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PROJECT FINAL REPORT

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4.1 Final publishable summary report

4.1.1 Executive summary

ANTICARB attempts to exploit the advantages offered by a novel nanotechnology platform – carbon nanotubes – and apply them to a clinically established therapeutic modality – targeted antibody therapy – for the creation of hybrid nanotechnology-based monoclonal antibody targeted cancer therapeutics. ANTICARB combines two emerging technologies, antibody and nanotube technology, in a way that will allow safe development of antibody-nanotube conjugates and explore their swift translation into a clinical oncology setting. By combining proven, clinically used, anti-cancer agents – antibodies – with a novel nanotechnology-based platform made of advanced nanomaterials, ANTICARB aims at enhancing the therapeutic potency of the antibody and establish a new paradigm for oncology therapeutics. The ability of carbon nanotube technology to transport antibodies into the tumor cell cytoplasm may lead to validation of specific intracellular targets for oncology. This objective will be reached by adopting a multidisciplinary approach and by bringing together expertise from the fields of drug delivery, molecular biology, chemistry, engineering, pharmacology and toxicology. The proposal capitalises on this industry-academia multidisciplinary and perfectly integrated team, whose expertise spans from advanced biotechnology to sophisticated nanotechnology.

4.1.2 Summary description of project context and objectives

Background

Cancer is a serious and costly threat to human health today. According to the Public Health Portal of the European Union, 3.2 million Europeans annually are diagnosed with cancer, mostly breast, colorectal or lung cancers. While there are many different types of cancer, the underlying problem is the same: cells divide and grow in an uncontrolled manner, most commonly resulting in solid primary tumors that may spread to other organs, leading to metastasis.

One of the challenges with cancer treatment is the non-selective nature of therapy, i.e. both healthy and malignant tissues are affected. In addition, most treatments also inhibit the production of erythrocytes and white blood cells, causing patients to become anaemic and neutropenic, leading to enhanced susceptibilities to secondary infections. Cancer is projected to become more widespread in the next few decades due to ageing of the population and increased chemo- and radio-resistance.

Project Aim

The aim of the ANTICARB project is the improvement of oncology treatment options using systemic administration of nanotechnology-mediated antibody therapeutics. Antibodies were selected as they allow for therapeutic and active targeting to specific cell receptors. Carbon nanotubes were chosen because their large surface area offers a template for conjugation with a variety of targeting and therapeutic monoclonal antibodies.

The CNT-Ab constructs are tagged with fluorescent probes and radioisotopes to help determine their cell biology and pharmacology. Fluorescent probes allow for in vitro imaging to understand the mechanism of the interaction between the CNT-Ab constructs and cancer cells. Radioisoprobes offer capabilities for in vivo diagnosis and quantitative tissue distribution, pharmacokinetics and toxicokinetics. The ANTICARB project also attempted to determine the safety profile of the novel CNT-Ab constructs using an array of toxicokinetic, immunological and cytotoxicity assays.

Project Objectives

The ANTICARB project seeks to create new technologies that may offer more treatment and diagnostic options to clinicians and patients.

The main objective of ANTICARB is the design and development of carbon nanotube-antibody (CNT-Ab) constructs. They are investigated as novel platforms for cancer treatment with the purpose to act as combinatory therapeutic/diagnostic agents.

The specific ANTICARB objectives are:

- Improve and expand oncology treatment options based on systemic administration of nanotechnology-mediated antibody therapeutics
- Determine the safety profile of the novel CNT-Ab constructs based on pharmacokinetic, immunological and toxicological assays
- Develop CNT-Ab constructs that can be rapidly translated into larger animal and clinical pre-Phase I trials
- Determine the pharmacology and cell biology of functionalised carbon nanotubes with and without antibody conjugation
- Increase the competitiveness of the European industry (pharmaceutical and nanotechnology sector)

Project Workplan

The ANTICARB workplan is divided in three almost distinct Stages as the diagram below shows. Even though Stages I-III follow a scientifically logical sequence, our intention was to engage in all three Stages simultaneously very early on in the project in order to allow for optimisation of the CNT-Ab constructs through multiple feedback loops: lab-to-cells-to-animals.

Stage I: CNT-Ab Engineering Carbon Nanotube Platform material [contribution from WP1 & WP2]

A very important problem related to the use of carbon nanotubes is their extraordinary aggregation due to very strong intertube forces, which causes insolubility in any type of organic solvent or aqueous solution. For biomedical applications, it is therefore mandatory to modify the pristine material in order to disrupt the bundles and make the manipulation of CNTs easier. To render the CNTs soluble or, better, biocompatible, we followed several strategies. Nanocyl provided CVD-synthesized carbon nanotubes: single-walled carbon nanotubes (SWNT), double-walled carbon nanotubes (DWNT) and multi-walled carbon nanotubes (MWNT). The purity of the raw MWNTs was always above 90% and always further purified. All purified new products of DWNTs and MWNTs CNT were shortened and functionalized at the same time and available at a laboratory scale too.

Functionalisation of CNTs was performed in order to have different functional groups at the CNT surface that influenced reactivity towards antibodies. NH_2 functional groups were introduced on the surface of CNTs. Optimisation steps included purification, functionalisation and shortening of CNTs to achieve as narrow as possible the size distribution of CNTs. The objective is to increase the reactivity of CNTs towards antibodies conjugation, a higher yield of simple functional group such as NH2 can be envisaged througha plasma functionalization process. Based on the reactivity of such modified CNT with selected antibodies, the choice of the ideal number of functional groups were estimated.

Alternatively, the CNT were treated with strong oxidising acids to generate carboxylic functions at their tips and side-walls at much higher concentrations. After oxidation, the nanotubes were also chemically shortened and compared with those obtained by the ball milling process (vide supra). The material so produced was much more easily dispersable than the pristine nanotubes, and can be further functionalised with many relevant biomolecules. Another approach in the modification will consist on the use of organic addition reactions, including the 1,3-dipolar cycloaddition of azomethine ylides. This process, optimised in the last few years by the UTr and CNRS groups of this Consortium, will allow the direct introduction of the functionalities at the side-walls and tips of the unmodified tubes. The functional groups will be again modified with the suitable bio fragments (vide infra). These two types of functionalisation strategies were applied to double- and multi-walled CNTs provided by Nanocyl. The two functionalisation processes were applied contemporarily, so that we can produce CNTs derivatised with two different molecular entities, such as an antibody and/or a drug, or a labelling unit. In addition, the functionalisation allowed the complete removal of the catalytic particles that may not be totally eliminated during the manufacturing process.

Antibody construct [contribution from WP3 & WP4]

UCB has over twenty years history of taking antibodies into the clinic, indeed it was the pioneer in evaluating chimeric antibodies. Over the decades it has acquired a large library of antibodies - human and murine - different IgG sub-classes and whole IgG, as well as fragments such as Fabs. This library of therapeutic antibodies has been mainly produced in E.Coli and has in general a clinical specification of 99.9% purity. For the purposes of

ANTICARB, a series of antibodies were used that were clinically developed to Phase II clinical trials.

Carbon Nanotube – Antibody conjugate [contribution from WP2 & WP3]
Following the first step, the f-CNTs will contain carboxylic and/or amino groups at their tips and side walls. These f-CNTs, derived from the oxidation reaction and the organic cycloaddition reactions, will be used as starting materials for the conjugation to the cell specific targeting monoclonal antibodies and to the therapeutic monoclonal antibodies (IgG or fragments). To generate the different conjugates, the f-CNTs will possess amino functions, fundamental for the introduction of suitable linkers for the monoclonal antibody binding. The amino groups around the nanotubes will be modified with a maleimide function. Indeed, the maleimide will allow a direct chemo-selective reaction with the thiol-free cysteine amino acid residues within the antibody sequence. All these types of CNT-Ab conjugates are of covalent nature.

Radiation and Optical Probes [contribution from WP2, WP4, WP5]
The f-CNTs, derived from the oxidation reaction and the organic cycloaddition reactions, will be further functionalised with chelating agents for radioisotopes emitting γ and Auger radiation to perform in vivo diagnosis and intracellular radiotherapy. To generate the different radiolabelled conjugates, f-CNTs will be modified with amino functions for the introduction of suitable ligands including DOTA (1,4,7,10-tetraazacyclododecane-1,4,7,10-tetraacetic acid) and DTPA (diethylentriaminepentaacetic dianhydride) for the complexation of the different radionuclei. In parallel, a similar approach will be exploited to link fluorescent probes to f-CNTs for in vitro imaging. Alternatively, the radioisotopes and the fluorescent molecules will be grafted to the monoclonal antibodies before or after the conjugation to the nanotubes.

Stage II: CNT-Ab Biology - CNT-Ab construct Cell Biology [contribution from WP2, WP4, WP5]
All CNT-Ab conjugates, including the fluorescent derivatives, will be assessed for their cellular uptake behaviour. A wide panel of human and murine cells lines, murine T and B lymphocytes, and murine macrophages will be used to study the cell penetration, the intracellular trafficking and the mechanisms of internalisation. Fluorescent spectroscopy (epifluorescence and/or confocal laser scanning microscopy) will be used to observe the internalisation process. Flow cytometry (FACS) will be helpful not only for the uptake analysis, but also for the determination of the kinetic, the time and concentration dependence of the process. In addition, FACS will be fundamental for the assessment of the cytotoxic effects. The lymphocytes and macrophages will be directly isolated from the animal models available in our laboratories (vide infra). Surface plasmon resonance analysis (Biacore technology) will be used to measure the parameters of binding between the CNT-Ab constructs and the receptor expressed at the cell surface. 3D human tumor spheroids are routinely cultured in our laboratories and will be used as an in vitro model for metastatic nodules and the avascular interstitial space of solid tumors. Penetration into the tumor volume will be assessed by optical slicing of the spheroid using confocal laser scanning microsocpy tracking the optical signal from fluorescently labelled CNT-Ab constructs. Image analysis packages will allow modelling of the capacity of different CNT-Ab conjugates to penetrate deeper into the tumor mass and also simulate the predicted radiation dose deposition and tumor cell kill.

