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Engineered Fullerene Nanomaterials as Advanced Personalized Nanotheranostic System for Chemotherapeutics

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Administration and therapeutic effectiveness of drugs is limited by several tribulations such as solubility, instability, targeting and side-effects which hoist health concerns for a long time. Nanomaterials have revolutionized this era and have all solutions of emerging troubles. Engineered Carbon Nanotubes are elongated fullerenes wrapped into cylindrical dimensions with a very high length to width ratio known potentially potential for drug delivery, discovery and theranostics. They have a high adsorptive surface and can be employed exhaustively for absorbing drugs on the surface. Cancer nanotheranostics is a rapidly developing field which aims at combining both imaging and therapy of tumor involving nanomaterial engineering that potentially interacts with malignant cells at the molecular level, thereby significantly improves the efficacy and specificity of pharmacotherapeutics at advanced stage. Personalized approaches provide customization of treatment based on biomarkers which influences cancer progression. The therapeutic and diagnostic agents are formulated in carbon nanotubes system as theranostic platform by conjugating varieties of biological ligand, nanoparticles, stem cells and T cells in immunotherapy and to promote siRNA co-delivery, stimuli- responsive release, multimodality therapies. Some major neoplasms like metastatic cancers, drug-resistant cancers impose the greatest challenge, which exclusively overcome by different types of nanotube carriers that execute synergetic cum combinatory therapy bypass the biological membranes to reach the target cancer cells including the blood, liver, kidneys, spleen and blood-brain barrier. This article describes current personalized theranostics approaches and technologies of conjugated fullerene carriers for improved imaging, identifying, targeting, delivery and chemotherapeutics of progressive malignancy at the earliest stage.