

White blood cells cast 'spider's web' of germ-killing DNA

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Scientists at the University of Birmingham have found a way of triggering the release of a powerful 'spider's web' of disease-fighting DNA in the body's protective white blood cells.

Researchers in the School of Dentistry used Hypochlorous acid (HOCl) to produce the webs, known as NETS (neutrophil extracellular traps), from the white blood cells of patients who have a condition in which their cells are unable to produce NETs naturally. The findings are reported in the journal *Clinical and Experimental Immunology*.

Recent studies have shown that when neutrophils - the white blood cells which form the body's first line of defence against bacterial infection - are heavily challenged by microbes, they start to die in a specially controlled way. As a last-ditch measure, they expel their entire DNA from within their nucleus into the surrounding tissue. It is this DNA that forms a sticky 'spiders' web' or NET, which also contains enzymes that destroy the bacteria once they are trapped by the NET.

Scientists led by Professor Iain Chapple and Dr Paul Cooper in the Periodontal Research Group at the University of Birmingham discovered that Hypochlorous acid stimulated NET release in patients suffering from the condition Chronic Granulomatous Disease (CGD), who fail to routinely make NETs. They also discovered that "Taurine" reduced NET formation and may therefore prolong neutrophil survival.

Professor Chapple commented: 'Our interest is in the role of NETs in combating bacteria that initiate periodontal disease (gum disease), but the fundamental biology surrounding NET formation is common to many infectious-immune conditions.'

'We know that oxygen radicals are needed for NETs to form and CGD patients cannot effectively produce oxygen radicals from their neutrophils, so cannot produce NETs or respond as well to certain infections. This work helps us understand those processes a little more and may in the future lead to new therapies that increase, or indeed in some cases decrease, NET formation.'

The research has highlighted a perplexing paradox surrounding NETs. 'In some patients NETs appear to be very important in bacterial killing,' reports Professor Chapple, 'but in others they appear to generate auto-antibodies against NET components which are being associated with certain immune-mediated diseases like Rheumatoid Arthritis and auto-immune vasculitis.'

'It appears that NETs may be a double-edged sword for some patients, but research in this new area of immune control is very active at present and exciting discoveries are likely to come thick and fast over the next five to ten years.'

For more information, please contact Jenni Ameghino, University of Birmingham press office, 0121 415 8134. Mobile: 07768 924156.

** Hypochlorous acid regulates neutrophil extracellular trap release in humans*

Notes to editors

Professor Iain Chapple is available for interview. Please contact the press office to arrange.