Antitumor Efficacy of Integrin αVβ3 Antibody Conjugated ZnO Nanocarrier Based Drug Delivery System to Target Breast Carcinoma

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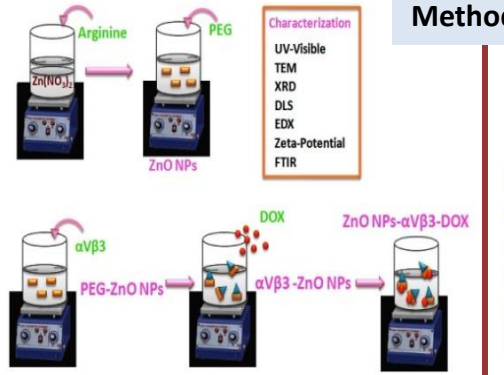
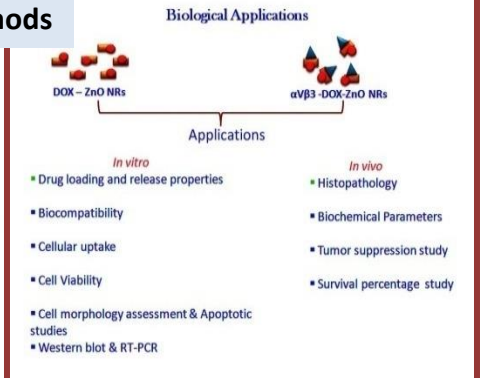
Introduction: The overexpression of integrin αVβ3 enhances tumour development, metastasis, angiogenesis, treatment resistance, and clinical staging in breast cancer patients. As a result, inhibiting integrin αVβ3 might be a promising anti-cancer agent for breast cancer. Furthermore, dealing with a post-operative wound from breast cancer is a difficult method in cancer biology.

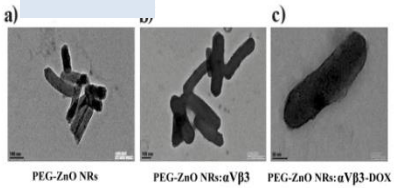
Objectives: The present proposal is concerned with a new approach of integrin αVβ3-decorated nanocomposites for the intelligent subcellular targeted delivery of anticancer drugs and wound healing.

Methods





Results



Nanoparticles (NPs)	Particle size (nm)	Poly dispersity index	Zeta potential (mV)	Pore size (nm)
PEG-ZnO NRs	128.26±5.32 nm	0.039	+25.04±0.54	11.73±0.43
PEG-ZnO NRs:αVβ3	133.37±6.54 nm	0.046	-21.45±0.41	4.36±0.27
PEG-ZnO NRs:αVβ3	139.23±7.23 nm	0.052	+34.21±0.29	2.14±0.36

Figure 1.TEM images of ZnO NRs synthesized using bio-organic method; Table 1. Characteristics of Different Nanoparticles Prepared under Optimal Conditions

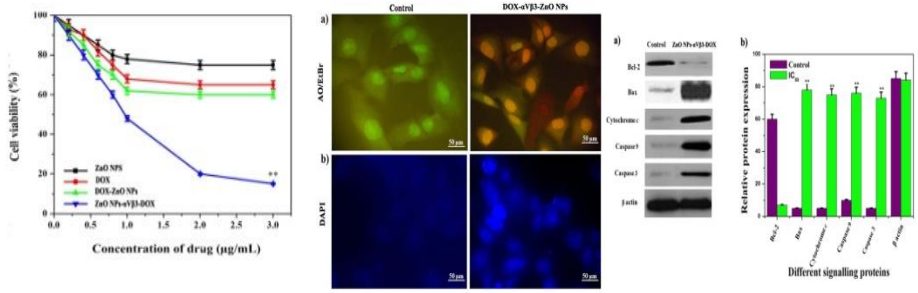


Figure 2-4. In vitro antitumor efficacy of DOX-αVβ3-ZnO NPs; Fluorescent microscopic images and Western blot analysis of DOX-αVβ3-ZnO NPs treated with MDA-MB-231 breast cancer cells

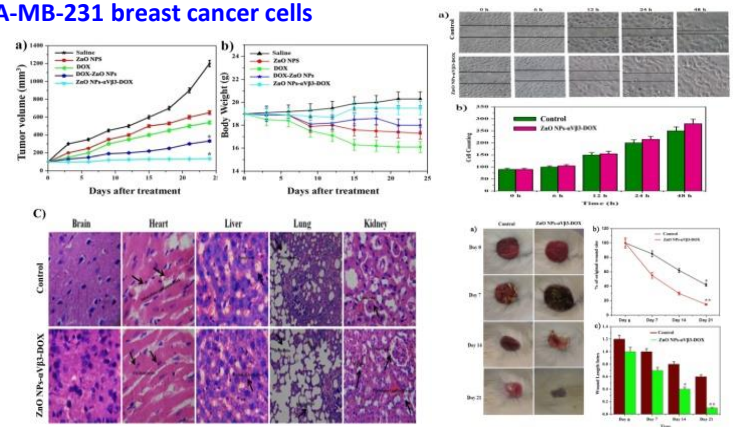


Figure 5. In vivo anti-tumor therapy. Figure 6. Light micrographs of scratch assay Figure 7. The effect of DOX-αVβ3-ZnO NPs on wound healing

Conclusion

DOX-αVβ3-ZnO NPs strongly inhibited tumor progression and suppress cell migration and proliferation. As a result, targeting certain integrins and integrin-binding proteins might open up new therapeutic avenues for breast cancer therapies

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