CNT-Ab Pharmacology [contribution from WP2, WP4, WP5]

The pharmacological properties of the CNT-Ab conjugates will be highly dependent on the tissue distribution, pharmacokinetics, blood residence time and body excretion kinetics following their in vivo administration. A variety of critical parameters will be assessed: a) route of administration – three main routes relevant to current clinical application of antibodies and proteins will be explored: intravenous, subcutaneous; pulmonary; b) dose escalation – our starting point will be the currently administered therapeutic antibody doses (approximately 3mg/kg in a single administration) and escalate from there; c) in vivo model upscaling – we will carry out all of the routine tissue biodistribution and pharmacokinetic analysis using mice and dynamic whole-body imaging (microSPECT/CT – requested for ULSOP) deemed essential to allow rapid, accurate, ethical (minimisation of animal numbers) and feasible (minimisation of labour intensity required) determination of the in vivo transport kinetics and organ distribution of the CNT-Ab. In that way, fundamental understanding of the CNT-Ab pharmacology will be obtained.

Stage III: CNT-Ab Safety & Therapeutic Efficacy - CNT-Ab Toxicology, Immunocompatibility and Radioprotection [contribution from WP2, WP4, WP5]

Toxicology - To achieve a long-term risk assessment of the CNT-Ab constructs, dose escalation studies will be carried out first to determine doses to the various organs and tissues of relevance. In a second step we will study the toxicological effects in those organs. We will carry out long-term biokinetics after intravenous injection (two, four weeks and 3 months) of stably radiolabeled Ab-CNT in rats. Once we know which secondary target organ is going to be dosed we will perform toxicological studies on some of these organs at selected time points (determined by the dose escalation studies) by pro-inflammatory cytokine assays and limited induction tests. These tests will include gene array analyses. We are expecting to be able to determine which organs are affected and the lower dose limit, under which toxicity will not be expected to act as an adverse effect (toxicity threshold).

Immunocompatibility - The rationale behind studying complement activation in vitro and complement-mediated pseudoallergic reactions in vivo, as predictors of short-term immune toxicity of CNT-Ab, lies in the fact that complement activation might cause, or play a major role in those unusual hypersensitivity reactions (HSRs) wherein prior exposure to the reactogen agent, and, hence, a causal role of IgE, cannot be established. These reactions have been referred to as “complement activation-related pseudoallergy” (CARPA), and include widely known and feared “infusion” reactions to anticancer drugs solubilized by micellar solvents, such as Cremophor EL and polysorbate-80 (in Taxol and Taxotere), liposomal anticancer and antifungal drugs (Doxil and Ambisome), radiocontrast media, plasma expanders and blood substitutes. The pathomechanism of CARPA involves complement activation through both the classical and the alternative pathways, giving rise to C3a and C5a anaphylatoxins that trigger mast cells and basophils for secretory response that underlies the clinical symptoms of HSRs. Considering their cylindrical structure with extended length, CNTs have a substantial surface area for binding plasma and complement proteins, particularly if, after functionalization and targeted binding, they deposit on cell surfaces in a tandem or aligned manner. CNT-Ab may therefore activate complement, posing realistic danger for CARPA. In addition, unexpected cross reactions with immune cell surface antigens might trigger the release of cytokines or allergomedins, as observed with TGN1412. The proposed measurement of complement and basophil activation by CNT-Ab in human serum and blood in vitro and reactogenicity studies in animals in vivo will serve as essential predictors of biocompatibility or toxic effects in the clinic.

Radioprotection - Gamma (or X) ray emitting radionuclides suitable for imaging emit photons which are energetic enough to escape the body and, thus, in addition to the self-dose in the residing tissue are also capable of cross-irradiating adjacent organs. Given their relatively uniform mode of irradiation, a quantitative estimate of the energy deposition to the various organs (radiation absorbed dose) will be obtained by the MIRD mathematical formalism using experimental biokinetic data for the radionuclides, its characteristic emission properties (type and energy of emitting photons/electrons, and half life) as well as its source-to-target specific absorption values. For radionuclides that also (or solely) emit Auger electrons which deposit their energy in a highly non-uniform and localized manner (usually within less than 100 nm from their origin), the MIRD scheme is not suitable, therefore we will perform detailed, nanoscale Monte-Carlo simulations to assess the energy deposition by the Auger electrons in radiobiologically sensitive subcellular domains (e.g. mitochondrium, cell nucleus, DNA). Appropriate weighting factors will then be used for the irradiation component that resulted from the Auger electrons, to properly account for their increased radiobiological effectiveness in comparison to the gamma and X rays.

CNT-Ab Preclinical Efficacy [contribution from WP2, WP4, WP5]

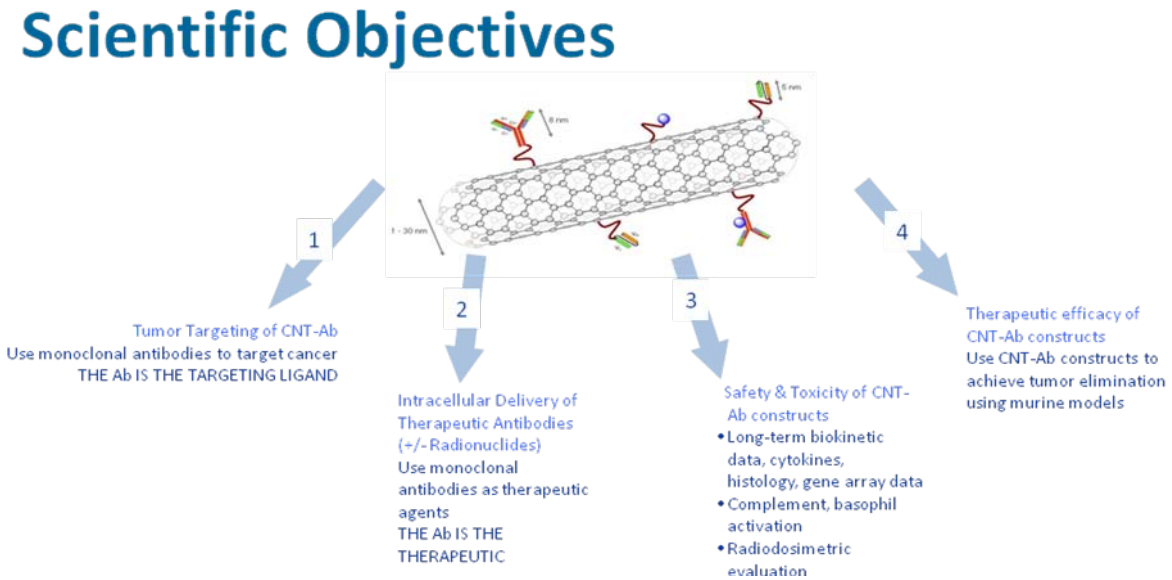
The therapeutic efficacy of the CNT-Ab conjugates were performed using human tumor xenograft models in nude mice. The main objective is to use antibody nanotubes bearing no isotope or cytotoxin but with antibodies that are biologically active against an intracellular target. The changes in tissue biodistribution and pharmacokinetics of radiolabelled CNT-Ab in mice were initially established by microSPECT/CT, followed by tumor xenograft therapeutic studies using a dose regime previously established to be lower than the toxicity threshold. The intratumoral route was primarily explored to investigate the therapeutic activity of the CNT-Ab.

4.1.3 Description of the main S&T results/foregrounds.

The main aim of ANTICARB has been the design and development of novel, safe and effective carbon nanotube –antibody (CNT-Ab) constructs for combinatory therapeutic/diagnostic (theranostic) oncology indications. The individual components employed to achieve this technology are:

a) Antibodies - Monoclonal antibodies - full (approx. size 8 nm) or fragments (5nm) will be used for therapeutic and active targeting to specific cell receptors
b) Carbon Nanotubes - Single- (1 nm diameter) and multi-walled (20-30 nm in diameter) functionalised carbon nanotubes will be used as platforms for controlled conjugation of the antibodies. Also, antibodies with the capacity for intracellular activity
c) Radionuclides - Radioisotopes emitting γ and Auger radiation will be grafted either on the carbon nanotube or the antibody to offer capability for *in vivo* diagnosis (SPECT/CT imaging) and synergistic intracellular radiotherapy.
d) Optical Probes - Fluorescent probe molecules will be grafted on the carbon nanotubes or antibodies to offer capability for *in vitro* imaging (microscopy)

ANTICARB had four major scientific objectives (shown in the schematic below):



ANTICARB has achieved the following Science and Technology foregrounds in each of its objectives:

1. Fabrication and Synthesis of CNT-Ab

Two types of MWNT material, morphologically different, were compared throughout the project (Nanocyl and NanoAmorph). As shown in **Figure 1.1** below the Nanocyl material was thinner (5-10nm) than the NanoAmorphous (20-30nm) material.

