
Call Title: Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies – LARGE 2011

- Call identifier: **FP7-NMP-2011-LARGE-5**
- Date of publication: 20 July 2010
- **Deadline: 4 November 2010** at 17.00.00 (Brussels local time); first stage proposal
- Indicative budget: EUR 118 million
- Funding Scheme: Large-scale integrating collaborative projects.

SELECTED PRIORITY TOPIC:

Activity/area: Nanotechnology for benefiting environment, energy and health

Topic: NMP.2011.1.2-2 New targeted therapy using nanotechnology for transport of macromolecules across biological barriers

Technical content/scope

Nanomedicine and Nanopharmaceuticals are an emerging sector which offers potential for radical improvements in the treatment of difficult diseases with important benefits for patients by providing highly specific targeted drugs with lower side effects. One area identified as being crucial for breakthrough is the area of nano-encapsulation or nano-delivery systems. These systems have to be able to provide a significant payload and must be capable of efficiently and selectively being transported through biological barriers and must be capable of releasing the active agent in a controlled manner at the location of the disease so as to reduce the side effects in the patient. Ultimately, therapeutic delivery systems should be biocompatible, inexpensive, manufacturable, stable to store and acceptable to regulators.

At the focus of this call topic is the challenge to develop:

- technologies that promote the application of therapeutically significant payloads of higher molecular weight (>1kDa) pharmaceuticals across complex biological barriers aided by nanotechnology and exhibiting transport rates in such a way that a therapy can be effective. Examples of such biological barriers are blood-brain-barrier, mucosal barriers (e.g., intestinal, nasal, ocular, pulmonary) and epithelial skin barrier. The choice of therapeutic entity should include larger molecules such as proteins, antibodies, nucleic acids or peptide mimics, foldamers.
- a key objective would be to produce a comprehensive pre-clinical package which includes pre-clinical screening and decision making tools to demonstrate the potential for translation of the nanotechnology into the creation of diagnostic and therapeutic products. The research projects cannot include clinical testing but may include animal testing, applying the 3 R's principle (replacement, reduction, refinement). The potential for transfer of the developed technologies to clinical practice is very important taking into account current regulatory barriers. Therefore the active participation of industrial partners and clinicians represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact. The primary objective is to demonstrate a balance between efficacy and toxicity of the system with the aim of increasing benefit to risk ratio.

Expected Impact

Nanomedicine will offer the possibility for new therapeutic modalities with radical improvements for treatment of difficult diseases and benefits for the patients. At the same time, it offers opportunities for the pharmaceutical industry to innovate and change more radically to face strong global competition. Nanomedicines will be a key component as companies try to expand the established markets for macromolecule based therapeutics. In summary, the expected impacts are:

- (i) radical improvement of therapy;
- (ii) improvement of the competitiveness of the European healthcare industry;
- (iii) increase the application of nanotechnology in medicine;
- (iv) improved understanding by academics and research organizations of the requirements of the pharmaceutical industry and regulators.