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Nonspecific targeting of iron oxide nanoparticles to the liver, kidney and spleen: A novel approach to achieving specificity MAHESHIKA PALIHAWADANA ARACHCHIGE, AMANDA FLACK, XUEQUN CHEN, JING LI, DAVID OUPICKY, Y.-C. NORMAN CHENG, YIMIN SHEN, BHANU JENA, GAVIN LAWES, Wayne State University — Recently there has been significant interest in developing Fe_3O_4 nanoparticles for biomedical applications including targeted drug delivery and magnetic resonance imaging. One of the major problems in applying these nanoparticles clinically is to minimize the undesirable filtration of these materials by the mononuclear phagocyte system. Preliminary MRI and magnetization studies on hyaluronic acid coated nanoparticles injected intravenously into mice confirm that the nanoparticles accumulate in the liver, spleen, and kidneys. To identify whether this nanoparticle accumulation are due to some certain specific proteins, we exposed hyaluronic acid coated nanoparticles to proteins extracted from these organs, together with blood plasma proteins, then used gel electrophoresis together with mass spectroscopy to identify the proteins binding to the nanoparticles. We find that the accumulation of nanoparticles in these organs can be due to specific binding by a small number of proteins. By appropriately functionalizing the Fe_3O_4 nanoparticles, possibly by blocking the binding sites of these specific proteins, we expect that the nanoparticles uptake in the liver, spleen, and kidneys will be reduced, which, in turn, could increase the concentration of nanoparticles at tumor sites.

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