

Conference abstract PL-04

## **Nanotechnologies for the Delivery of Nucleic Acids and Contrast Agents**

**E. FATTAL**

UMR CNRS 8612, University of Paris Sud 11, Châtenay-Malabry, France

E-mail: elias.fattal@u-psud.fr (E. Fattal)

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Strategies for inhibiting gene expression have been applied in several therapeutic applications. Indeed, administration of nucleic acids such as antisense oligonucleotides (AS-ODNs) or small interfering RNA (siRNA) has raised a lot of interests in the recent years for the treatment of several diseases. Among the promising therapeutic approaches is antisense technology – oligonucleotides that are designed to be complementary to a target RNA sequence so they can bind to the target and stop the production of undesirable proteins. A more recent approach for targeting mRNA is the use of siRNA which can lead to hydrolysis of the target mRNA homologous at the site where the antisense strand of the siRNA is bound. Very similarly DNA delivery aiming to express intracellularly a protein that is absent or deficient raises close issues to AS-ODNs or siRNAs with the exception that the intracellular target is the nucleus, meaning one more barrier to cross. Nucleic acids are characterized by a high molecular weight and a negative charge being not able to pass biological membranes. Out of these reasons, two strategies are possible to improve their delivery: The first is to develop chemical modified nucleic acids in order to protect them or/and to improve their cellular uptake. The second strategy comprises the development of particulate carriers for oligonucleotides delivery which increase tremendously the efficacy of all these molecules.

Research developing molecularly targeted medical imaging and therapy has increased tremendously in recent years. The rationale is the detection of probes providing imaging contrast that can be targeted to specific molecular markers. The design of molecularly targeted contrast agents to elucidate molecular processes, to provide specific diagnosis and to help to target therapy is a major goal to achieve. In imaging techniques such as ultrasound and MRI, contrast agents are currently used to improve visualization of the microvasculature. Our goal is to design nanotechnologies containing these contrast agents for molecular imaging by echography and MRI. To reach this step, we have designed novel polymeric capsules containing perfluorooctyl bromide, a compound that can provide dual imaging with these techniques. The potentialities of these nanotechnologies appear highly interesting.

The presentation will demonstrate the possibilities and limits of nanotechnologies for the delivery of biotech drugs and contrast agents.