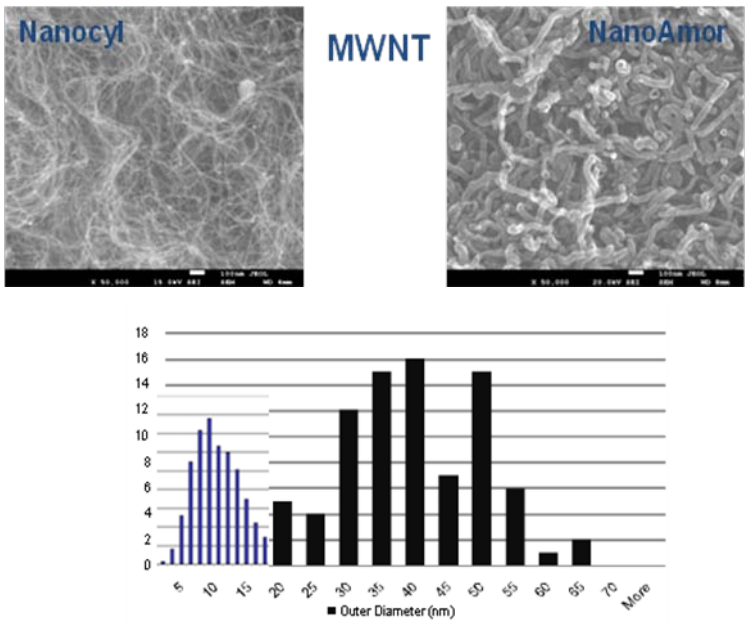


Figure 1.1

It was also found that the oxidation of the nanotubes in strong acids shortens the length of both Nanocyl and NanoAmorph materials (**Figure 1.2**) but also creates defects in their sidewalls as shown in **Figure 1.3**.

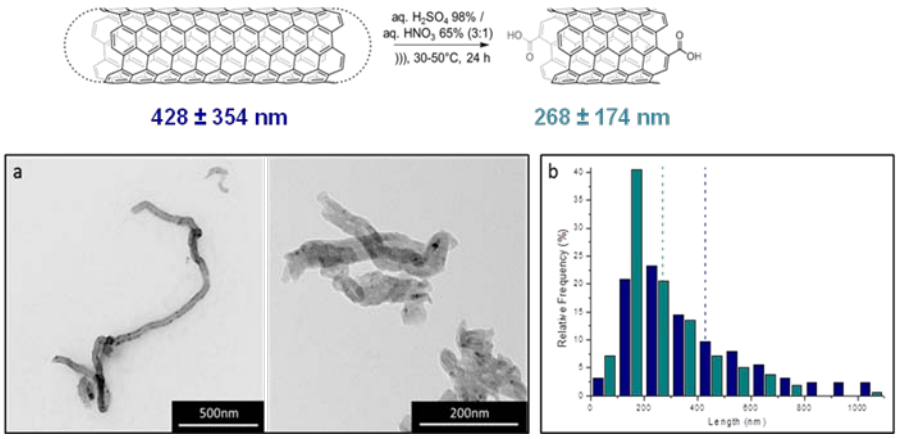


Figure 1.2

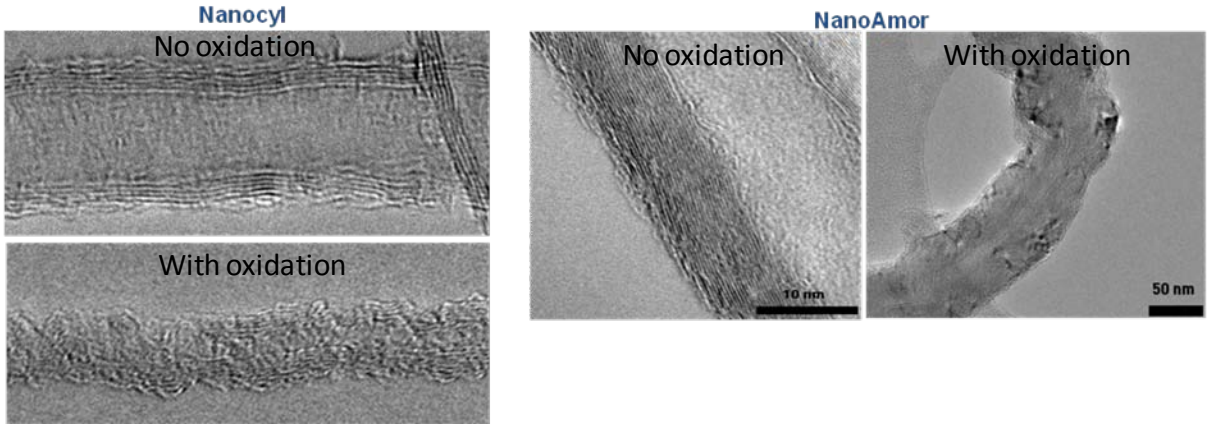


Figure 1.3

One of the interesting findings in ANTICARB, is that oxidation renders MWNT prone to enzymatic degradation as clearly shown in **Figure 1.4** when the oxidised MWNT were incubated in the phagolysosomal stimulating fluid (PSF) and horseradish peroxidase (HRP).

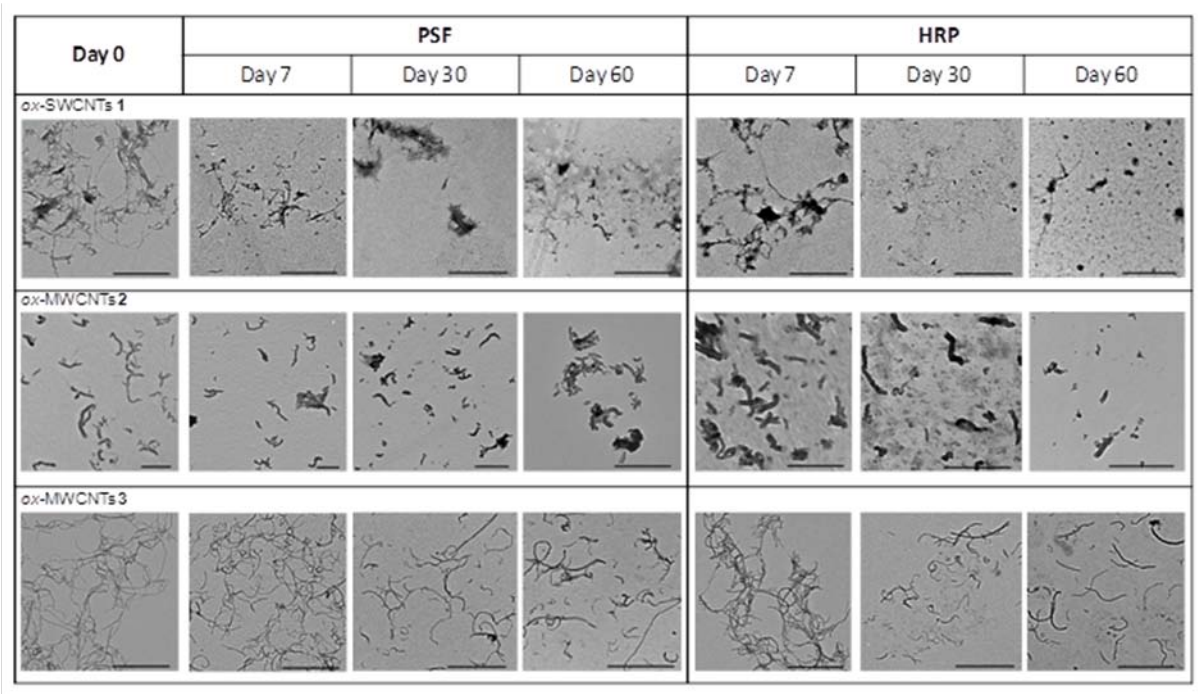


Figure 1.4

A series of Phase II clinically developed antibodies were used in ANTICARB. As shown in **Figure 1.5** this include the full IgG; a humanized monoclonal antibody (hCTM01) , the antigen binding fragment (Fab') and the single chain variable fragment (scFV). These antibodies were targeting the polymorphic epithelial mucins (MUC-1) which is over-expressed in many tumours.

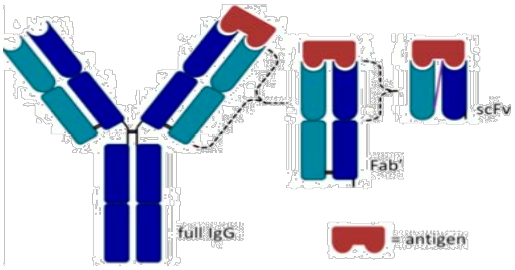


Figure 1.5

Therefore, different CNT-Ab constructs were synthesised, characterised and studied in ANTICARB as shown in **Figure 1.6**. These constructs had dual functional groups which allowed their conjugation to the antibodies (IgG, Fab', scFV) at one end and to a fluorescent probe (FITC) or a chelating molecule (DTPA) to the other end.

