

Fullerene Immunoconjugates for Cancer Imaging and Treatment

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Metallofullerene-paclitaxel-antibody conjugates are under investigation for combined cancer imaging and treatment. Fullerenes are non-toxic carbon cage molecules with a rich derivatization chemistry that is useful for generating covalently-conjugated therapeutic prodrugs [1]. Fullerene derivatives have been shown to spontaneously form non-covalent immunoconjugates with antibodies such as the anti-gp240 melanoma antibody ZME-018; a recent study revealed how ZME-018 forms non-covalent immunoconjugates with C₆₀ derivatives without significant loss of antibody activity [2]. Endohedral gadofullerene derivatives have been shown in prior studies to function effectively as T₁-active magnetic resonance imaging (MRI) contrast agents, both for *in vivo* MRI [3] and for *in vitro* cellular labeling [4].

In this study, chemical routes for conjugation of paclitaxel and Gd@C₆₀ are being developed to form a combined therapeutic/imaging agent prodrug. Using the gadofullerene-paclitaxel conjugates, immunoconjugates with the anti-gp240 melanoma antibody ZME-018 will be tested for cellular uptake, for MR imaging efficacy and for cytotoxicity against melanoma cancer cells *in vitro*. The strategy of combining antibody targeting with a therapeutic MR imaging agent will improve melanoma diagnosis and treatment, and has the potential for targeting multiple drugs to cancerous cells at the same time to improve patient outcome. Recent progress toward the gadofullerene-paclitaxel immunoconjugates, including *in vitro* cell binding and internalization of conjugates with A375 melanoma cells, will be discussed.

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