



C₆₀ fullerene-doxorubicin nanocomplex for combinative cancer photodynamic chemotherapy

BACKGROUND

Conventional cancer chemotherapy is limited due to its side effects on normal cells and resistance in cancer cells. We have developed a nanosized drug complex to improve the efficiency of chemotherapy complementing it with photodynamic approach. The photodynamic therapy exploits non-toxic photosensitizer and visible light, which in the presence of oxygen gain a pronounced toxicity. We use a non-covalent complex of a frontline anticancer drug doxorubicin (Dox) with carbon nanostructure C₆₀ fullerene, exploiting the latter as a drug carrier and a photosensitizer.

TECHNOLOGY

C₆₀ fullerene exhibits a negligible toxicity against normal cells. The method of C₆₀ fullerene-doxorubicin complex synthesis is established in water as well as in physiological solution. C₆₀-Dox complex is characterised with a number of physico-chemical techniques. A portable adjustable light source system is constructed based on high power single chip light emitting diode (LED). The facilitated intracellular accumulation of fullerene-bound Dox highlights extensive C₆₀ nanocarrier function. The cancer cells extensively die via compact apoptosis after treatment with C₆₀-Dox complex and LED light irradiation. The C₆₀ fullerene-based delivery system is shown to have a potential for the synergistic combination of photodynamic and chemotherapies for the treatment of cancer.

ADVANTAGES

- ✓ Easy, cost-effective and fast way of synthesis
- ✓ Proven high stability
- ✓ Synergetic combination of photodynamic and chemotherapies against cancer cells

APPLICATIONS

Photodynamic cancer chemotherapy

STATUS

Proof of principle *in vitro*



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