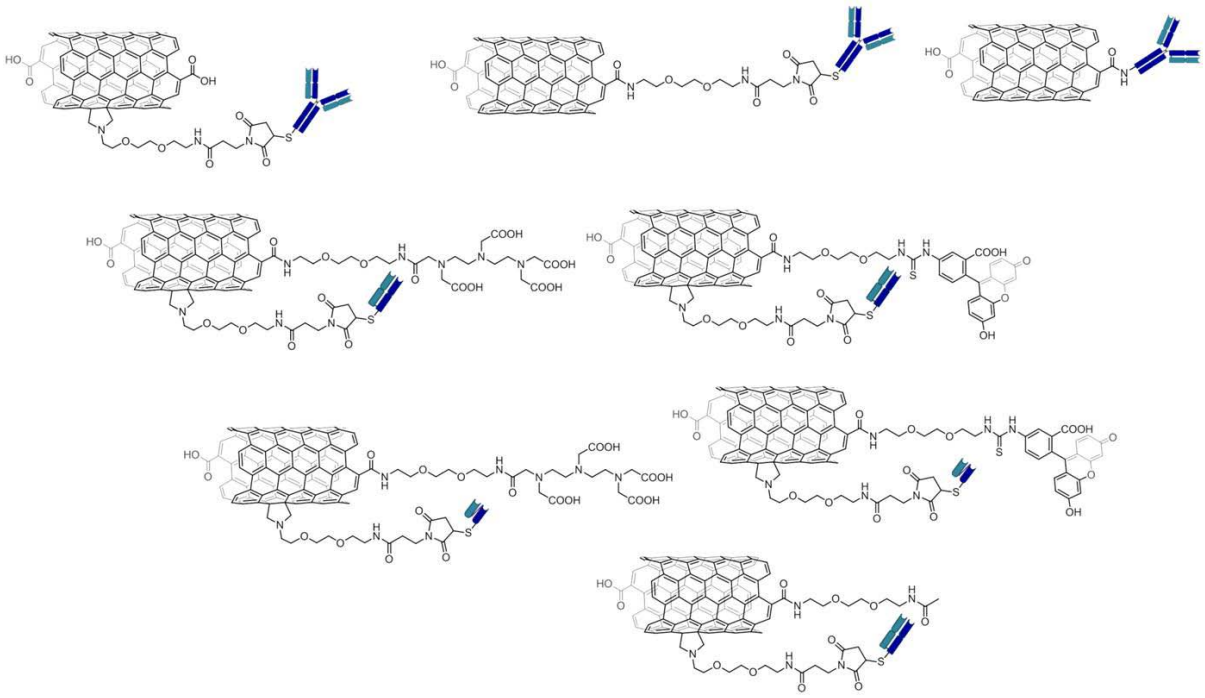


Figure 1.6

2. Intracellular delivery of CNT-Ab

The CNT-Fab' construct internalised in both MUC-1 positive cells (MCF7) and MUC-1 negative cells (Calu6) as shown by the presence of the green signal (FITC conjugated to CNT) and red signal (secondary antibody against Fab's) in both cell lines (**Figure 2.1**).

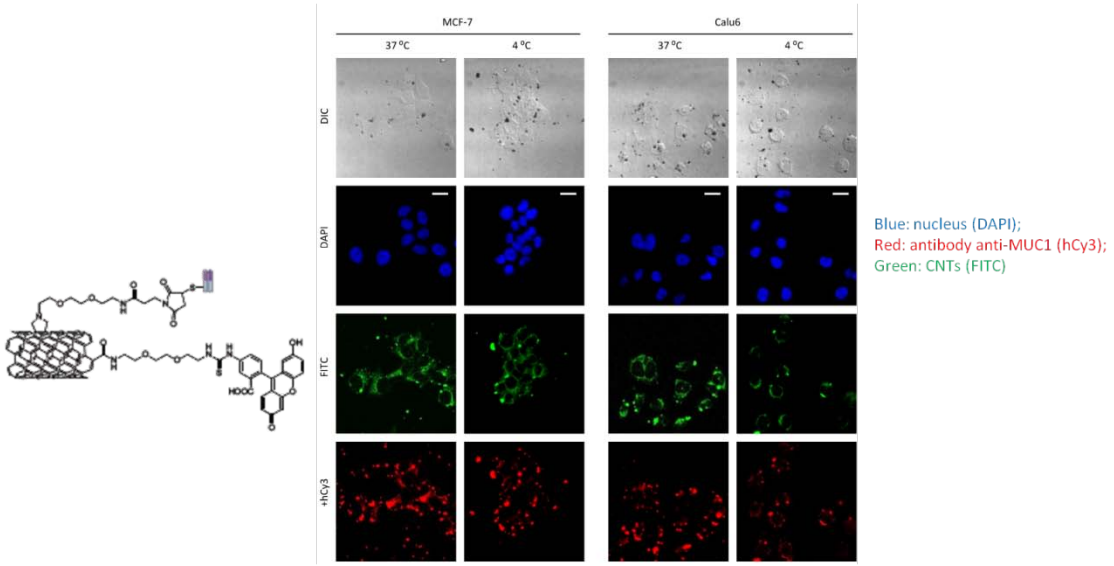


Figure 2.1

3. Tumor Targeting of CNT-Ab

In ANTICARB, we used multicellular tumour spheroids as *an vitro* 3D model to study the tumour targeting capacity of the CNT-Ab constructs.
Both MWNT-IgG and MWNT-Fab' constructs showed enhanced affinity for MUC-1 positive tumour spheroids (MCF7) as shown in **Figure 3.1** (left panel). However, MWNT-Fab' exhibited a deeper localisation within the tumour avascular interstitium which was even observed with the MUC-1 negative (HCT116) tumour spheroids as shown in the cryosections of the spheroids (**Figure 3.1**, right panel).This indicates that MWNT were driving the uptake when the antibody was a smaller fragment (Fab').

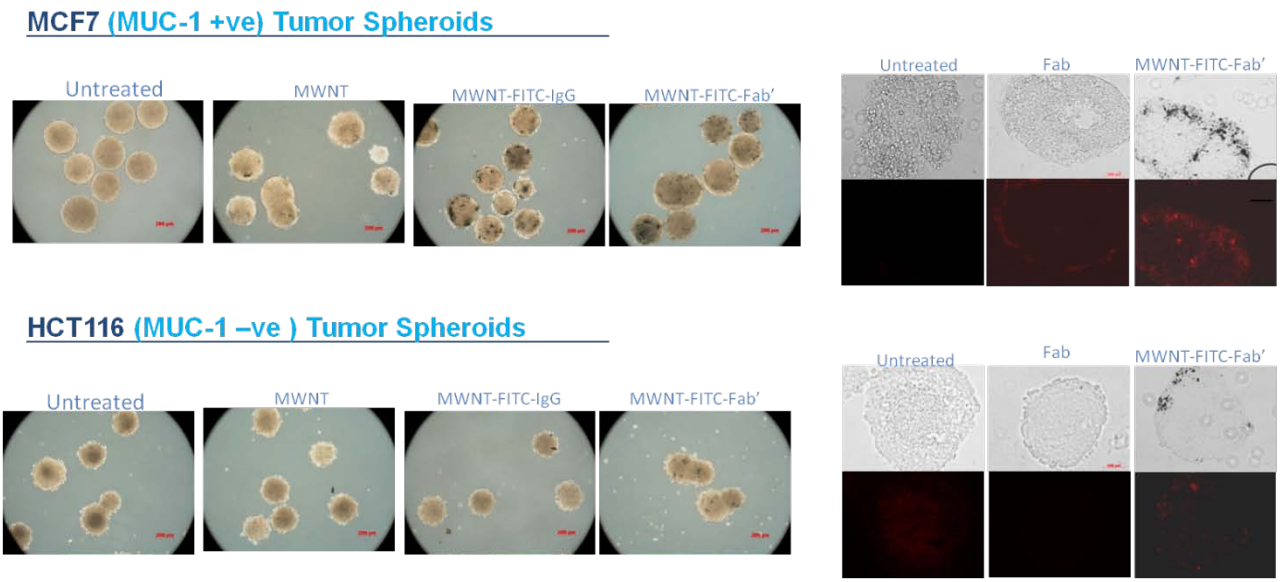


Figure 3.1

4. Pharmacokinetics of CNT-Ab

The biodistribution profile of the CNT-Ab constructs was studied after intravenous administration. As seen in the SPECT/CT images (**Figure 4.1**), there was no change in the biodistribution profile when the antibodies were conjugated onto the nanotubes.
However, the NanoAmorph CNT-Ab constructs accumulated mainly in the liver and spleen; while the Nanocyl CNT-Ab constructs were mainly detected in the lungs and liver (**Figure 4.2**). This indicates that the starting material has a drastic effect on the biological profile of materials *in vivo*.

