ΙΤΕ/ΕΙΧΗΜΥΘ

ΣΕΜΙΝΑΡΙΟ

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ΟΜΙΛΗΤΗΣ: **Dr. Patrick Couvreur**
Director of the Department "Physico-Chemistry, Pharmaceutical Technology and Biopharmacy"
Université Paris-Sud, UMR CNRS 8612, FRANCE

ΘΕΜΑ: **"SMART" NANOCARRIERS FOR DRUG DELIVERY AND TARGETING**

ΤΟΠΟΣ: Αίθουσα Σεμιναρίων ΙΤΕ/ΕΙΧΗΜΥΘ

ΗΜΕΡΟΜΗΝΙΑ: **Παρασκευή, 4 Σεπτεμβρίου 2009**

ΩΡΑ: **12:00**

ΠΕΡΙΛΗΨΗ:

The major obstacle to drug efficacy is the non-specific distribution of the biologically active compound after administration. This is generally due to the fact that the drug distributes according to its physico-chemical properties which makes that diffusion through biological barriers may be limited. Also, certain chemical entities are either rapidly degraded and/or metabolized after administration (peptides, proteins, nucleic acids). This is the reason why the idea has emerged that nanotechnologies may be employed to modify or even to control the drug distribution at the tissular, cellular or subcellular level.

The huge progresses done in material sciences as well as a better knowledge of the physio-pathological disorders of the diseased areas in the body has allowed to construct "smart" nanodevices to perform temporal and spatial site specific delivery. Nanosystems may also be useful to improve the performance of imaging techniques applied for the in vivo diagnosis. Thus, although we are still far from the ideal "magic bullet" proposed a century ago by the immunologist Nobel laureate Paul Ehrlich, today nanotechnology has already completed several key achievements to reach this goal.

In general, "smart" nanocarriers may be equipped with a "core" and a "corona" able to confer to the resulting supramolecular assemblies following functionalities:

- Protection of the drug from the recognition by the various detoxification processes of the organism (ie. degradative enzymes or efflux proteins)
- Combination of various biologically active compounds acting on complementary biological targets (ie. antiangiogenic and DNA intercalating agents)
- Release of the drug content in a controlled manner in response to an external stimuli (ie. pH, temperature or magnetic responsive nanocarriers)
- Camouflage towards the recognition by the immunological self-defense mechanisms of the body (ie. "stealth" nanocarriers)
- Targeting of specific tissues, cells or even sub-cellular compartments which is attainable by decorating these nanodevices with molecular ligands (ie. monoclonal antibodies, hormones, peptides, vitamins etc.)
- Ability to deliver intra-cellularly drugs which don't diffuse spontaneously into cells
- Combination of a pharmacological and an imaging agent to get simultaneously personalized patient treatment and diagnosis ("Nanotheranostics")

Although the introduction of nanotechnology has obviously permitted to step over numerous milestones towards the development of the above mentioned "Magic Bullet", a lot of work remains, however, to be done. Next improvements will certainly come from the introduction of new materials including better stimuli responsive polymers or lipids to elicit the challenge of targeting the drug to its specific site of action, to retain it for the desired duration and to release it according to the correct time schedule. It may also be expected that more sophisticated and multifunctional systems will be conceived allowing with a single system to perform in vivo diagnostic and to release the targeted drug on demand. Finally, the development of strategies aiming to develop entities existing in Mother Nature and based on biomimetism should also participate to major progresses in the next few years.