

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Reducing the Viscosity of Blood by Pulsed Magnetic Field R.

TAO, K HUANG, Temple University — Blood viscosity is a major player in heart disease. When blood is viscous, in addition to a high blood pressure required for the blood circulation, blood vessel walls are also easy to be damaged. While this issue is very important, currently the only method to reduce the blood viscosity is to take medicine, such as aspirin. Here we report our new finding that the blood viscosity can be reduced by pulsed magnetic field. Blood is a suspension of red blood cells (erythrocytes), white blood cells (leukocytes) and platelets in plasma, a complex solution of gases, salts, proteins, carbohydrates, and lipids. The base liquid, plasma, has low viscosity. The effective viscosity of whole blood increases mainly due to the red blood cells, which have a volume fraction about 40% or above. Red blood cells contain iron and are sensitive to magnetic field. Therefore, when we apply a strong magnetic field, the red cells make their diameters align in the field direction to form short chains. This change in rheology reduces the effective viscosity as high as 20-30%. While this reduction is not permanent, it lasts for several hours and repeatable. The reduction rate can be controlled by selecting suitable magnetic field and duration of field application to make blood viscosity within the normal range.

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Date submitted: 28 Nov 2009

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