CLADE X PATHOGEN ENGINEERING ASSUMPTIONS

The following is a description of biological properties and invented design assumptions for Clade X, a fictitious novel virus that was the cause of the pandemic in the Clade X exercise.

SCENARIO PATHOGEN

The imagined Clade X pathogen is a hybrid of 2 similar viruses: Nipah virus, and human parainfluenza virus (HPIV) serotype 3. In reality, Nipah virus has a high case fatality rate in humans (70%), but it is not transmissible between humans. And HPIV is transmissible in humans, but death caused by HPIV is rare. In the scenario story, the Clade X pathogen is theorized to retain both the lethality of Nipah and the transmissibility of HPIV. In addition, the virus was theorized to be antigenically distinct from the 4 existing HPIV serotypes. In this sense, the biological properties of the made-up Clade X virus are not novel, but there is no real-world evidence that such a hybrid virus has actually been engineered, nor has it been identified in nature.

ENGINEERING ASSUMPTIONS

In the fictitious story behind the exercise, the Clade X designers are imagined to be aided by animal and cell culture methods, animal models, and reverse genetic systems. It is also assumed in the story that the designers are not limited by ethical and moral standards, so they may use human test subjects rather than only cell culture and animal models.

The Clade X pathogen was imagined to be designed with a hybrid approach of rational and irrational methods. Rational approaches involve determining what genetic sequence performs a desired function and incorporating that into a build-design test loop. It has the advantage of being precise, targeted, and fast, but it is limited by the degree of knowledge designers have of the underlying biology or genes to be engineered. Irrational genetic engineering involves an iterative approach of random mutation or recombination followed by screening or selection. This approach has the advantage of evolving features that the "engineer" does not understand but may be slow and imprecise.