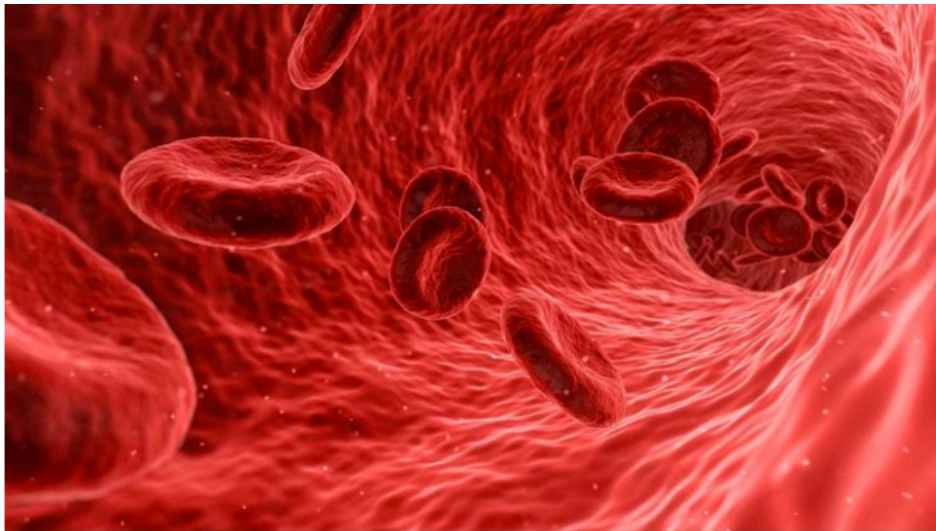


The San Diego Union-Tribune.

Engineered red blood cells can relieve autoimmune diseases, study finds

By: Bradley J. Fikes Contact Reporter

March 6, 2017



Red blood cells can be used to ease autoimmune reactions, according to a new study. (Pixabay)

Modified red blood cells can relieve symptoms of autoimmune diseases such as multiple sclerosis and type 1 diabetes, according to a study in mice published Monday.

Moreover, an immune system expert not involved with the study said it might be quickly readied for testing in people.

Researchers genetically engineered red blood cells to attach to protein fragments called antigens, substances that trigger an immune response. The antigens attached to them were interpreted by the body's immune system as a normal part of the red blood cells, suppressing the autoimmune response.

Researchers also demonstrated that human red blood cells could also be quickly modified, without genetic engineering, to carry similar antigens.

The process takes advantage of the routine destruction and disposal of red blood cells in the spleen and other regions of the body. As the cells are processed, the immune system examines the parts and determines they are "self."

The approach differs from other autoimmune therapies that target white blood cells, which are directly involved in the immune response. These include monoclonal antibody drugs such as Rituxan that deplete certain white blood cells.

The study was led by scientists from the Whitehead Institute for Biomedical Research at the Massachusetts Institute of Technology. It was published Monday in the Proceedings of the National Academy of Sciences. When published online, the study can be found at j.mp/redimmune.

“The fact that the authors can modify human red blood cells, and do this in an hour, suggests that their approach could soon be translated to clinical trials,” said Klaus Ley, M.D., a professor at the La Jolla Institute for Allergy and Immunology. He was not involved in the study.

“Endogenous (patient-derived) red blood cells could be used, or “universal donor red blood cells”, known as Null Rhesus negative, could even be stockpiled,” said Ley, head of the division of inflammation biology, in an email.

“The approach proposed is conceptually similar to the desensitization used in asthma and hay fever patients, where the allergen is given repeatedly at low doses to teach the immune system that it is harmless,” Ley wrote. “But the approach proposed here is much more powerful.”

“First, the authors show that they can prevent disease in accepted mouse models of multiple sclerosis (MS) and type 1 diabetes (T1D). More remarkably, they can reverse disease progression even after the disease has started. This is important for clinical translation, because you would not know that someone is getting MS or T1D unless they already have symptoms.”

Ley said there is a theoretical safety concern that, depending on the immune system processes certain protein fragments from the red blood cells, that some antigens could trigger rather than suppress an autoimmune response.

“However, more sophisticated targeting of red blood cell surface molecules may circumvent this (theoretical) concern,” Ley said. “Only Phase I safety studies in healthy volunteers will show whether this could be a real issue. Taken together, this is the most practical and promising approach to prevent and perhaps even treat autoimmune diseases.”