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# Peg@GDF3:TB3+ – Rb Nanocomposites for Deep-Seated X-Ray Induced Photodynamic Therapy in Oncology

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**Abstract :** Photodynamic therapy (PDT) is considered an alternative and minimally invasive cancer treatment modality compared to chemotherapy and radiation therapy. PDT includes three main components: a photosensitizer (PS), oxygen, and a light source. PS is injected into the patient's body and then selectively accumulates in the tumor. However, the light used in PDT (spectral range 400–700 nm) is limited to superficial lesions, and the light penetration depth does not exceed a few cm. The problem of PDT (poor visible light transmission) can be solved by using X-rays. The penetration depth of X-rays is ten times greater than that of visible light. Therefore, X-ray radiation easily penetrates through the tissues of the body. The aim of this work is to develop universal nanocomposites for X-ray photodynamic therapy of deep and superficial tumors using scintillation nanoparticles of gadolinium fluoride (GdF3), doped with Tb3+, coated with a biocompatible coating (PEG) and photosensitizer RB (Rose Bengal). PEG@GdF3:Tb3+(15%) – RB could be used as an effective X-ray, UV, and photoluminescent mediator to excite a photosensitizer for generating reactive oxygen species (ROS) to kill tumor cells via photodynamic therapy. GdF3 nanoparticles can also be used as contrast agents for computed tomography (CT) and magnetic resonance imaging (MRI).

**Keywords :** X-ray induced photodynamic therapy, scintillating nanoparticle, radiosensitizer, photosensitizer
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