Electronic Supplementary Material (ESI) for RSC Advances.

Dual drug loaded vitamin D3 nanoparticle to target drug resistance in cancer

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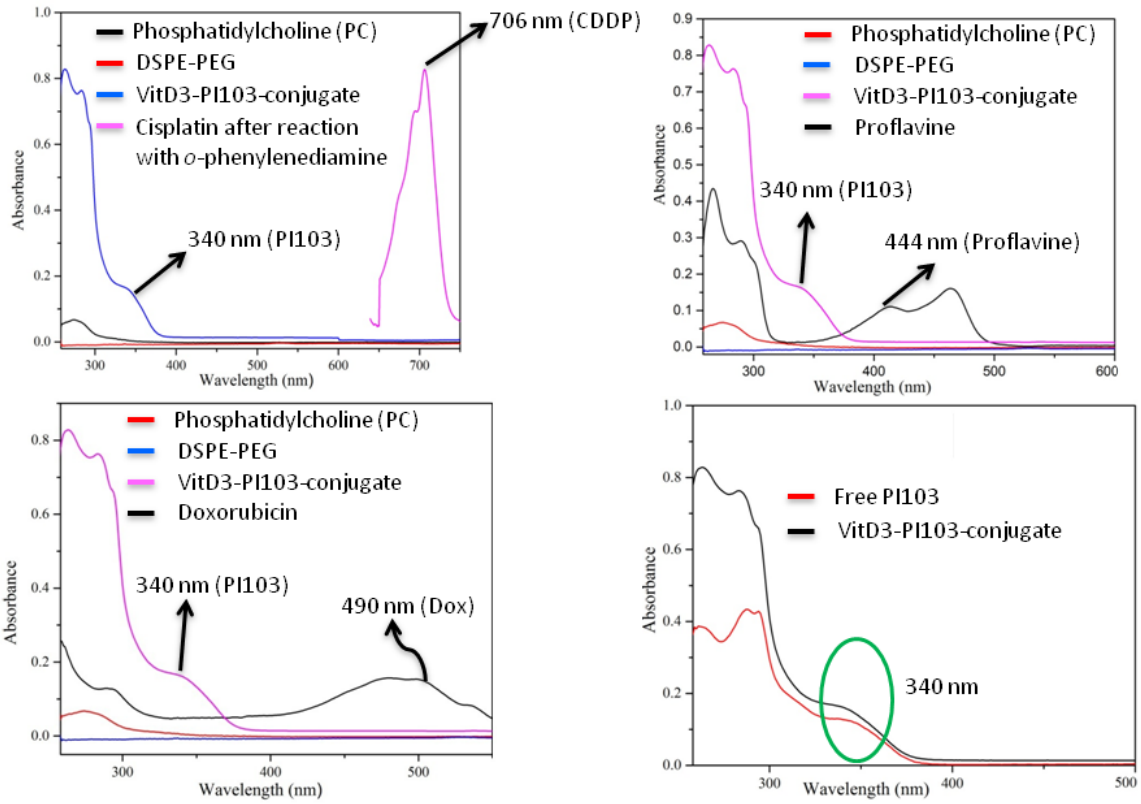


Fig. S1: UV-VIS spectra of phosphatidylcholine (PC), DSPE-PEG, VitD3-PI103 conjugate, doxorubicin, proflavine, PI103 and cisplatin after reaction with o-phenylenediamine at 100°C for 4h.

