MedicalXpress

Rescue NET for lupus patients

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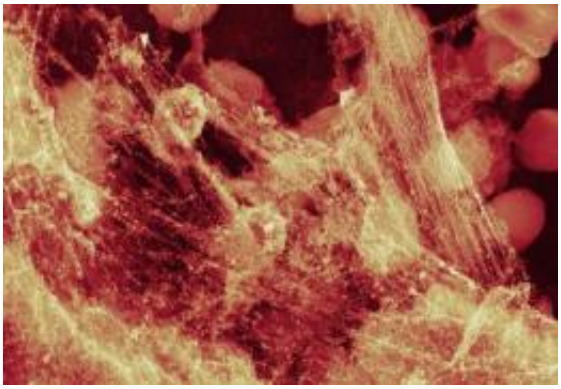


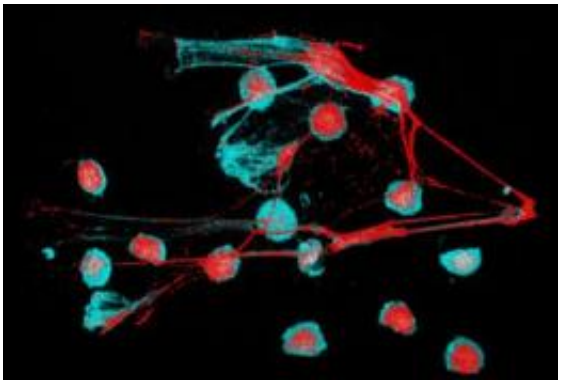
This is a scanning electron microscopy image of white blood cells and NETs in a healthy person. Credit: Volker Brinkmann

Lupus is a disease where the immune system attacks healthy cells of the body. This leads to progressive damage of different tissues and organs. The classical characteristic of the disease is the so-called butterfly rash in the face. Many Lupus patients eventually die of kidney failure. Scientists at the Max Planck Institute for Infection Biology in Berlin together with medical scientists from the University of Erlangen succeeded in elucidating basic principles of the disease. This opens up new perspectives for methods that might enable early diagnosis and treatment of Lupus patients with a high risk at kidney failure.

Lupus is one of the most common autoimmune diseases. The symptoms vary from patient to patient and can include rashes, muscle and joint pain, fatigue, inflammation, and miscarriage. One third of the patients

die of kidney failure. Little is known about the origin and the pathogenesis of this disease. Diagnosis is difficult because many symptoms are common with other diseases. The hallmark of Lupus is that the body produces antibodies against its own DNA, certain proteins of the nucleus and of white blood cells. The course of the disease is characterized by flares which are often triggered by infections. After a flare the health of the patient improves but often there are sequelae, resulting in a continuous exacerbation of the disease.

Scientists of the Max Planck Institute for Infection Biology suspected that an immune mechanism that was only recently discovered by them, plays a key role in Lupus: During an infection, white blood cells are stimulated and extrude nets in which they trap and kill pathogens (fig. 1). This NET (an acronym for Neutrophil Extracellular Traps) is composed of exactly those components against which a Lupus patient produces antibodies: DNA, as well as proteins of the nucleus and the white blood cells (fig. 2). In co-operation with clinical scientists from the University of Erlangen, the Max Planck scientists could show for the first time that, in contrast to healthy persons, a part of the Lupus patients could not degrade NETs after the infection.



These are white blood cells and NETs in a lupus patient. The DNA in NETs is shown in blue; the antibodies binding to the NET are shown in red (fluorescence microscopy). Credit: Volker Brinkmann

The scientists also discovered that NETs are degraded by the enzyme DNase-1, a protein which normally is found in the blood. Lupus patients, however, either lack this enzyme or their DNase-1 is blocked. Further examination of this patient group revealed that the remains of NETs together with the auto-antibodies are deposited in the kidneys of SLE patients. Indeed, the scientists showed a strong correlation between the inability to degrade NETs in Lupus and a high risk of kidney failure. These results provide a starting point for the development of a test that might allow an early diagnosis and treatment of these high risk patients.

More information: "Impairment of NET degradation is associated with Lupus nephritis", PNAS, May 3, 2010

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