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An optical and microPET assessment of thermally-sensitive liposome biodistribution in the Met-1 tumor model: Importance of formulation

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The design of delivery vehicles that are stable in circulation but can be activated by exogenous energy sources is challenging. Our goals are to validate new imaging methods for the assessment of particle stability, to engineer stable and activatable particles and to assess accumulation of a hydrophilic model drug in an orthotopic tumor. Here, liposomes were injected into the tail vein of FVB mice containing bilateral Met-1 tumors and imaged in vivo using microPET and optical imaging techniques. Cryo-electron microscopy was applied to assess particle shape prior to injection, ex vivo fluorescence images of dissected tissues were acquired, excised tissue was further processed with a cell-digest preparation and assayed for fluorescence. We find that for a stable particle, in vivo tumor images of a hydrophilic model drug were highly correlated with PET images of the particle shell and ex vivo fluorescence images of processed tissue, R(2)=0.95 and R(2)=0.99 respectively. We demonstrate that the accumulation of a hydrophilic model drug is increased by up to 177 fold by liposomal encapsulation, as compared to accumulation of the drug at 24 hours.

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