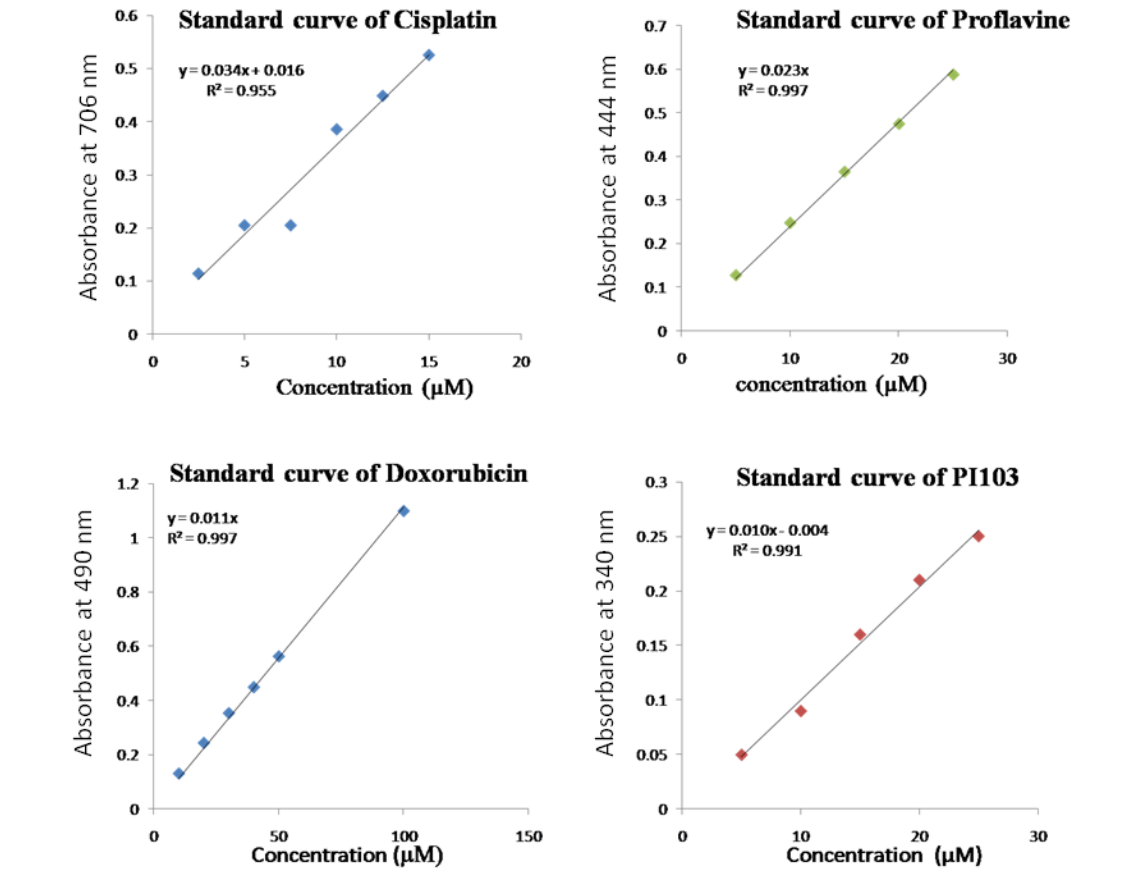


Fig. S2: Concentration vs absorbance calibration graph for Cisplatin, Proflavine, Doxorubicin and PI103 at their characteristic λ_{max} = 706 nm, 444 nm, 490 nm and 340 nm respectively determined by UV-VIS spectroscopy.

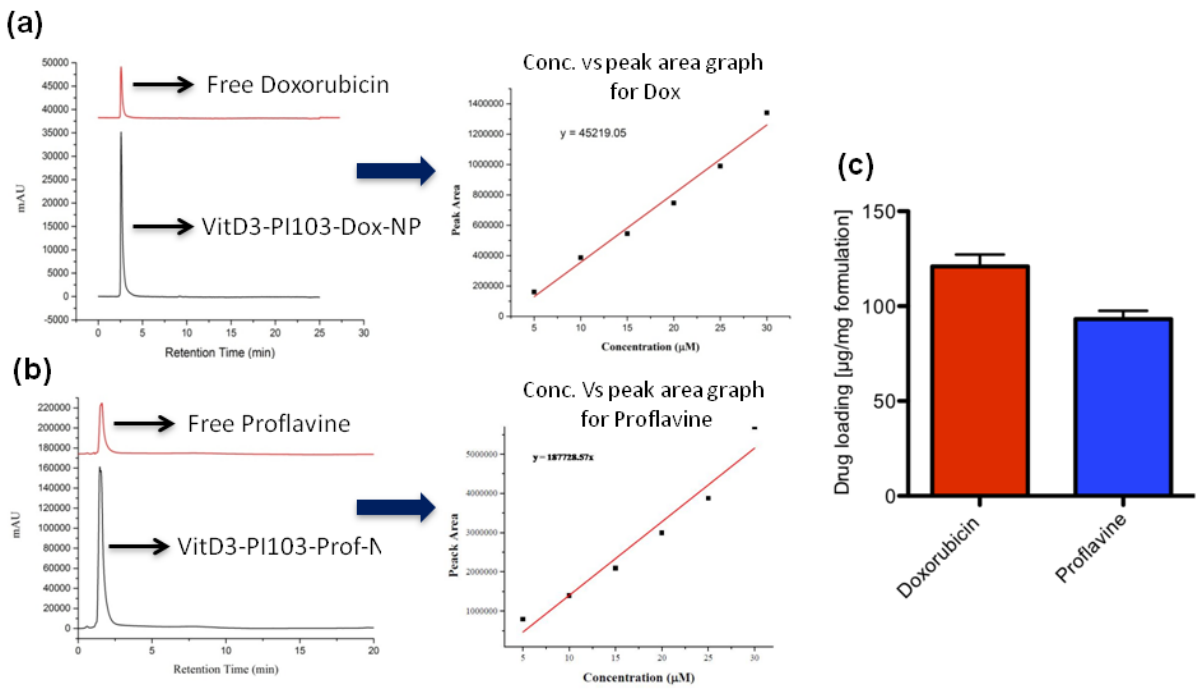


Fig. S3: (a-b) RP-HPLC traces and concentration vs peak area graph for free doxorubicin, vitD3-PI103-Dox-NP and free proflavine, vitD3-PI103-Proflavine-NP respectively. **(c)** Loading graph of doxorubicin and proflavine in vitD3-PI103-Dox-NP and vitD3-PI103-Proflavine-NP respectively.

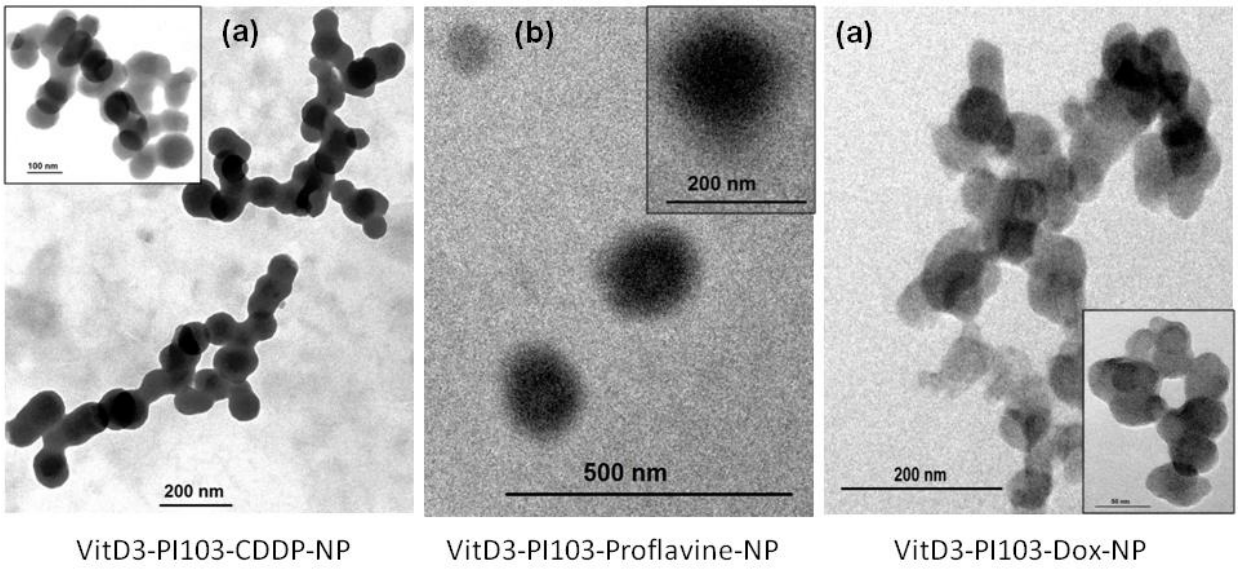
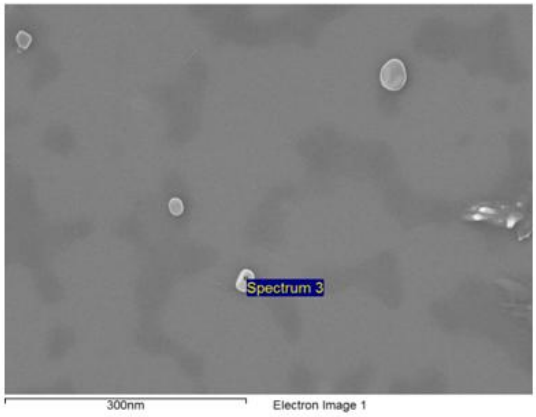


