

## Development of cockleshell (*Anadara granosa*) derived CaCO<sub>3</sub> nanoparticle for doxorubicin delivery

### ABSTRACT

Despite the progress made in cancer treatment, difficulties are encountered with tumour targeting due to cancer structural complexity. The synthesis of homogenous calcium carbonate (CaCO<sub>3</sub>) nanoparticles could be a carrier for doxorubicin in the management of bone cancer due to its osteoconductive and physicochemical properties with simple synthesis method to produce large scale. Among the nanocarriers, CaCO<sub>3</sub> nanoparticles have exhibited promising potential as targeting drug nanocarrier. The aim of this study is to synthesised and characterised doxorubicin-conjugated CaCO<sub>3</sub> nanoparticle (CS-CaCO<sub>3</sub>NP-DOX), using a simple precipitation and mechanical approach to synthesise homogeneous CaCO<sub>3</sub>NP from cockleshell. The oven-dried nanoparticles were further characterised for its physicochemical properties before and after conjugating with doxorubicin. A homogenous aragonite, spherical, porous nanocarrier was obtained with a mean diameter of 24.9 nm and zeta potential of -21 mV. The energy dispersion X-ray analysis revealed high proportion of calcium as a major element in the nanoparticle. The spectrum peak suggests little alteration upon incorporation of doxorubicin. Higher loading content and encapsulation efficiency were recorded with CS-CaCO<sub>3</sub>NP. These properties underscore the potential of CS-CaCO<sub>3</sub>NP in the delivery of doxorubicin, thus giving it a high potential for application in the delivery of the anticancer in the management of cancers.

**Keyword:** Cockleshell; Doxorubicin; Drug Delivery; Nanocarrier