Application of plga (poly lactic-co-glycolic acid) for anticancer therapy

Combination of arginine-glycineaspartic acid – sorafenib- quercetin (RGD-SRF-QT) nanoparticles could provide a promising platform for co-delivery of multiple anticancer drugs for achievement of combinational therapy and could offer potential for enhancing the therapeutic efficacy on hepatocellular carcinoma. Anticancer efficacy of poly (lactic acid)-quercetin nanoparticles has been reported for sustained release kinetics revealing novel vehicle for the treatment of breast cancer. Quercetin-loaded poly (lactic-co-glycolic acid)-d-α-tocopheryl polyethylene glycol succinate nanoparticles could be used as a potential intravenous dosage for treatment of liver cancer owing to the enhanced pharmacological effects of quercetin with increased liver targeting. Tamoxifen (Tmx) embedded poly(lactic-co-glycolic acid) (PLGA) nanoparticles (PLGA-Tmx) is prepared to evaluate its better DNA cleavage potential, cytotoxicity using Dalton’s lymphoma ascite (DLA) cells and MDA-MB231 breast cancer cells. PLGA-Tmx shows excellent DNA cleavage potential as compared to pure Tamoxifen raising better bioavailability. Sustained release kinetics of PLGA-Tmx nanoparticles shows much better anticancer efficacy through enhanced DNA cleavage potential and nuclear fragmentation and, thereby, reveals a novel vehicle for the treatment of cancer. Poly (e-caprolactone) (P(CL)) is one of biodegradable and biocompatible polyester polymers. The cellular uptake of P (CL)-TPGS nanoparticles by SKBR3 cells is reported through cholesterol dependent endocytosis. The P (CL)-TPGS nanoparticles show improved toxicity and uptake efficiency and could be potentially used for the delivery of quercetin to breast cancer cells. The retardation of drug release from the nanoparticles depends on temperature and crystallinity of the polymer. However, other factors must be considered such as the compatibility and interaction of

polymer and drug. A few studies have established the investigation of P (CL)-TPGS copolymers with and without other co-monomers for the delivery of genistein, paclitaxel and TRAIL/endostatin. Quercetin-PLGA nanoparticles can be used as effective drug delivery systems for skin cancer treatment encompassing natural drugs.

Metastatic breast cancer is the fundamental driver of death from breast cancer. We have reported the efficacy of trans-copper (II) β-dithioester complexes and homoleptic zinc (II) complexes against breast cancer. However, medicines are not focused on or successful at this stage probably because of the presence of breast cancer stem cells (BCSCs). Propinquity of BCSC is the critical explanation behind resistance and failure of therapy. As BCSC originates from normal breast stem cells and having self-renewal, high proliferation rate, ability to generate heterogeneity etc. further, mesenchymal to epithelial transition (MET) is important for invasion, intravasation, circulation and extravasation; and ultimately leads to colonization of metastatic cells. Afterward, Lungs, bone, liver and brain are the main site of metastasis for breast cancer. Nanoconjugated quercetin in this regard has attracted much of interest due to effective therapeutic approaches against various molecular targets during breast cancer metastasis in vitro as well as in vivo system.

The combination of a chemotherapeutic drug with a chemosensitizer has emerged as a promising strategy for cancers showing multidrug resistance. Biotin conjugated poly (ethylene glycol)-b-poly(ε-caprolactone) nanoparticles encapsulating the chemotherapeutic drug doxorubicin and the chemosensitizer quercetin (BNDQ) has a potential role in the treatment of

drug-resistant breast cancer. BNDQ is more effectively taken up with less efflux by doxorubicin resistant MCF-7 breast cancer cells (MCF-7/ADR cells) than by the cells treated with the free drugs or non-biotin conjugated nanoparticles. BNDQ exhibited clear inhibition of the activity and expression of p-glycoprotein, a multidrug resistance marker in MCF-7/ADR cells.