THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

Drug Delivery

BTM Nanocapsules and Nanoemulsions for Formulations of Drugs

These stable nanocapsules with a liquid oil core are the ideal vehicle to solubilize poorly water-soluble or insoluble drugs with high entrapment efficiency (97-100%). They are composed of a liquid di-/tri-glyceride core with two surfactants which can be pegylated to make long circulating stealth nanocapsules. The nanocapsules are very stable in aqueous suspension, shelf stable for over one year and may be lyophilized with no cryoprotectant. Manufacture is easily scaled in a single vessel. Although the nanocapsules can be adapted for use in a wide variety of treatment models they are particularly valuable for overcoming resistance to the anti-cancer agents by decreasing the tumor efflux rate of chemotherapeutic agents (a result of inhibition of P-gp function and ATP depletion).

Benefits

- Well suited for insoluble or poorly soluble drugs
- Shelf stable
- Can be lyophilized with no cryoprotectant
- Simple manufacture process
- Adaptable to multiple delivery formats
- Overcomes drug resistance/decreases tumor efflux

carolina blue™ opportunity

For More Information

If you would like more information about this technology or UNC - Chapel Hill's technology transfer program, please contact:

Jackie Quay
Office of Technology Development
Phone:
Fax:
Email: jlquay@unc.edu

http://research.unc.edu/otd/

Office of Technology Development
UNC - Chapel Hill
308 Bynum Hall
CB 4105
Chapel Hill, NC 27599-4105

Ref: 09-0011

02.08.11

The Technology

Nanoparticles offer an alternative delivery system for cancer therapy that have the potential to control the release rate of drug, improve the drug pharmacokinetics and biodistribution, and reduce drug toxicity. Due to their small size, nanoparticles with entrapped drugs may penetrate tumors due to the discontinuous and leaky nature of the microvasculature of tumors. Also, the characteristically poor lymphatic drainage of tumors may result in slower clearance of nanoparticles that accumulate in tumors.

BTM NPs represent a novel liquid reservoir, or nanocapsule-type formulation. The liquid reservoir containing drug dissolved in Miglyol 812 is stabilized with the polymeric surfactants. Higher drug loading of BTM nanoparticles indicate the advantage of this nanocapsule-type formulation as compared to the solid-core type systems. The BTM NPs were spontaneously formed from the microemulsion precursors. BTM NP formulations lyophilized in water, without cryoprotectants, produced uniform white cakes that could be rapidly rehydrated with complete retention of original physicochemical properties, in-vitro release properties, and cytotoxicity profile. BTM formulations have been tested by creating cremophor-free lipid-based paclitaxel nanoparticle formulations that, 1) utilized acceptable oil phases having improved solvation ability for PX, 2) had PX entrapment efficiency >80% with a minimum final concentration of 150 ?g/mL with over 5% drug loading, 3) resulted in slow(er) release profiles of PX from NPs, and 4) had comparable in-vitro cytotoxicity to Taxol ®.

- Drug Delivery

Opportunity

UNC's Office of Technology Development seeks to stimulate development and commercial use of UNC-developed technologies. UNC is flexible in its agreements, and opportunities exist for joint development, academic or commercial licensing (exclusive, non-exclusive, and field-of-use), publishing, or other mutually beneficial relationships. UNC is pursuing U.S. and international intellectual property protection for this innovation.