Hopes for prophylaxis and therapy for Chikungunya

Researchers at the Institut Pasteur and Inserm, working together with Laboratoire Français du Fractionnement et des Biotechnologies (LFB), have managed to treat and prevent the Chikungunya virus infection in animals by purifying antibodies directed against this virus using plasma from patients that had recovered from the disease and were therefore immune to the virus. The research demonstrating the efficacy of this process, which was published in the Journal of Infectious Diseases, paves the way to the development of the first specific treatment for the infection in the near future.

Researchers at the Institut Pasteur and Inserm, working within the Microbes and Host Barriers Group (1), have demonstrated the efficacy, both in vitro and in vivo, of the first prophylaxis and therapy for the Chikungunya virus.

The scientists used blood plasma from almost 600 donor patients from Reunion Island who had contracted the disease. As one may know, Reunion Island was severely affected by the Chikungunya epidemic of 2005-2006, with almost one third of the island’s population contracting the disease. During this outbreak, people who contracted the disease and then recovered produced antibodies that immunized them against Chikungunya virus. These antibodies remain in the blood plasma for a number of years after infection. In response to a request by the French department of health calling on the pharmaceutical industry to look for therapeutic and preventive solutions to the disease, LFB worked with the Reunion branch of the French Blood Agency (EFS), collecting plasma from recovered patients, checking for antibodies directed against Chikungunya and purifying these using a process already used to manufacture an LFB drug that has been available in France for a number of years.

Tests carried out by researchers at the Institut Pasteur and Inserm, working with LFB researchers, showed that sera from these immunized patients, as well as the antibodies purified using their plasma, were
capable of blocking the infection of cells inoculated in vitro in the laboratory, curing all animals infected with the virus. Anti-Chikungunya serum and antibodies therefore have a neutralizing effect on the virus. The preventive effect of the treatment has also been proven, as none of the mice treated developed the disease after the virus was administered.

The use of anti-infection serum – or serotherapy – has long been known. It was first used in human by the Pasteurian and bacteriologist Emile Roux to treat diphtheria in the late 19th century. Similarly, antibodies administered regularly boost the immune defenses of patients that do not produce enough or any antibodies.

This research provides proof in principle that the first specific anti-Chikungunya treatment can be produced quickly and easily from donors who have recovered from the disease. Two batches produced in the framework of a strictly regulated production procedure, at the LFB production facility, and will be made available for clinical trials in the event of new outbreaks of the disease. This treatment can be used in particular with people at risk that are likely to develop severe forms of the disease, such as elderly people and babies born to infected mothers. More generally, a similar strategy could be used for other emerging infections for which there is no specific treatment.

Picture: The Chikungunya virus (in red) affects the joints, one of the tissues in which seat the symptoms in humans. © T. Couderc & M. Lecuit/Institut Pasteur/Inserm

(1) Institut Pasteur/Avenir and FRM Team, Microbes and Host Barriers – Inserm Unit 604
(5) Laboratoire Français du Fractionnement et des Biotechnologies, Les Ulis
(6) French Army health service, virology laboratory, Tropical Medicine Institute, Marseille, France.

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Contacts

Institut Pasteur Press Office
Tuline Clément ou Nadine Peyrolo :  +33 (0)1 40 61 33 41 – tuline.clement@pasteur.fr

LFB S.A
Sandrine Charrières
Director of Communications -  +33 (0)1 69 82 72 80 - charrieres@lfb.fr