Fig. S4: (a-c) TEM images of VitD3-PI103-CDDP-NP, VitD3-PI103-Proflavine-NP and VitD3-PI103-Dox-NP respectively.



Elements	Weight %	Atomic %
C	68.03	80.51
N	8.42	8.54
O	11.31	10.05
Pt	12.24	0.89
Total	100	

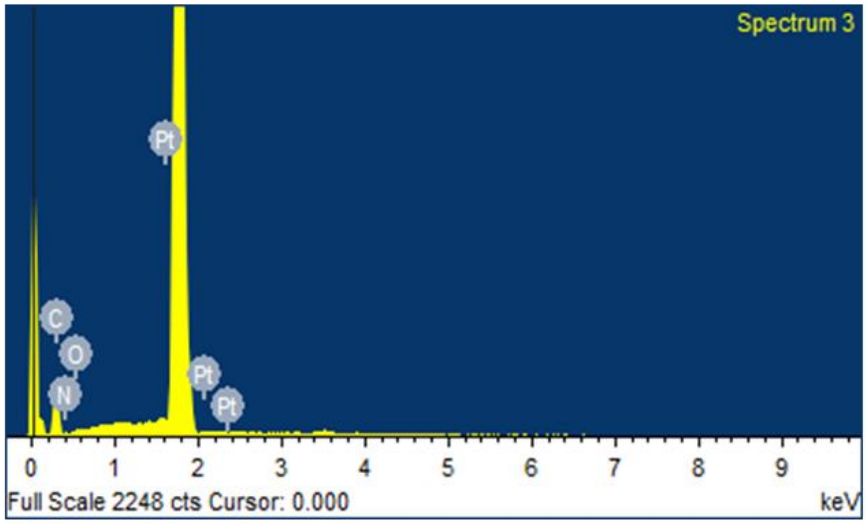


Fig. S5: Characterization of Pt in VitD3-PI103-CDDP-NP by energy-dispersive X-ray spectroscopy (EDX).

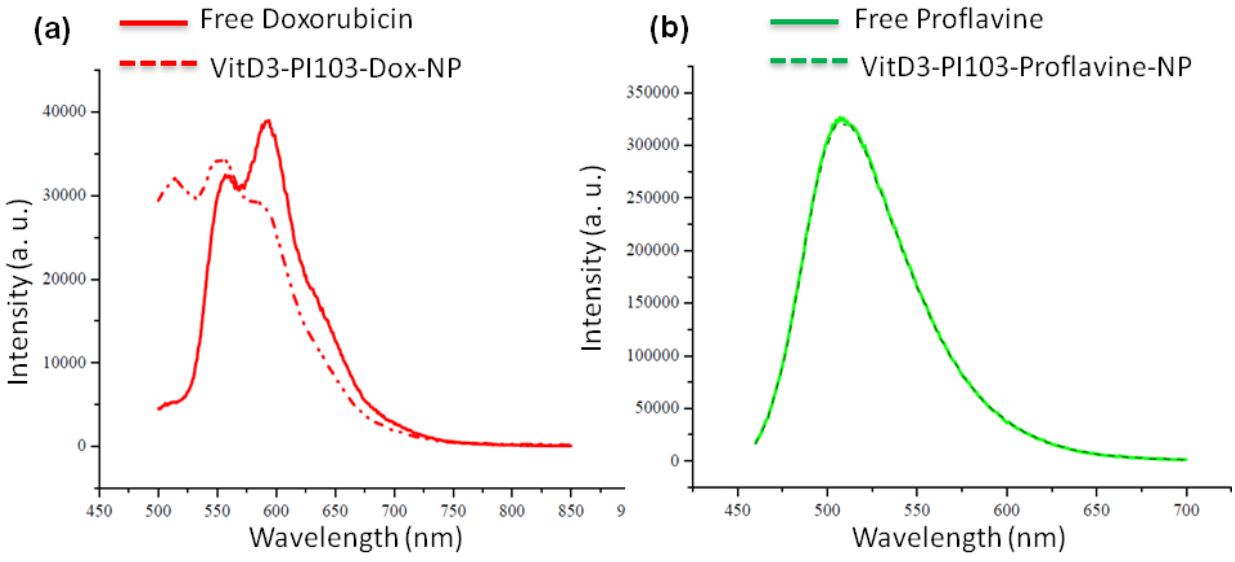


Fig. S6: Fluorescence emission spectra of (**a**) VitD3-PI103-Dox-NP and free Doxorubicin, (**b**) VitD3-PI103-Proflavine-NP and free Proflavine.

