

Scientists uncover clues to prevent disease pandemics

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EU-funded researchers have examined new ways of rapidly detecting infectious pathogens - such as rabies and influenza - in order to prevent pandemics.

Zoonoses - the natural transmission of viral diseases from animals to

humans - represent a persistent global threat to our health. Scientists are striving to better understand how new human pathogens emerge in order to put in place strategies that effectively prevent widespread outbreaks, such as the tragic 2014 Ebola outbreak in West Africa and the current Zika virus outbreak in South America.

The EU-funded PREDEMICS project has been at the forefront of this endeavour. Launched in November 2011, this five year project has investigated ways of detecting a range of [infectious pathogens](#) - such as rabies, the [human influenza virus](#) and Ebola - quickly and simultaneously. This was accomplished through diligent research on identifying the key viral mechanisms that are involved in evading the host's immunity.

The success of this work will contribute towards the design of effective disease prevention, control and treatment strategies as well as pandemic preparedness and response. Significant progress was made for example in better understanding influenza viruses, which can cause seasonal epidemics and occasional pandemics.

The flu virus spreads between people by different routes, including through the air in droplets and aerosols and through direct contact. However, the contribution of these different transmission routes in human influenza outbreaks is difficult to quantify and has to date been poorly understood.

In order to address this, the project team studied transmission routes in animals inoculated with mixtures of antiviral drug-sensitive and resistant viruses. By housing ferrets under different conditions, the PREDEMICS team was able to mimic various routes of transmission, such as through the air and through direct contact. Ferrets were chosen because they show a similar distribution of sialic acid (SA) receptors with humans, which enable incoming virus to enter target cells. Ferrets also display

clinical signs after infection reminiscent of influenza-like symptoms in humans.

The scientists found that, for animals with a mixed infection of viruses that were resistant and sensitive to the antiviral drug oseltamivir, resistance was propagated through contact transmission but not by air. This implies that transmission events with a looser bottleneck can propagate minority variants and may be an important route for influenza evolution.

Project partners also found that viral isolates from patients with severe H1N1 infection (originally known as swine flu) displayed higher genetic heterogeneity compared to patients with mild forms of the disease. This underscores the importance of genetic variation in virus adaptation. And studies on infected bat colonies and red fox populations also provided novel insights.

For instance, the prevalence of lyssaviruses (which include rabies) depended on bat colony size and the number of species. Such findings will contribute towards better infection control methods in wildlife. Two major studies on the Zika virus - another mosquito-borne disease funded within the PREDEMICS consortium have recently been published in *The Lancet*.

All data amassed through the PREDEMICS project is currently being collected and compiled in a freely accessible data-sharing platform, which will enable further analysis after the project is completed at the end of October 2016. Furthermore, training in leading European universities, as well as exchanges of approaches and data sharing with national and international health organisations has been carried out, in order to strengthen Europe's position in this global challenge.

More information: Project website: predemics.biomedtrain.eu/cms/

Provided by CORDIS

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