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PLACEBO EFFECT – THE HIDDEN PERSUADER

The placebo effect has enormous potential for boosting our physical and mental health. New research at the Technion Israel Institute of Technology in Israel shows that stimulating the brain's reward system can boost immunity.

It is well-known that we tend to become ill during or following a stressful time in our lives. But **Dr Asya Rolls** is looking at the impact of the neuronal networks involved in positive experiences that contribute to recovery from illness. It is the reward system that drives positive emotional states and expectations for a good outcome.

If someone takes a sugar pill in the belief that it is a medicine, the reward system fuels their expectations that it will aid their recovery. Understanding the mechanisms that control the interaction between the brain and the immune system are key to a new approach to therapies.

Speaking at the FENS Forum of Neuroscience in Berlin today (8 July), she said, "We have underestimated the potential of the placebo in treatment and recovery. The mechanisms of the placebo effect are largely unknown. A placebo plays a role in many medical conditions when some people get better even though they are unknowingly taking a sugar pill. But we don't understand how a placebo works and therefore, as a medical community we can't benefit from its therapeutic potential."

In recent experiments in mice, Professor Rolls' team used a combination of genetic tools and drugs to activate dopaminergic neurons involved in the reward system and analysed the immune response after exposure to bacteria (*Escherichia coli*). They found that the antibacterial activity by the body's immune system was enhanced, and the mice recovered more quickly than the mice whose reward system was not activated.

"We know that thoughts and emotions affect our ability to cope with disease, we just don't know how. But, in fact, all thoughts and emotions affect our brain activity. Now with new technology we can understand how brain activity translates into changes in immune activity. We can activate the specific brain region involved in sense of reward and monitor the effects on the immune system. Once we understand how it works in the brain, then we can ask ourselves how we can use this knowledge to control brain activity to boost recovery," she said. There are many new innovations in technological devices now, such as transcranial magnetic stimulation (TMS), that locally affect brain activity. On the one hand, such tools may be useful to improve immune activity without using drugs. On the other hand, these devices, that can now be bought online may be more dangerous than we assumed.

Examining the reverse of positive emotions, Dr Rolls is also interested in the how negative emotions, linked to depression, affects immune activity. "In conditions where there are changes in reward system activity, such as schizophrenia, there are also immunological changes. These conditions may be linked much more closely than we previously suspected," she said.

A better understanding of the interaction between emotional processing and the immune system could lead to new ways to treat psychiatric diseases.

"Our goal is to understand how the brain controls our well-being. In experiments we can manipulate the reward system of the brain and see how that affects emotional processing," she said. The next stage of research is to test different techniques in humans, using tools like neurofeedback (a process that enables person to learn how to change body functions) and TMS to see whether it is possible to affect immune activity by the brain. But, she cautioned, it is only the beginning and it will take time to translate the research to humans.

"This research is important to find out how the placebo effect could be harnessed as an entirely new approach to treating infections and other disease," she concluded.

END

Symposium: S16 – Two to tango: Brain immune interactions
Abstract: A Rolls – Reward system regulation of anti-bacterial and anti-tumor immunity

Contact
FENS Press Office and all media enquiries:
Elaine Snell, Snell Communications Ltd, London UK *(English language)*
tel: +44 (0)207 738 0424 or mobile +44 (0)7973 953794
email: Elaine@snell-communications.net

Barbara Ritzert, ProScience Communications, Pöcking, Germany *(German language)*
tel: +49 8157 9397-0 or mobile +49 151 12043311
email: ritzert@proscience-com.de

NOTES TO EDITORS
Dr Asya Rolls, Technion - Israel Institute of Technology, Haifa, Israel
https://rolls.net.technion.ac.il/

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