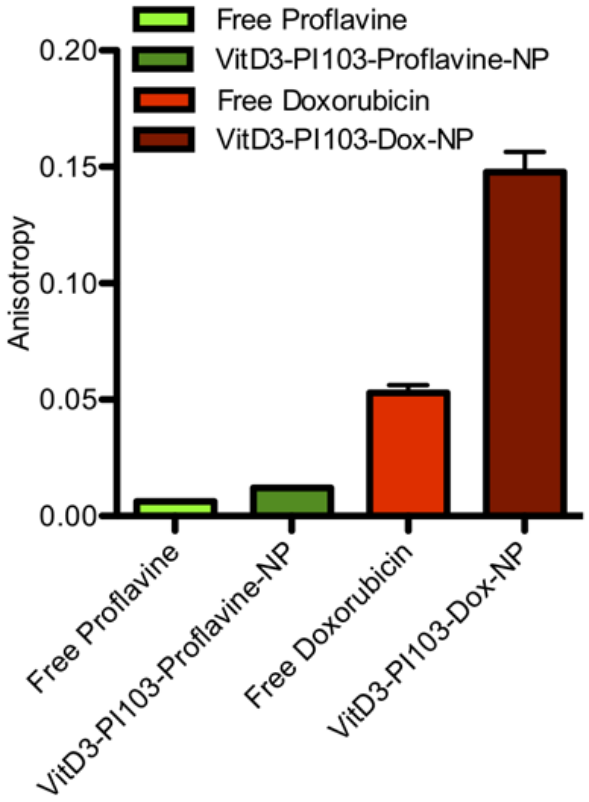


Fig. S7: Change in steady state fluorescence anisotropy in free Proflavine and free Doxorubicin with VitD3-PI103-Proflavine-NP and VitD3-PI103-Dox-NP.

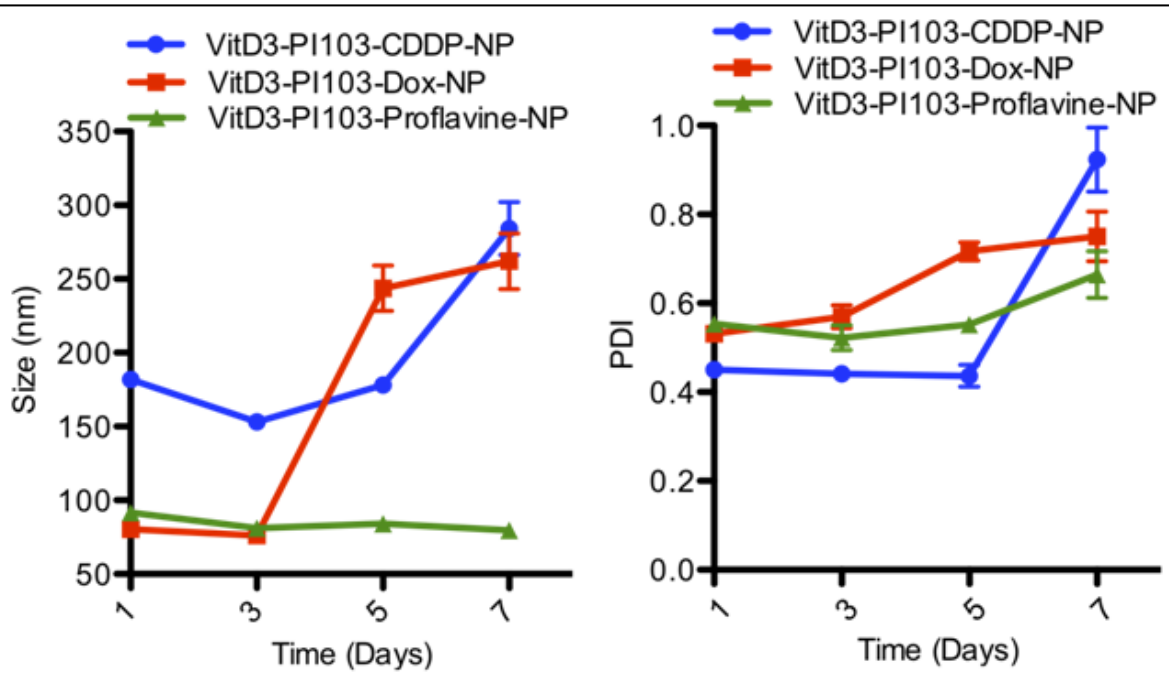


Fig. S8: Stability of different dual drug loaded vitamin D3 nanoparticles in serum at 37°C for 7 days determined by DLS.

