

Course: Smart drug delivery systems

Duration: 24 hours

Teacher(s): SALMASO Stefano, CALICETI Paolo

Curriculum: Pharmaceutical Sciences

Description:

Objectives. The course aims at introducing the features expected from advanced nanocarriers for drug delivery, the properties affecting their biodistribution in vivo, the rationale for design of “smart” nanocarriers to exploit the phenotypic and microenvironmental features of the tumor to increase site-selectivity.

Contents. Drug nanocarrier properties affecting the pharmacokinetic profile and biodistribution: size, hydrophilic/hydrophobic ratio on the surface, surface charge and zeta potential. Case studies with liposomes and metal nanoparticles. Peculiar microenvironments of disease sites. The concept of “smart” nanocarriers: how nanocarriers can be endowed with active targeting capacity and responsiveness to microenvironment to improve their biopharmaceutical behaviour.

Metal based nanoparticles: SPIONS and gold nanoparticles, characterization methods, approaches to confer responsiveness and targeting capacity, potential uses in diagnostics and drug delivery, remote activation of therapeutic activities. Cyclodextrins: a classical pharmaceutical excipient with novel nanotechnological applications in drug delivery. Case study of cyclodextrin based nanoparticles for siRNA delivery.

Polymer based nanoassemblies: novel copolymers design by using living radical polymerization techniques to obtain defined architecture, composition and molecular weight. Assembly of smart and functional nanocarriers (e.g. micelles, polyplexes, nanoparticles) for controlled release of drugs/therapeutic nucleic acids and specific targeting. Principles governing the assembly and drug loading.