When vaccinations fail to cause response: Causes vary with vaccine and person

August 15 2013

Most people react very well to vaccinations and have an adequate immune response against the pathogens. The lack of response to vaccines, so-called vaccine failure, affects between one and ten percent of people. The reasons for some people failing to develop a protective immune response, despite having been vaccinated, have remained unidentified up to now. Researchers at the MedUni Wien from the Institute of Specific Prophylaxis and Tropical Medicine have now discovered that there is no standard pattern to this but that he causes vary according to vaccination and group of people, and that vaccination strategies should therefore be revised accordingly.

The reason for non-response in primarily healthy people to the TBEV and influenza vaccination was examined in people, who are not able to build up any or little protection against TBEV or Hepatitis B. The scientists of the MedUni Vienna around Ursula Wiedermann-Schmidt, Director of the Institute of Specific Prophylaxis and Tropical Medicine, were able to demonstrate that the vaccination's failure was the result of various causes and patterns. The results have now been published in the leading *Journal of Immunology*.

Ageing process of the immune system involved

In people, who did not react to the TBEV vaccination by forming antibodies ("non-responders"), this did not change even with a more recent TBEV vaccination. "These non-responders are mainly older people. They do not form any antibodies and cellular immunity to the antigen injected, this indicates that an ageing process in the immune system is playing a role," explains Wiedermann-Schmidt.

And yet the non-response in these persons is restricted to TBEV as these people do respond to an influenza vaccination. "This may be explained by, amongst other things, the fact that they come into contact with influenza viruses repeatedly throughout the course of their lives. The immune system remembers the viruses and reacts to them."

Vaccination failure due to genetic disposition

Another pattern was observed in people, who had been classified as non-responders after a hepatitis B vaccination, that is, they had not responded at all to a hepatitis B vaccination and their immune response to an TBEV and influenza vaccination was examined. Prior to the immunisation these non-responders had already displayed high readings of the immune system messenger substance interleukin-10, which plays a part in the

formation of the regulatory T und B cells and puts the brakes on the immune response. "In this group the reason for vaccination failure is more likely due to a certain genetic disposition (certain HLA subgroups)," says Wiedermann-Schmidt. Nevertheless these people displayed sufficient antibodies against the vaccines.

According to Wiedermann-Schmidt this was attributable to memory cells acquired through earlier TBEV and influenza vaccinations. The question now is how these people react to new and/or first time vaccinations. These and similar questions are now being examined in allergy-sufferers, obese people and others at risk (such as tumour patients for example) in order to be able to optimise vaccination strategies for these groups.

More information: Garner-Spitzer, E. et al. Tick-Borne Encephalitis and Hepatitis B Nonresponders Feature Different Immunologic Mechanisms in Response to Tick-Borne Encephalitis and Influenza Vaccination with Involvement of Regulatory T and B Cells and IL-10, *J Immunol*. 2013 Jul 19. doi:10.4049./jimmunol.1300293

Provided by Medical University of Vienna