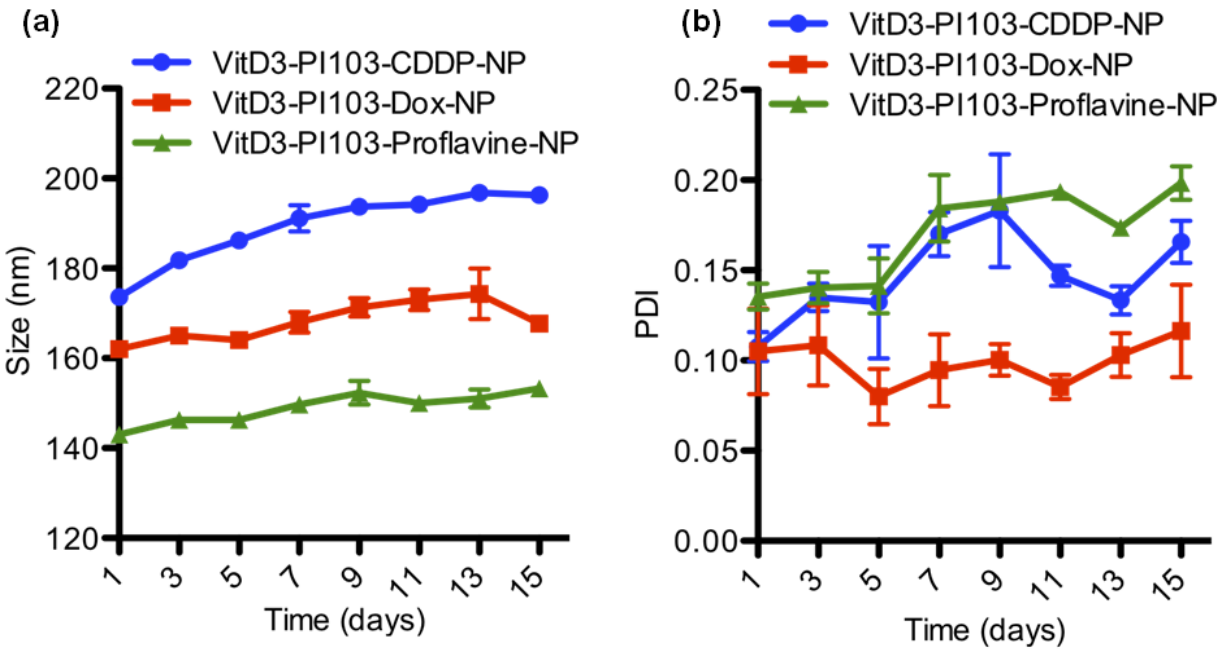


Fig. S9: Stability of different dual drug loaded vitamin D3 nanoparticles at 4°C for 15 days. (**a**) Change in hydrodynamic diameter and (**b**) PDI values determined by DLS.

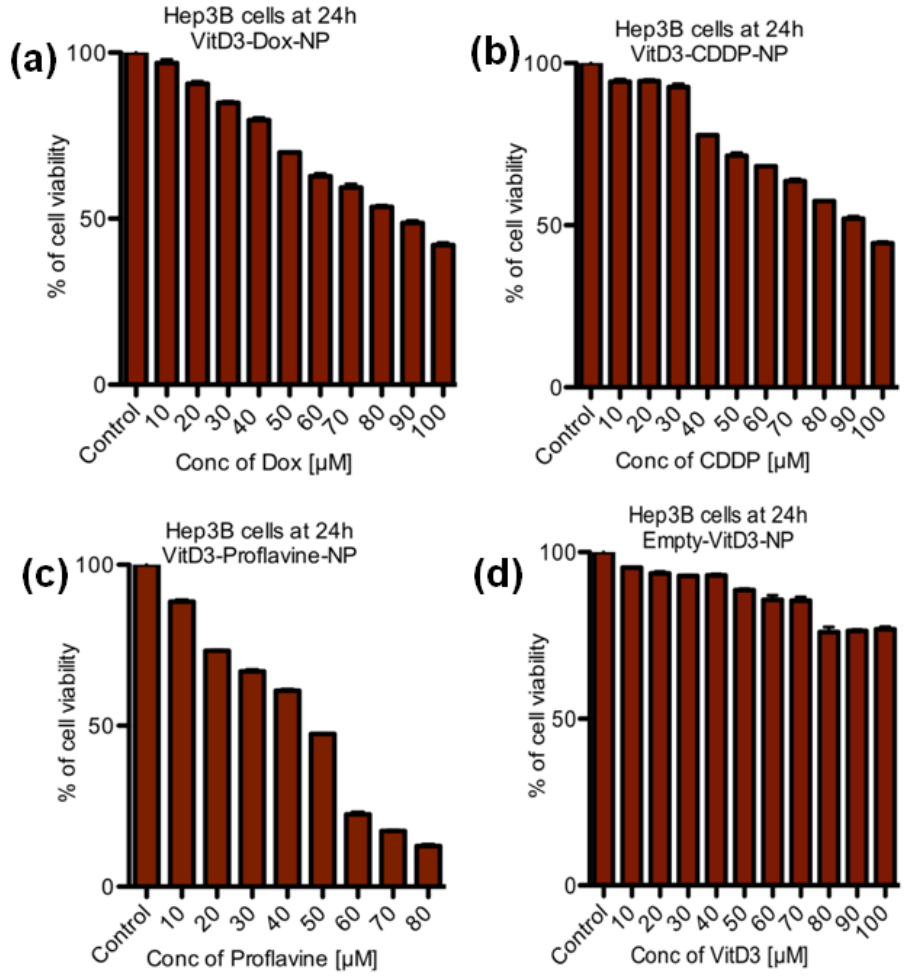


Fig. S10: (a-d) MTT assay of vitD3-Dox-NP, vitD3-CDDP-NP, vitD3-Proflavine-NP and empty vitD3-NP in Hep3B cells at 24h post-incubation respectively.

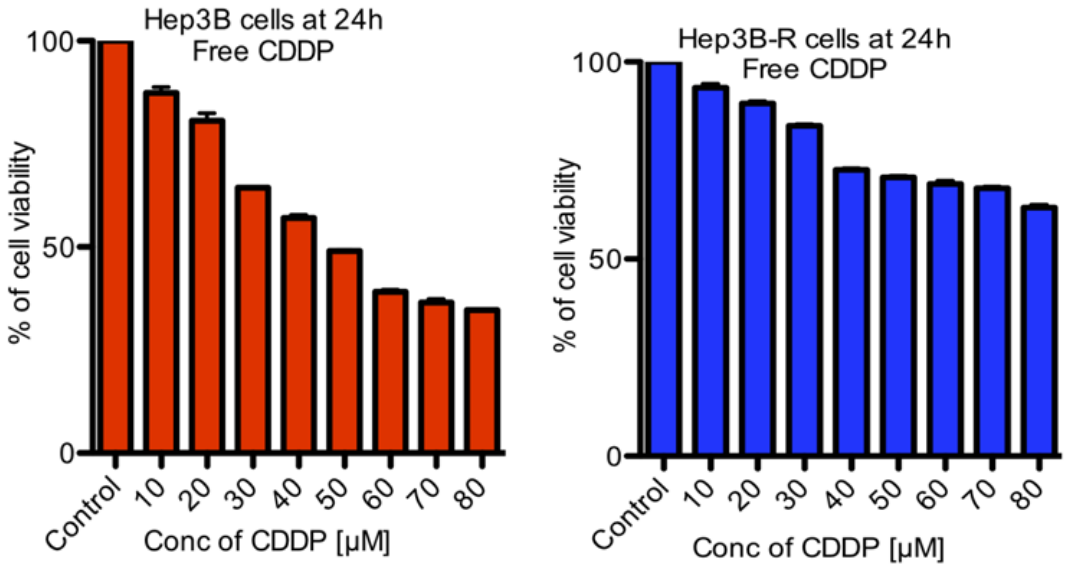


Fig. S11: MTT assay of free CDDP in Hep3B and Hep3B-R cells in different concentration at 24h post-incubation.