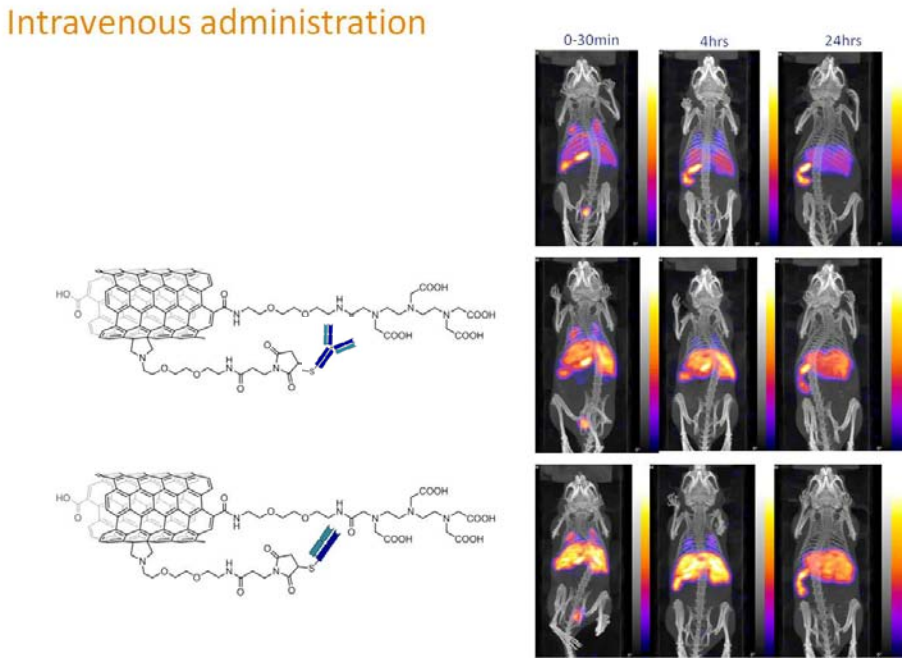


Figure 4.1

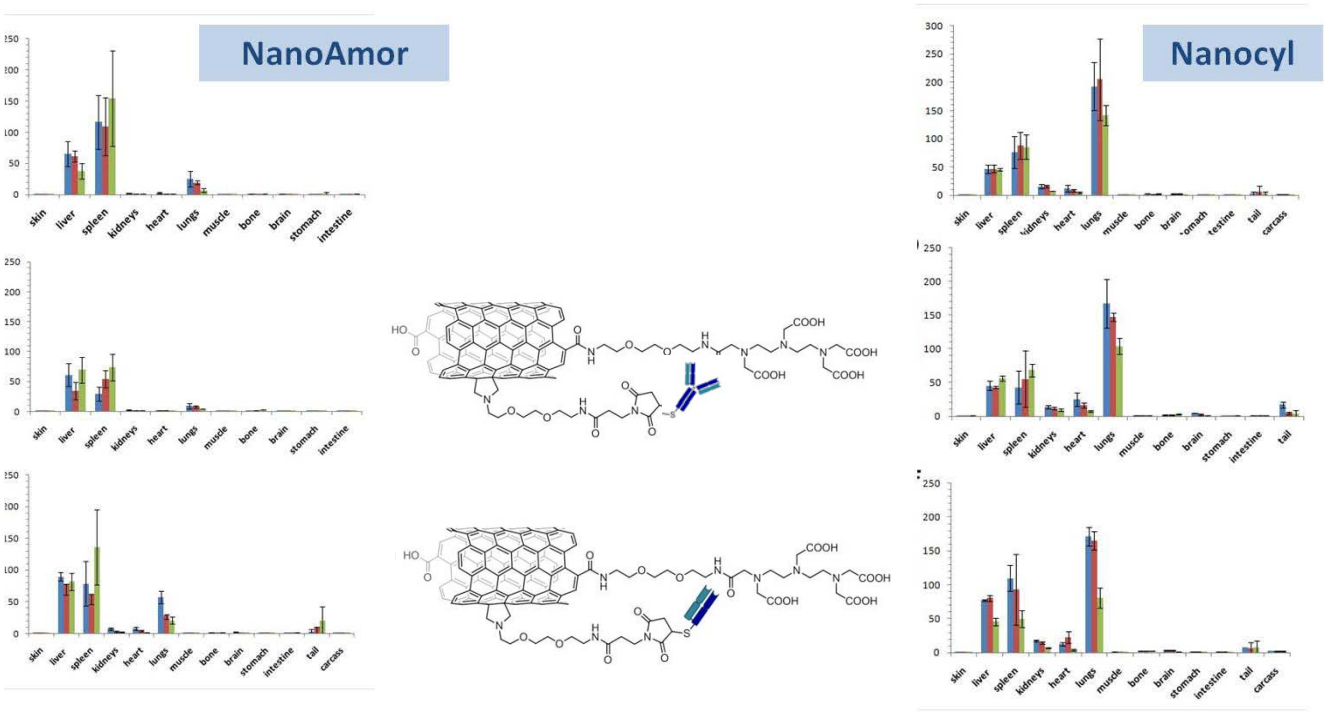


Figure 4.2

5. Safety and Toxicity of CNT-Ab

The toxicity of CNT-Ab constructs was assessed after intra-tracheal administration. It was found that the MWNT-Fab' construct caused the most significant acute and chronic inflammation followed by the Fab' fragment alone and then the MWNT alone as seen in **Figure 5.1 (Top panel**).
In addition, acute macrophage depletion was observed with the same construct after 24 hrs post-injection but was also observed to a lesser degree with the Fab' alone and MWNT (**Figure 5.1, lower panel**).

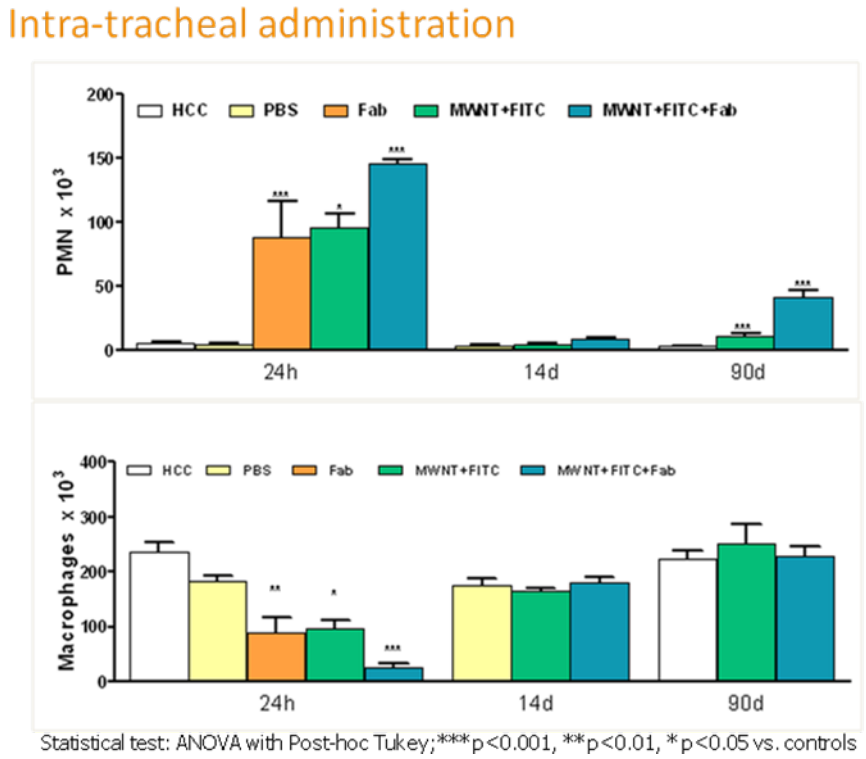


Figure 5.1

Moreover, the cardiovascular changes were assessed using a porcine model which was intra-arterially administrated with repeated doses of CNT (**Figure 5.2**). While the *in vitro* data indicated complement activation with the oxidised MWNT, the most severe cardiovascular changes were also observed with the same oxidised MWNT. Interestingly, amino functionalisation and Fab' conjugation to MWNT alleviated those risks (**Figure 5.3**).

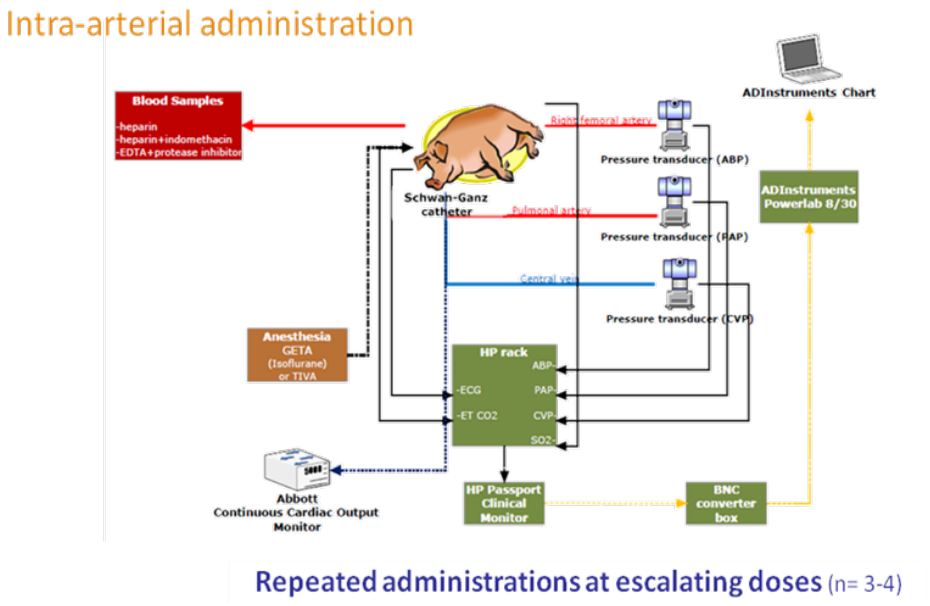


Figure 5.2

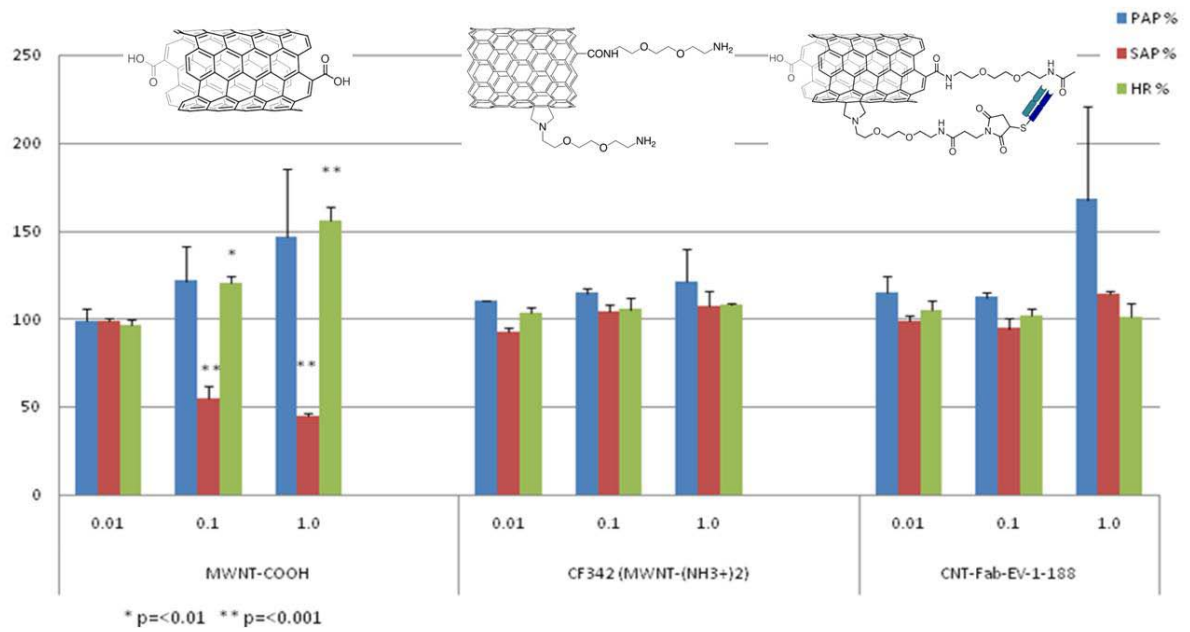


Figure 5.3

S&T ANTICARB achievements

- Fabrication, Characterisation and Upscaling of complex MWNT-Ab.
- Confirmation of the cellular internalisation of MWNT-Ab.
- Elucidation of mechanisms leading to cellular internalisation of MWNT-Ab.
- Determination of pharmacokinetic and pharmacodynamic profile of MWNT-Ab .
- Revelation that surface carboxylation increases risk of unwanted reactivity and chemical ways to alleviate this.
- Development of antibodies with biological activity against intracellular targets.
- Biologically active MWNT-Ab conjugates.

