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Novel graphene oxide particles as a plasmid-based Stat3 siRNA carrier for mouse hepatocarcinoma targeted therapy

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Graphene oxide (GO) has attracted intensive interest in the biomedical field in recent years. Constitutive activation of signal transducer and activator of transcription 3 (Stat3) promotes survival in a wide spectrum of human cancers. We study the *in vitro* and *in vivo* behavior of graphene oxide chemically functionalized with polyethylenimine, polyethylene glycol and folic acid (GO-PEI-PEG-FA) as a plasmid-based Stat3-specific small interfering RNA (siRNA) carrier in mouse hepatocarcinoma. The carries can readily bind plasmid with high transfection efficiency. Moreover, molecular biology studies reveal that Stat3 related gene and protein expressions were significantly inhibited. The *in vivo* results indicated significant regression in tumor growth and tumor weight after plasmid-based Stat3 siRNA delivered by GO-PEI-PEG-FA treatment. Thus, our work is the first success of using GO-PEI-PEG-FA as a promising carrier for plasmid Stat3 siRNA delivery and suggests the great promise of graphene in biomedical applications such as cancer treatment. Future studies will be exploring the exact release mechanisms of the plasmid from the complexes *in vitro* and *in vivo*. In addition, future studies will be aimed at determining GO-PEI-PEG-FA metabolism *in vivo*, targeting deep tumors and long-term survival assessment of the GO-PEI-PEG-FA and si-Stat3 complex simultaneously with infrared irradiation on the tumor in different xenograft tumor models.

Biography

Baofeng Guo has completed his PhD from Jilin University and Post-doctoral studies from Cold Spring Harbor Lab. He is Doctor at Jilin University. He has published more than 20 papers in reputed journals.

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