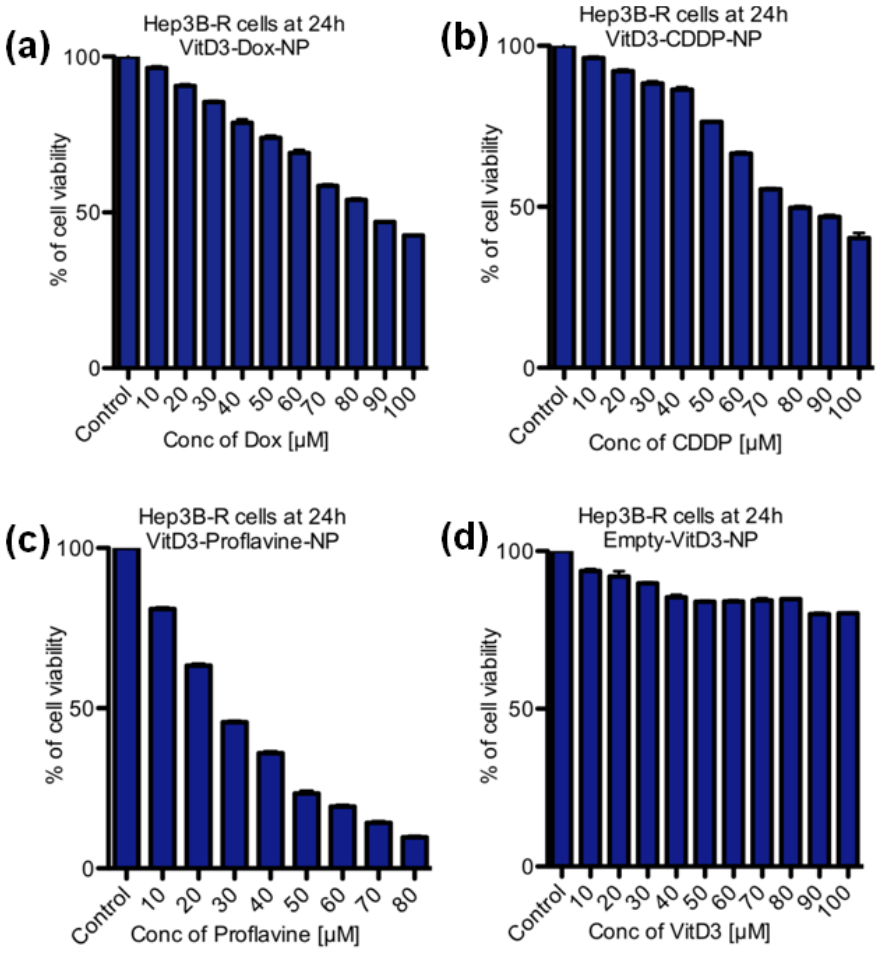


Fig. S12: **(a-d)** MTT assay of vitD3-Dox-NP, vitD3-CDDP-NP, vitD3-Proflavine-NP and empty vitD3-NP in Hep3B-R cells at 24h post-incubation respectively.

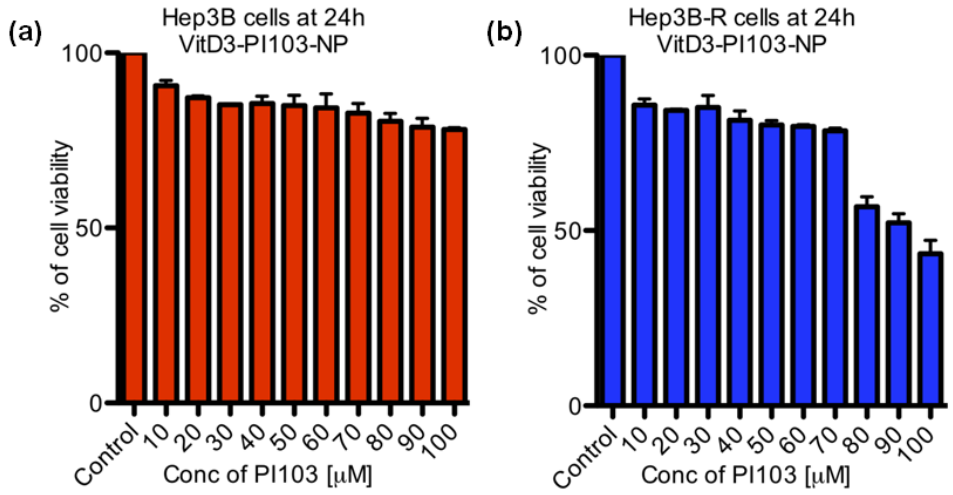


Fig. S13: Cell viability assay of vitD3-PI103-NP in Hep3B and Hep3B-R cells after 24h post incubation.

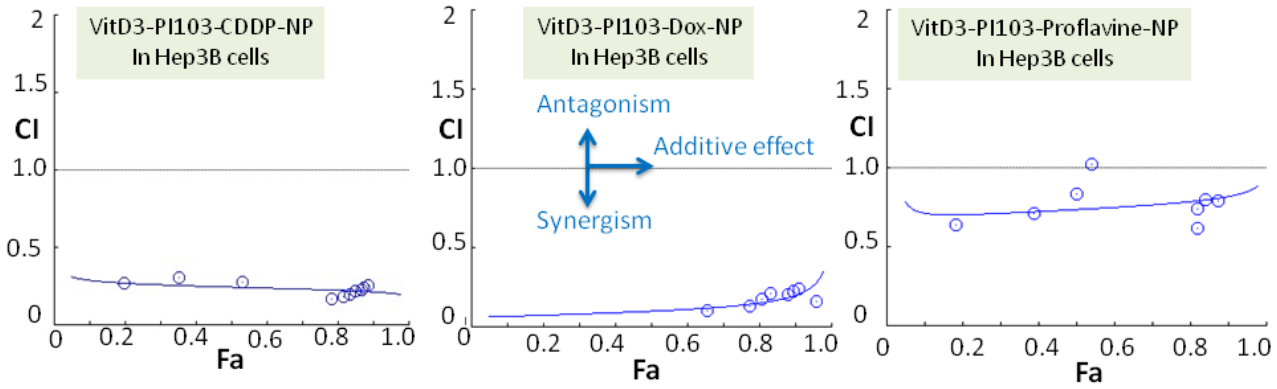


Fig. S14: Chou-Talaly analysis of vitD3-PI103-CDDP-NP, vitD3-PI103-Dox-NP and vitD3-PI103-Proflavine-NP in Hep3B cells to determine synergistic, additive and antagonistic effects.