S&T ANTICARB reflections

- Conjugation of proteins on MWNT is not easy, straightforward and cannot avoid physisorption (contrary to what literature indicates).
- Batch variation in terms of starting material and functionalisation still persist and affects biological interactions.
- Size of MWNT-Ab constructs (depending on the Ab size: IgG, Fab', scFv) determines localisation within tumor interstitium.
- The kinetics of free probes (in our case radionuclides Gd-153 and In-111) can affect exact determination of biokinetic profiles.
- Fiber-related toxicity is not really relevant to short, chemically functionalised carbon nanotubes.
- It is exceedingly challenging for CNT and other novel nanomaterials to match the short-term scope of pharmaceutical industry, maintain novelty (i.e. attractive patentability) and avoid hype (positive and negative) to keep public funding (that requires industry participation/support) for the medium/long term.

4.1.4 The potential impact (including the socio-economic impact and the wider societal implications of the project so far) and the main dissemination activities and exploitation of results.

A. Potential impact

The ANTICARB consortium brought together five of the most qualified research centres in Europe, one multinational pharmaceutical company that leads the global biopharmaceutical market segment (UCB) and two young and dynamic SMEs (NANOCYL and SeroScience) with a major scientific aim: to generate a new class of nanomedicine constructs as anticancer therapeutics by joining the carbon nanotube and the monoclonal antibody technologies. The proposal was based on a large and well-coordinated effort from seven different countries (United Kingdom, Belgium, France, Germany, Hungary, Italy and Greece).

Training a new generation of European researchers.
The development of nanopharmaceuticals is a new emerging multidisciplinary area and research within a European-wide network is mandatory for progress in the field. The ANTICARB Consortium brought together the three sides of the "knowledge triangle": industrial innovation, cutting-edge academic research and education within an inter-sectorial approach. One of the key impacts that were addressed is the improvement of technical skills, training and the level of innovation of the new generation of European researchers, so as to improve European competitiveness within the global nanotechnology and pharmaceutical market. The participation of researchers from different European countries is in line with the spirit of European Union Cohesion and joint policymaking for research. The sharing of knowledge between the members of ANTICARB led to research activities that could not be achieved at the national scale. The ANTICARB network contributed to a strong interdisciplinary and inter-sectoral training of top-researchers that will be the workforce of the future.

Further the understanding the hurdles of clinical translation The interaction between cancer physiology and the nanotechnology-based innovative strategy proposed (the CNT-Ab hybrids) has been of fundamental importance throughout the development of ANTICARB. ANTICARB has been seeking to contribute to the creation of fundamental knowledge at the European level and at the same time, through the central role of the pharmaceutical industry partner (UCB), maximized the possibilities of translation into the clinical setting.

Exploit basic knowledge to develop novel drugs & treatment strategies ANTICARB created necessary knowledge that was lacking on how to transform a novel nanomaterial of known fascinating physical properties, such as carbon nanotubes, in the biomedical arena and explore the possibility to translate it clinically into an effective cancer therapeutic. One of the key conclusions from ANTICARB is that the particular nanotechnology has been shown to have the capacity to transform otherwise ineffective known entities into therapeutically active and effective anti-cancer drugs. ANTICARB offers evidence that a new market in therapeutic oncology can be opened – that of using antibodies and their fragments against intracellular targets.

European economical and social advantages ANTICARB provided a variety of social and economical advantages to the European Community. It will reinforce the collaboration among European scientists and laboratories and will contribute to establish a European

scientific identity. US and Asian Universities and companies represent the major competitors in genome science and nano- and biotechnology. The quality of life for European citizens depends on Europe's ability to compete and, where possible, to take the lead. In addition, shrinking or closing the gaps in sectors where Europe currently lags behind is of vital importance. If successful, this policy will create opportunities and increased prosperity within Europe. To this end no individual country within Europe is in the position to either assemble a consortium of this calibre or to fund it to the extent necessary to either compete with or gain a competitive advantage over the US and Asia. Finally, the multifaceted nature of the nanobiotechnology research area requires a multidisciplinary approach, which is best achieved through coordinated and integrated European wide research.

B. Main dissemination activities

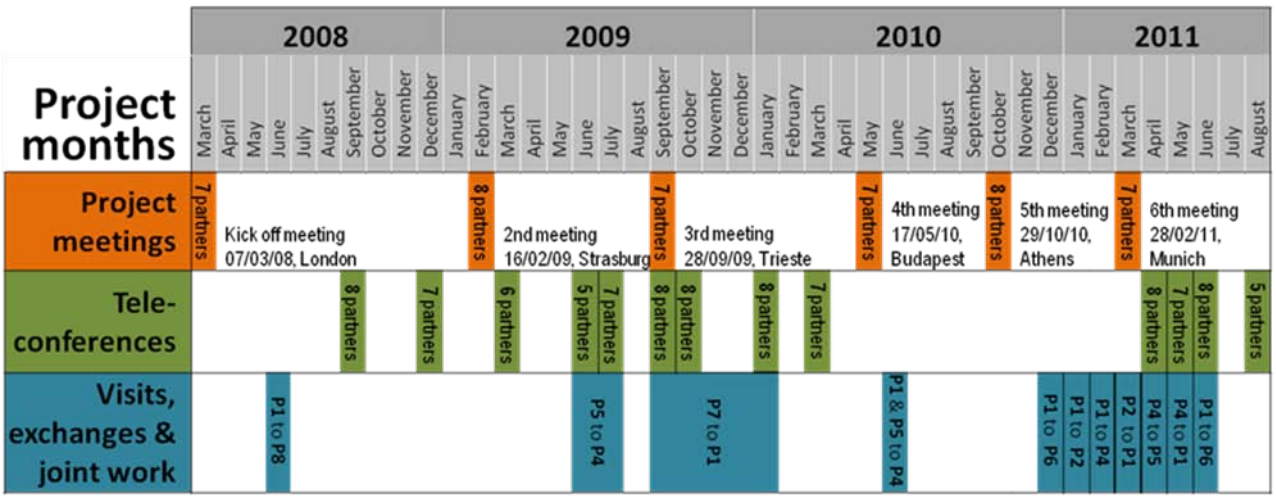
1. Project coordination activities

Although the project coordination mainly involved the consortium, in several cases they involved dissemination of project information beyond the consortium, via each partner's collaborations network.

During the whole project period the partners held 33 coordination activities:

- **7** Project meetings with **93%** participation
- **14** Teleconferences with **92%** participation
- **12** Visits, exchanges & joint work involving:
  - 4 meetings involving 2 or more partners
  - 1 sabbatical visit
  - 7 visits in order to perform jointly experiments

The table below show the time each activity took place and the partner's involvement



* Final meeting: 28/11/2011, Brussels | 8 partners

** Final Telco: 08/09/2011 | 7 partners

2. Publications

The ANTICARB consortium published in all **53** publications in wich ANTICARB project is acknowledged.

- **47** articles in journals and
- **6** book chapters.

The journals the partners published and the number of publications each had, can be seen in the table below.

Journals	Publications
Advanced Dug delivery Reviews	1
Angewandte Chemie International Edition	1
Applied Physics Letters	1
Carbon	1
Chemical Communication	4
Chemistry and Biology	1
Chemistry: A European Journal	1
Computer Physics Communications	1
Drug DiscoveryToday	1
Expert Opinion on Drug Discovery	1
FASEB Journal	1
Inhalation Toxicology	1
Int J Radiat Biol.	4
J. Appl. Phys.	2
Journal of Nanoparticle Research	1

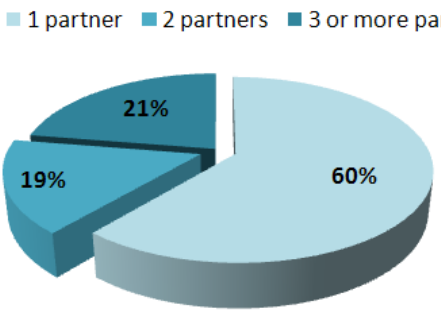
Journals	Publications
Journal of Physics: Conference Series	1
Journal of the American Chemical Society	1
Methods in Molecular Biology	1
Nano Today	1
Nanomedicine	2
Nanoscale	1
Nature Biotechnology	1
Nature Nanotechnology	1
Nucl. Inst. and Meth. in Physics Res. S.B	6
Particle and Fibre Toxicology	2
Phys. Med. Biol.	4
PNAS	1
Radiat. Res.	1
Small	2

Regarding the authorship of the above publications:
- **32** were submitted by 1 partner
- **10** by two partners
- **11** were submitted by three or more partners.

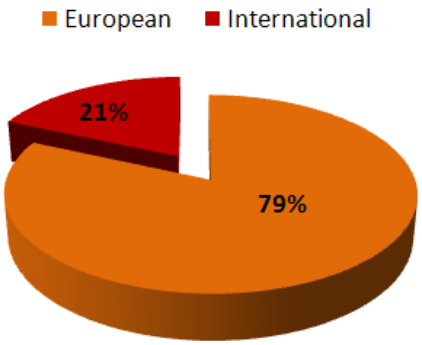
Regarding the area the publishing houses are situated:
- **42** of them were published in journals & books published in Europe and
- **11** in journals & books published outside EU, mainly in USA.

