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Influenza -- insidious and baffling

We have all heard of influenza, and we don't take it particularly seriously, but in fact, it belongs to Category 3 of potentially dangerous agents which could be used in biological warfare. In Saint Petersburg, an entire facility is devoted to studying the problem of influenza. Doctor of Biology Oleg Ivanovich Kiselev, the director of the State Scientific Research Institute on Influenza, explains why the facility is necessary and why influenza poses such a serious threat:

The Soviet authorities thought not only about the possibility of a world nuclear war, but also about the spread of infectious diseases. Epidemiologists were working on a concept of step-by-step elimination of diseases and even meant to export it. For example, V. I. Vishnikov, who was the director of our institute's international department, received recognition from the government of India for eradication of small pox. The Soviet government created the strictest anti-infection control standards in the world, which eliminated polio, tuberculosis, malaria, typhoid, and leishmaniasis.

Then in 1957, came the crushing south Asian flu epidemic: schools and offices were simply empty. The Communist Party of the Soviet Union decreed that along with polio and small pox, influenza should be eliminated. To accomplish this, a network of epidemiological institutions was established across the country. We study influenza and acute respiratory viral infections. These infections are important because often when someone is diagnosed with the “flu,” it turns out that they actually suffer from a close relative of the flu virus—rhinovirus, adenoviral infections and others. These viruses cause the same or similar symptoms as influenza. Even atypical pneumonia was originally considered influenza, because the symptoms are the same (fatigue, headache, rhinitis, eye pain, and fever), and patients were being treated for cold symptoms before ending up in the hospital with more serious complaints.

The Scientific Research Institute for influenza is a component of the system called “State Medical-Epidemiological Supervisory.” The head sanitary inspector oversees six of our supporting institutions across the country. We work closely with the Ministry of Health and provide it with the most current reports on influenza, and particularly with regard to epidemics. In complex matters, we prepare reports for the head sanitary inspector of the Russian Federation. We are affiliated with the WHO (World Health Organization) and take part in the global system of influenza studies. Two years ago we did not take our allotted vacation time off, and instead prepared a series of recommendations on atypical pneumonia for local public health departments, so that doctors could quickly identify atypical pneumonia in patients, a diagnosis that in the early stages of illness is difficult to make. When mad cow disease became a crisis, we studied the prions which are the cause of the disease, and published a monograph on the subject, which can be used as a resource if there is an outbreak of this infection in our area.

Q: Did the institute solve the problem which it was created to study?

A: The institute has not solved the influenza problem, and no one in the world has yet solved it. In science it is impossible to put a question in that way, because the main criteria for evaluating the success of scientific work is the conformity of the work to the standards of the science world, and not “solving the problem.” There are results along the way. In China we are renowned as the creators of the first vaccine in the world against Asian influenza. Almost all the vaccines which are used today in this country were developed within the walls of this institution. We have developed on the order of 40 anti-influenza vaccines.

Q: Why so many?

A: There are different variations in the construction of a vaccine, and we needed to understand which was best. We needed a vaccine which would provide a relatively long-term, solid immunity, which would not contain allergens, and which would not cause side effects. Today we have four preparations with completely different mechanisms of action. There is a live influenza vaccine, a weak form of the virus, which creates immunity which lasts not just one but several seasons. Inactive vaccines (single virion, “sub-single” and split) contain the dead virus and do their work with the help of antigens. The influenza virus is highly mutative; therefore, in order to create a vaccine for the season ahead, we meet with the WHO in February to determine which strains to concentrate on.

Q: How is it possible to determine that?

A: There is a global system of influenza surveillance for that. National centers in each country are under the direction of a special department of the WHO in observing influenza trends. Around the world, specialists take mucus samples of influenza patients, isolate the influenza virus and study its gene structure. On the basis of the genetic structure of viruses scientists construct an “evolutionary tree,” from which it is possible to see the “next” stage of the virus—that is, the latest evolutionary step. WHO committee members, who meet in February, make the decision of which virus to use in developing the next vaccine. A few years ago, for example, the “Moscow strain” was used.