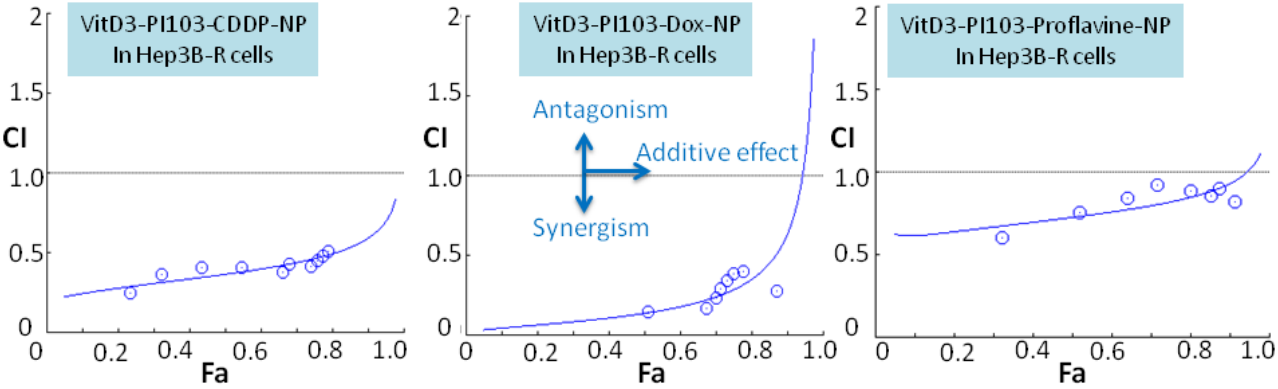


Fig. S15: Chou-Talaly analysis of vitD3-PI103-CDDP-NP, vitD3-PI103-Dox-NP and vitD3-PI103-Proflavine-NP in Hep3B-R cells to determine synergistic, additive and antagonistic effects.

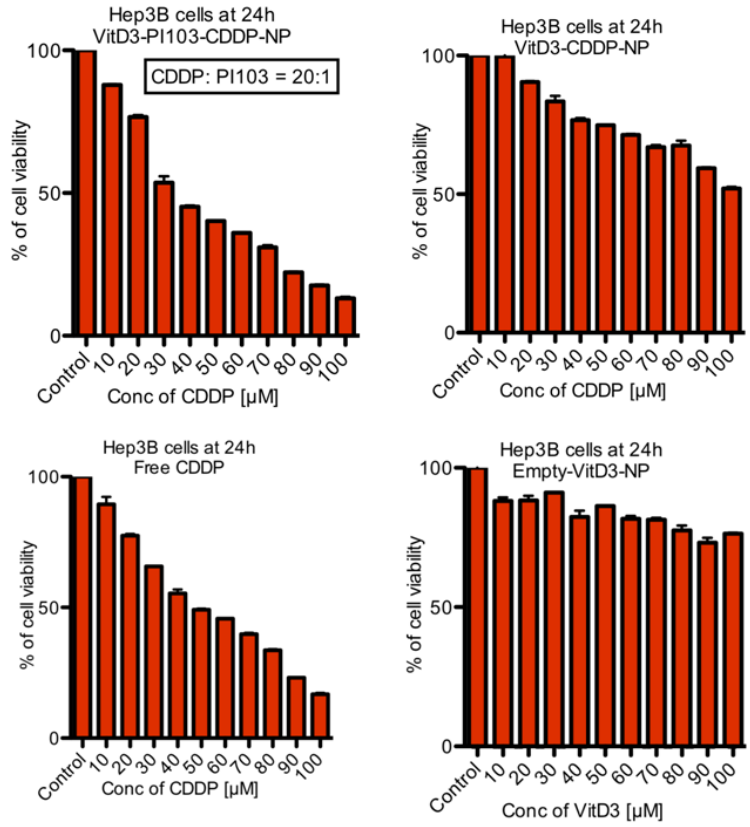


Fig. S16: WST-1 assay of vitD3-PI103-CDDP-NP, vitD3-CDDP-NP, free CDDP and empty-vitD3-NP in Hep3B cells at 24h post-incubation.