The charts below shows the above numbers in percentage.

Publications authorship



Publication places



3. Presentations

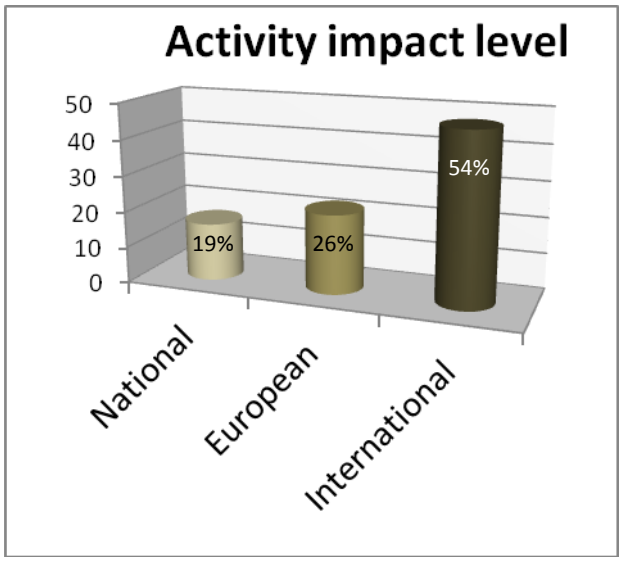
The ANTICARB consortium presented their work in **85** activities of which:
- **50** were conferences
- **15** were Summer Schools – Seminars

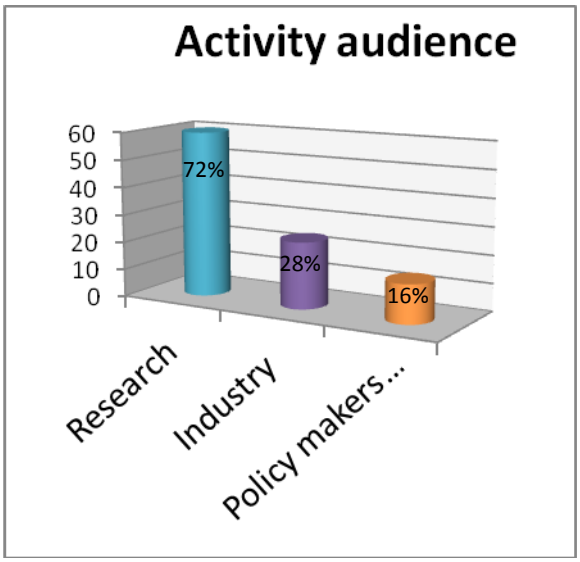
- **20** were Workshops – Meetings

The impact level of the above activities was for:
- **16** national
- **22** European
- **47** international

Regarding the activity audience for:
- **61** involved mainly the research community
- **24** involved the industry community (together with the research community in some cases)
- **14** involved mainly policy makers & media (together with the research and the industry community in some cases)

The charts below shows the above numbers in percentage.





4. PhD Studentships

The project employed in all **13** PhD students, 3 of which worked entirely on ANTICARB and acknowledged the project in their Thesis. The Thesis were **submitted, examined** and **published** while the ANTICARB project was still running.

5. Events organized

4 major events were organized under or supported by ANTICARB project:

5.1 2nd Carbon Nanotube Biology, Medicine & Toxicology Satellite Symposium

20 June 2009 | Tsinghua University Campus, Beijing, China

The ANTICARB project sponsored the organization and implementation of the above symposium.
For that reason the **ANTICARB logo** features until today in the Symposium website.

This one-day Symposium took place one day prior to the official opening and within the content of the "Tenth International Conference on the Science and Application of Nanotubes - NT09".
The Symposium involved participation of about **120** scientists presenting their work and discussing the interaction of nanotubes with cells and tissues *in vitro* and *in vivo*, and exploring specific applications of nanotubes in the biomedical field.
For more information please see the symposium website at http://www.cntbiology.org/CBTN09/
Website snapshot: Annex I – Dissemination Material

5.2 3rd Carbon Nanotube Biology, Medicine & Toxicology Satellite Symposium
27-28 June 2010 | Hilton Bonaventure, Montréal, Canada

The ANTICARB project sponsored the organization and implementation of the above symposium.
For that reason the **ANTICARB logo** features until today in the Symposium website.
This two-days Symposium took place during the first two days and within the content of the "Eleventh International Conference on the Science and Application of Nanotubes - NT10".
The Symposium involved participation of about **90** scientists presenting their work and discussing the correlation between the specific characteristics of carbon nanomaterials (method of synthesis and manufacturing, purity, type of surface functionalization) and their biological effect in various model systems (immortalized or primary cells, in vivo models).
For more information please see the symposium website at http://www.cntbiology.org/CBTN10/
Website snapshot: Annex I – Dissemination Material

5.3 4th Carbon Nanotube Biology, Medicine & Toxicology Satellite Symposium
15-16 July 2011 | University of Cambridge, UK

The ANTICARB project sponsored the organization and implementation of the above symposium.
For that reason the **ANTICARB logo** features until today in the Symposium website .
This two-days Symposium took place during the last two days and within the content of the "Twelfth International Conference on the Science and Application of Nanotubes - NT11".
The Symposium involved participation of about 78 scientists presenting their work and discussing the determining the therapeutic and diagnostic potential of carbon nanomaterials and the challenges ahead. Moreover, particular attention was placed on attempts to understand the toxicological and environmental risks posed by use of carbon nanotubes.
For more information please see the symposium website at
http://www.cntbiology.org/CBTN11/
http://www-g.eng.cam.ac.uk/nms/cnbmt/
Website snapshot: Annex I – Dissemination Material

5.4 Carbon Nanotubes: From Safety Assessment to Biomedical Applications
One-day Workshop | 29/11/2011 | Brussels, Belgium

The ANTICARB project organized in synergy with another FP7 Strep project NANOMMUNE, an one day workshop. In this workshop it was attempted to present the state-of-the-art in the field of carbon nanotechnology in medicine, by bringing together

success stories and lessons learnt from the research work carried out by the two FP7 projects that have worked in parallel in this domain for the last 3 years.
Distinguished speakers were invited beyond the two projects' consortia, like independent experts, Nano – Fora and industrial associations' representatives, EU policy makers and EC Project Officers.
The workshop was advertised also in the Nanosafety Cluster and the Nanotechnology Industries Association news' webpages.
Workshop flyer & agenda: Annex I – Dissemination Material

6. Web dissemination

6.1 Project website

The project website was created within the first 6 months of the project and since then it provide information to the project partners and the wider public.
In its current status the public website is fully updated with latest information regarding publications and dissemination activities of the consortium. The private (only for partners) webpage is also fully updated with all information and presentations for all partners coordination activities. The website is planned to remain online for at least the next 12 months.
For more information please see the project website at http://www.anticarb.org
Snapshots of the website: Annex I – Dissemination Material.

6.2 Coordinator's website

Project information can also be found in the coordinator's website.
For more information please see the Nanomedicine lab website at http://www.nanomedicinelab.com/collaborations.html
Snapshots of the website: Annex I – Dissemination Material.

6.3 Other websites

Here are some other websites relevant to the ANTICARB partners or subject providing information about the project:

IST WORLD
http://www.ist-world.org/ProjectDetails.aspx?ProjectId=cc03235c40904005884360b8a4d57bba&SourceDatabaseId=018774364ea94468b3f4dec24aa1ee53

NANOCYL
http://www.nanocyl.com/CNT-Expertise-Centre/R-D-Projects-Alliances/Nanocyl-can-Quote-10-European-Projects-and-4-Belgian-Ones

HELMHOLTZ INSTITUTE
http://www.helmholtz-muenchen.de/ilbd/about-ilbd/projects-and-collaborations/index.html

Snapshots of the websites: Annex I – Dissemination Material.

C. Exploitation of results

1. Research era

The project results will be exploited in the following way in order to contribute to the EU research era.

- New knowledge and know-how acquired during the project will serve to set up a new research field around antibody therapeutics and drug delivery.
- The results of the project will be used to explore the carbon nanotube-based drug delivery concept for several applications as cancer and neurological disorders.
- The results obtained will be used to design new protocols for the exploration of gene involvement in various diseases (e.g. Parkinson's).
- Research and evaluation of the results by upscaling to large animal studies for eventual use in the design of clinical studies.
- New techniques to be introduced into small animal imaging courses and newly developed therapy options can be evaluated in order to transfer them into clinical trials.

2. Training & education

The project results will be exploited in the following way in order to contribute to the training and education of new scientists.

- New knowledge and expertise acquired during the project will be utilized in postgraduate course curriculum at the University partners (ULSOP, UTr & UoI).
- Novel technologies on the development of carbon nanomaerials will be part of the curriculum for a nanomedicine -based approach to cancer treatment and will be incorporated in our existing teaching modules in drug delivery.
- Some of the topics can feed into master's curricula of biomedical engineering faculties as teaching material.

3. Industry

The project results will be exploited in the following way in order to contribute to the EU nanotechnology and medicine industry.

- Improve our knowledge in nanoparticles design. Extend nanoparticles applications to innovative imaging and therapy applications.
- Extending the application of carbon nanomaterials as key components in new sophisticated drug delivery systems and further development of the market of anticancer therapeutics in the long term.
- The investigated methods will be used in the further development for intracellularly-targeted antibody therapeutics. The tools developed for the preclinical work in this project may in itself become a commercially viable option for the research oriented gene and protein delivery research market (e.g. nanotube-based transfection agents).
- The new therapy options and methods for delivery of antibodies directly adds to the industrial partners (UCB, Nanocyl & SeroScience) production and exploration of new products programme.

