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Magnetic Nanoparticles *in-vivo* Detection of Transplant Rejection E.R. FLYNN, Senior Scientific, H.C. BRYANT[1], University of New Mexico, R.S. LARSON, UNM, D.A. SERGATSKOV[2], UNM — Superparamagnetic nanoparticles are being used to develop methodology for the *in-vivo* detection and imaging of immune system attacks on transplanted organs. The signature for impending rejection of a transplant is enhanced presence of T-cells. Magnetic nanoparticles coated with specific antibodies (CD-2 and CD-3) will target and attach to these T-cells. Approximately $3 \cdot 10^5$ nanoparticles can attach to each cell. When a pulsed external magnetic field is applied to the decorated cells for a fraction of a second, magnetic moments of the nanoparticles aligned with the field. After the pulse is switched off, the net magnetic moment decays over several seconds by the Nèel mechanism. The resulting magnetic remanence field (typically 10^{-11} T) is measured using a multi-channel SQUID array. We present the data from live T-cells placed in realistic kidney phantom. The detection sensitivity was $\sim 2 \cdot 10^3$ T-cells - a small fraction of the number actually invading the rejected transplant. The 7-channel SQUID array allows us to image the cell clusters with a few millimeters resolution.

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