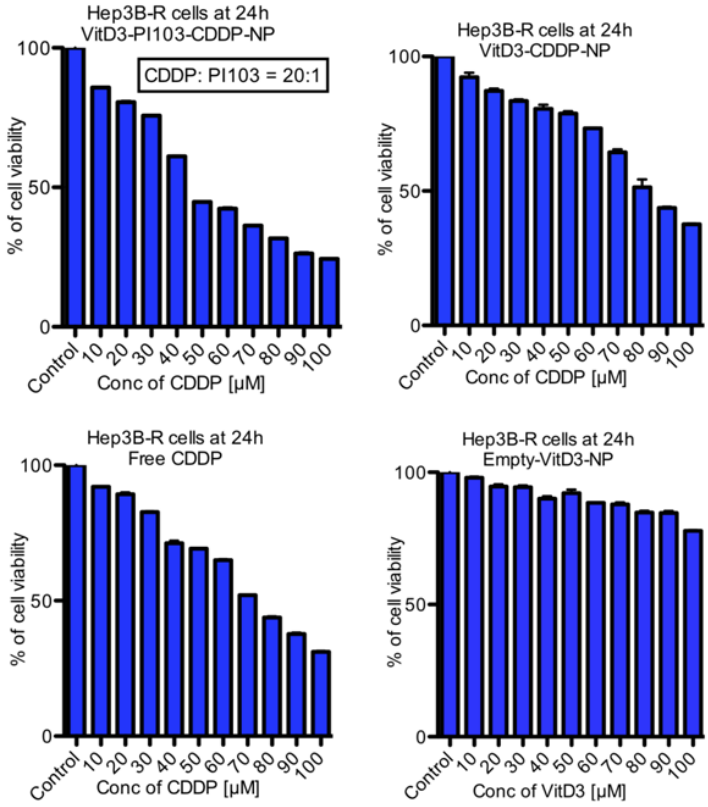


Fig. S17: WST-1 assay of vitD3-PI103-CDDP-NP, vitD3-CDDP-NP, free CDDP and empty-vitD3-NP in Hep3B-R cells at 24h post-incubation.

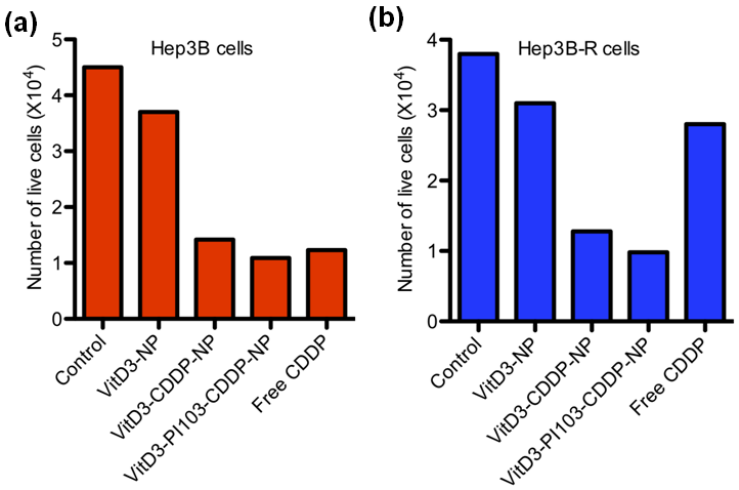


Fig. S18: (a-b) Trypan blue assay of vitD3-PI103-CDDP-NP with proper controls in Hep3B and Hep3B-R cells at 24h post-incubation respectively.

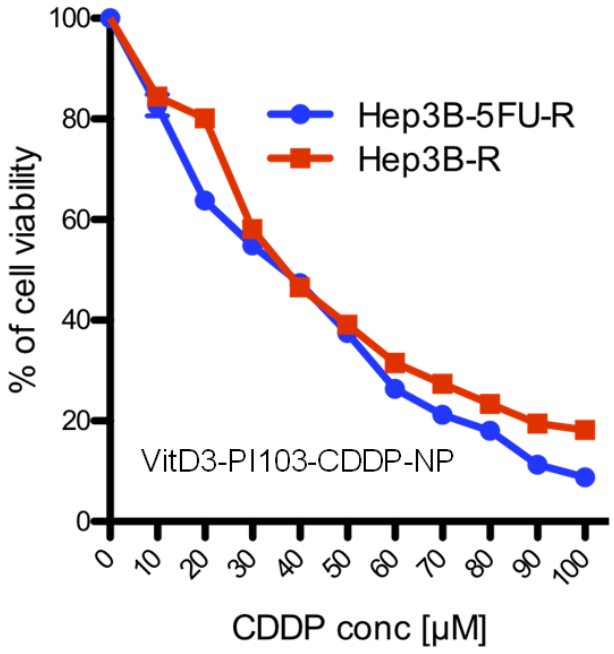


Fig. S19: Cell viability assay of vitD3-PI103-CDDP-NP in 5-FU resistant Hep3B-5FU-R cells and cisplatin resistant Hep3B-R cells after 24h post incubation.

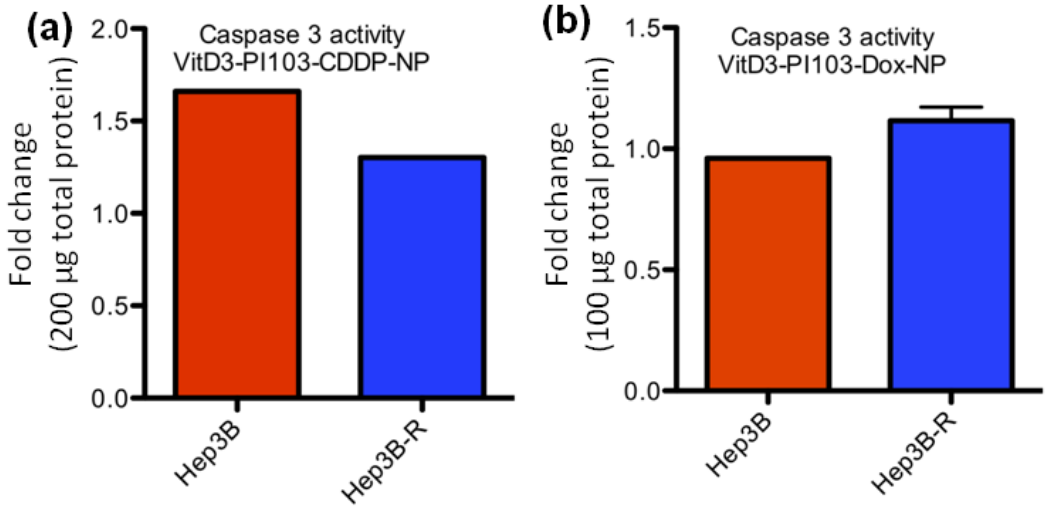


Fig. S20: (a-b) Caspase-3 activity of vitD3-PI103-CDDP-NP and vitD3-PI103-Dox-NP in Hep3B and Hep3B-R cells with respect to un-treated control with 200 µg and 100 µg of total protein content respectively.