possible for an infected person's immune system to mount its own fight against the disease, once the Ebola virus enters the bloodstream?

Assessing the future of Ebola, and the world's collective fight against the deadly virus, we learn something important from the National Institutes of Health. The virus itself appears to have a built-in defense mechanism which prevents a body's immune system from immediately springing into action.

Researchers have found a specific Ebola-virus protein which hides the virus' existence. Because a person's body cannot detect the hidden virus, the virus effectively prevents our immune system from going to work.

America's National Institute of Allergy and Infectious Diseases (NIAID) tells us about this Ebola-virus masking technique:

> *... researchers have determined the structure of a critical part of Ebola's VP35 protein, which interferes with the natural immune response to infection.*
>
> *Typically, when a virus infects cells, the human immune system responds to the virus' RNA and mounts a defense. A protein on the surface of the Ebola virus, called VP35, masks the viruses' RNA, and inhibits the human immune system from attacking the virus.*
>
> *To learn more about this interaction between the host and the virus, researchers at Iowa State University determined the X-ray crystal structure of a double-stranded Ebola RNA bound to VP35* [the protein] *from the deadly Zaire species* [that is the Ebola sub-type which emerged at Yambuku in 1976].
>
> *The team, led by Dr. Gaya Amarasinghe, found that multiple copies of VP35 cap the end of the double-stranded RNA and bind to the RNA backbone, preventing host immune systems* [such as in the infected person's body] *from recognizing infection* [as depicted in this image from Iowa State University].



If an Ebola-infected person's immune system cannot recognize an infection, it cannot start—let alone fully engage—its defense. As a result, researchers are looking at ways to get around the masking capability of the Ebola virus' VP35 protein:

> *One avenue being explored is development of a drug that targets the VP35 functions and could inhibit RNA binding, preventing severe infection.*

Promising work is also proceeding on a potential Ebola vaccine. Using scientific terms, the NIH (National Institutes of Health) tell us more about that avenue:

> *The Vaccine Research Center (VRC) has developed an Ebola vaccine candidate in collaboration with Okairos, a Swiss-Italian biotech company recently acquired by GSK. The investigational vaccine, which was designed by VRC scientists, contains no infectious Ebola virus material.* [In other words, it is not a live virus.] *It is a chimpanzee adenovirus vector vaccine into which two Ebola genes have been inserted.*
>
> *This is a non-replicating viral vector, which means the vaccine enters a cell, delivers the gene inserts and does not replicate further. The gene inserts express a protein to which the body makes an immune response.* [In other words, the infected person's immune system begins to fight against the inserted protein.]
>
> *The investigational vaccine has recently shown promise in a primate model. The VRC vaccine will enter into a phase 1 clinical trial* [meaning it will involve testing on humans], *which could start enrollment as early as fall 2014, pending approval by the FDA* [the U.S. Food and Drug Administration]. *The VRC is also in discussions with governmental and non-governmental partners regarding options for advancing this candidate beyond Phase I clinical evaluation.*

NIAID is also partnering with other pharmaceutical companies and research facilities to develop a potential Ebola vaccine for animals. That approach has worked well for years to prevent rabies:

> *Investigators from NIAID's Division of Intramural Research and Thomas Jefferson University are collaborating to develop a candidate Ebola vaccine based on the established rabies virus vaccine that has demonstrated protection against rabies and Ebola infection in animals.*
>
> *This research team is pursuing an inactivated version of this vaccine for human and veterinary use and a live vaccine for use in wildlife in Africa to help prevent the transmission of Ebola virus from animals to humans.*

Why is it taking so long for an Ebola vaccine to be available for people? Thomas Geisbert, a leading Ebola vaccine developer, has some frank (and troubling) thoughts about that topic:

> ...[the] *small global market has generated little commercial interest.*

Those observations are shared by Francis Collins, Director of America's National Institutes of Health:

Because of the extremely limited market potential prior to the 2014 outbreak, there was little industrial interest in an Ebola vaccine.

A nasal spray for monkeys is also showing positive results. It's a needle-free approach to preventing Ebola which scientists think might also work for humans. Much more testing has to be done, however, before anyone can say if nasal spray is an option for people.

Meanwhile, as an anxious world awaits news of effective Ebola-fighting measures, we are left with preventive strategies reminiscent of the nineteenth century:

- Contact tracing (following the footsteps of Ebola-infected people to learn where, and with whom, they've been in contact);
- Quarantine (isolating Ebola-infected people and those with whom they've had contact); and
- Similar rudimentary public-health strategies.

This will have to do until a new Ebola vaccine passes the rigorous process of human trials.

UPDATES: The fight against Ebola has ups and downs:

On Thanksgiving Day, 2014, the head of NIH's National Institute of Allergy and Infectious Diseases discussed promising results of a new study involving a potential Ebola vaccine. The study answers "yes" to both of these key questions: Is it safe and does it induce a protective response in volunteers? In short, researchers successfully completed the first phase of the early round of testing.

AND ... WHO discussions about vaccination clinical trials were scheduled for January of 2015.

THEN, in December of 2016, even better news: NPR reports that "First Ebola Vaccine Likely to Stop the Next Outbreak."

NOW ... "the world's second-biggest Ebola outbreak is still raging" during the summer of 2019.

See Alignments to State and Common Core standards for this story online at:
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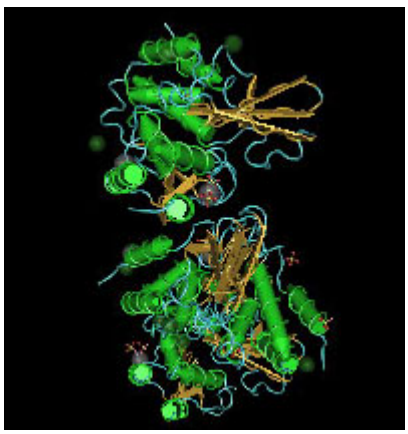
See Learning Tasks for this story online at:
http://www.awesomestories.com/asset/AcademicActivities/FUTURE-of-EBOLA-Ebola-Past-Present-and-Future

Media Stream



Ebola Virus VP35 Protein
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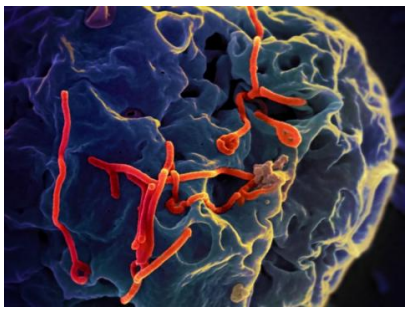

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