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CurcuEmulsomes tailored with the S-layer targets immunoglobulin G

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Advances in the chemotherapy remain limited largely because drug candidates have low specificity and show poor in vivo bioavailability. Recent progresses in targeted drug delivery clearly demonstrate that the association of drug molecules with a carrier system contributes not only to the solubility and the bioavailability of the biomolecules, but also to the efficacy of the molecule with increased concentration at the site of action. The present study introduces a biomimetic approach that utilizes one of the most precise self-organizing domains of nature, i.e. S-layer proteins, to tailor a novel functional nanocarrier system, so called CurcuEmulsomes. Composed of a solid fat core and a phospholipid shell, CurcuEmulsomes are spherical nanoparticles with an average size of 286 nm and a zeta potential of 37 mV. One significant advantage of this nanoformulation is that it increases the solubility of the lipophilic anticancer agent curcumin, where medical use is otherwise limited. Recently, CurcuEmulsomes were also modified by S layer proteins fused with two protein G domains possessing specific affinity for immunoglobulin G (IgG). Our study has demonstrated that the S-layer fusion proteins recrystallize on the surface of the nanocarriers and form an ordered surface layer exposing a square lattice with 13 nm unit-by-unit distance; thereby presenting the functional GG domains in a predicted orientation. This inherent control over orientation enables binding of the IgG on the S-layer with its Fc domain, whereas functional Fab region of the IgG remains accessible for antigen binding, as verified by transmission electron microscopy analysis using anti-IgG gold conjugates. The introduced system, i.e. CurcuEmulsomes tailored with the S layer, has the potential to enable targeted delivery of curcumin to abnormal cell.

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The generation of autoantibodies to C1q and their usefulness in diagnosing lupus nephritis

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SLE is a multisystem autoimmune disorder with a broad spectrum of clinical presentations including kidney disease in the form of lupus nephritis. Due to the heterogeneity of the disease and the absence of a single diagnostic test, the diagnosis of lupus nephritis in SLE patients remains challenging. The first component of complement–C1q plays a major role in removing apoptotic cells and immune complexes from the circulation of autoimmune patients. We and others have suggested that post-translational modifications of C1q upon exposure to free radicals could generate antigenic neo-epitopes that may lead to the generation of autoantibodies that may be useful in diagnosing lupus nephritis and also explain how changes in C1q structure may lead to breakdown of immune tolerance and impair C1q's ability to resolve inflammation.

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