

Carbon nanomaterials and 2D nanomaterials in biomedicine: applications, main challenges, and opportunities

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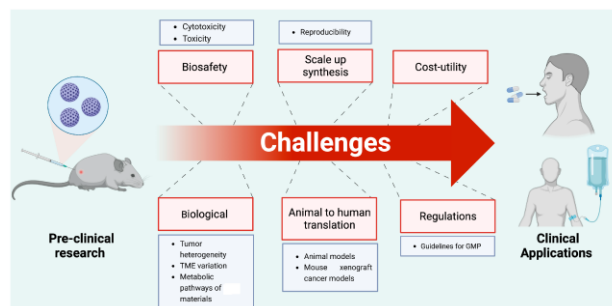
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Carbon nanomaterials (CNM) have gained great interest in the scientific community and motivated multiple studies in the biomedical field thanks to their unique properties. CNM colloids can be used as multifunctional agents in phototherapy (photodynamic and photothermal therapy (PTT)), targeting cancer and antimicrobial applications.

The first bi-dimensional nanomaterial (2DnMat) to be isolated was graphene in 2004 by Geim, Novoselov *et al.* Nevertheless, the initial investigations employing graphene-based materials (GBM) for cancer PTT were documented only in 2010, while GBM use for PTT against infections was reported in 2013. The emergence of graphene as a novel material inspired the development of other 2DnMat. Remarkable advances have been achieved in the field of nanomedicine and immunotherapy, since it was found that several nanomaterials can modulate the immune response. CNM, including GBM, and also new 2DnMat have a vast potential on the field, however, little is known about the effects of several of those materials in the immune system.

A general perspective on the work of our team will be presented, focusing on applications of 2DnMat, with emphasis on graphene-based materials for phototherapy, immunotherapy, and 3D-printing for tissue regeneration [1-3].



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