4. Policy making

The project results will be exploited in the following way in order to influence EU policies regarding advancements in nanotechnology and nanomedicine.

- New activities are already initiated using the *Nanosafety Cluster* (http://www.nanosafetycluster.eu) and other technologies in collaboration with other FP7 Consortia (http://www.nanommune.eu).
- Attempts to bridge the gap between regulation of nanomaterials in the context of public health safety and nanotoxicology and nanomedicine through the EMA.

4.1.5 Project public website & contact details

Project website address:
www.anticarb.org

Contact details:
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Centre for Drug Delivery Research
The School of Pharmacy

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Project logo:

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Dr. Tzu-Wen WANG

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Dr. Ioanna KYRIAKOU

P8. SeroS Core Scientific Team (Hungary)
Prof. Janos SZEBENI
Dr. Rudolf URBANICS
Dr. Zoltan ROZSNYAY

Section A (public)

This section includes two templates

- Template A1: List of all scientific (peer reviewed) publications relating to the foreground of the project.
- Template A2: List of all dissemination activities (publications, conferences, workshops, web sites/applications, press releases, flyers, articles published in the popular press, videos, media briefings, presentations, exhibitions, thesis, interviews, films, TV clips, posters).

These tables are cumulative, which means that they should always show all publications and activities from the beginning until after the end of the project. Updates are possible at any time.

	TEMPLATE A1: LIST OF ALL SCIENTIFIC PUBLICATIONS RELATING TO THE FOREGROUND OF THE PROJECT										
NO.	Title	Main author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publication	Year of publication	Relevant pages	Permanent identifiers[1] (if available)	ANTICARB PARTNERS Participating	Is/Will open access[2] provided to this publication?
1	*Subcellular S-factors for low-energy electrons: A comparison of Monte Carlo simulations and continuous-slowing-down calculations.*	*Emfietzoglou, D.*	*Int J Radiat Biol.*	*84, Dec 2008*	*Taylor & Francis*	*United Kingdom*	*2008*	*pp. 1034-1044*	*http://informahealthcare.com*	*P1 ULSOP P7 UoI*	*No*
2	*Advances in lung*	*Möller,W.*	*Drug*	*177*	*Elsevier*	*Netherlands*	*2008*	*pp. 426-*	*http://www.science*	*P6 GSF*	*No*

[1] A permanent identifier should be a persistent link to the published version full text if open access or abstract if article is pay per view) or to the final manuscript accepted for publication (link to article in repository).

[2]Open Access is defined as free of charge access for anyone via Internet. Please answer "yes" if the open access to the publication is already established and also if the embargo period for open access is not yet over but you intend to establish open access afterwards.

	imaging techniques for the treatment of respiratory disease		*DiscoveryToday*		*B.V.*			*432*	*direct.com/science/article/pii/S1740677308000363*		
3	*Total and Regional Deposition of Ultrafine Particles in a Mouse Model of Allergic Inflammation of the Lung*	*Alessandrini, F.*	*InhalTox*	*20 (6)*	*Informa Healthcare*	*United Kingdom*	*2008*	*pp. 585-93*	*http://informahealthcare.com/doi/abs/10.1080/08958370801949167%20*	*P6 GSF*	*No*
4	*Occupational and consumer risk estimates for nanoparticles emitted by laser printers*	*Hänninen, O.*	*Journal of Nanoparticle Research*	*12*	*Springer Netherlands*	*Netherlands*	*2009*	*pp. 91-99*	*http://www.springerlink.com/content/70656474nhn12413/*	*P6 GSF*	*No*
5	*Cell shape imaging analysis: A fast and reliable technique for the investigation of internalised carbon nanotubes in flat macrophages*	*Tian, F.*	*Journal of Physics: Conference Series*	*151*	*IOP Publishing*	*United Kingdom*	*2009*	*pp. 8*	*http://iopscience.iop.org/1742-6596/151/1/012033*	*P6 GSF*	*Yes*
6	*Electron inelastic mean free paths in biological matter based on dielectric theory and local-field corrections.*	*Emfietzoglou D.*	*Nuclear Instruments and Methods in Physics Research Section B*	*267, Jan. 2009*	*Elsevier B.V.*	*Amsterdam, Netherlands*	*2009*	*pp. 45-52*	*http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TJN-4TYR03M-1&_user=83469&_coverDate=01%2F31%2F2009&_rdoc=1&_fmt=high&_orig=gateway&_origin=gateway&_sort=d&_docanchor=&view=c&_acct=C0000759626&_version=*	*P7 UoI*	*No*

									1&_urlVersion=0&_userid=83469&md5=948d5004fffae48583d02562af5674f6&searchtype=a		
7	*The effects of energy-loss straggling and elastic scattering models on Monte Carlo calculations of dose distribution functions for 10 keV to 1 MeV incident electrons in water.*	*Bousis, C.*	*Nuclear Instruments and Methods in Physics Research Section B*	*267, May 2009*	*Elsevier B.V.*	*Amsterdam, Netherlands*	*2009*	*pp. 1725-1732*	*http://www.sciencedirect.com/science?*	*P7 UoI*	*No*
8	*Electron inelastic mean free paths for carbon nanotubes from optical data.*	*Kyriakou, I.*	*Applied Physics Letters*	*94, June 2009*	*American Institute of Physics*	*Melville, NY, USA*	*2009*	*pp. 263113*	*http://apl.aip.org/resource/1/applab/v94/i26/p263113_s1*	*UoI ULSoP*	*No*
9	*A dielectric response study of the electronic stopping power of liquid water for energetic protons and a new I-value for water.*	*Emfietzoglou, D.*	*Phys. Med. Biol.*	*54, June 2009*	*IOP Publishing*	*United Kingdom*	*2009*	*pp. 3451-3472*	*http://iopscience.iop.org/0031-9155/54/11/012/*	*P7 UoI*	*No*
10	*Calculated depth-dose distributions for H+ and He+ beams in liquid water.*	*Garcia-Molina, R.*	*Nucl. Instrum. Methods Phys Res.B*	*267, Aug. 2009*	*Elsevier B.V.*	*Amsterdam, Netherlands*	*2009*	*pp. 2647-2652*	*http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TJN-4WCSR3F-Y&_user=7367780&_coverDate=08%2F15%2F2009&_rdoc=1&_fmt=high&_orig=gateway&_ori*	*P7 UoI*	*No*

									gin=gateway&_sort=d&_docanchor=&view=c&_acct=C000059626&_version=1&_urlVersion=0&_userid=7367780&md5=dbcd60c632e5d26b5bc69ad3a268ab68&searchtype=a		
11	A Monte Carlo study of cellular S-factors for 1 keV to 1 MeV electrons.	Bousis, C.	Phys. Med. Biol.	54, Aug. 2009	IOP Publishing	United Kingdom	2009	pp. 5023-5038	http://iopscience.iop.org/0031-9155/54/16/012/	P7 UoI	No
12	Synthesis and Characterization of Polycationic Carbon Nanotubes for siRNA Delivery	Herrero, Kostarelos, Bianco and Prato	Journal of the American Chemical Society	No131, June 2009	ACS	USA	2009	pp. 9843-9848	http://pubs.acs.org/journal/jacsat	P1 ULSOPP4 CNRS P5UTr	No
13	Promises, facts and challenges for carbon nanotubes in imaging and therapeutics	Kostarelos, Bianco and Prato	Nature Nanotechnology	No 4, October 2009	npg	UK	2009	pp. 627-633	http://www.nature.com/nnano/index.html	P1 ULSOPP4 CNRS P5 UTr	No
14	Functionalized carbon nanotubes for probing and modulating molecular functions	Ménard-Moyon and Bianco	Chemistry and Biology	No 17, February 2010	Cell Press	USA	2010	pp. 107-115	http://www.cell.com/chemistry-biology	P1 ULSOPP4 CNRS P5 UTr	No
15	Enhanced anticancer activity of multi-walled carbon nanotube-methotrexate conjugates using cleavable linkers	Samorì, Kostarelos, Bianco and Prato	Chemical Communication	No 46, March 2010	RSC	UK	2010	pp. 1494-1496	http://pubs.rsc.org/en/journals/journalissues/cc	P1 ULSOPP4 CNRS P5 UTr	No
16	Monte Carlo single-cell	Bousis,	Phys. Med.	55, April	IOP	United	2010	pp.	http://iopscience.io	P7 UoI	No

	dosimetry of Auger-electron emitting radionuclides.	*C.*	*Biol.*	*2010*	*Publishing*	*Kingdom*		*2555-2572*	*p.org/0031-9155/55/9/009/*		
17	*Parallelization of a Monte Carlo particle transport simulation code.*	*Hadjidoukas P.*	*Computer Physics Communications*	*181, May 2010*	*Elsevier B.V.*	*Amsterdam, Netherlands*	*2010*	*pp.928-936*	*http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TJ5-4Y88DDP-2&_user=7367780&_coverDate=05%2F31%2F2010&_rdoc=1&_fmt=high&_orig=gateway&_origin=gateway&_sort=d&_docanchor=&view=c&_acct=C000059626&_version=1&_urlVersion=0&_userid=7367780&md5=a90f17133c57afb42dd3b860b7b356a6&searchtype=a*	*UoI*	*No*
18	*Effect of the Bethe surface description on the electronic excitations induced by energetic proton beams in liquid water and DNA.*	*Abril, I.*	*Nuclear Instruments and Methods in Physics Research B*	*268, June 2010*	*Elsevier B.V.*	*Amsterdam, Netherlands*	*2010*	*pp.1763-1767*	*http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TJN-4YGHGK4-6&_user=7367780&_coverDate=06%2F30%2F2010&_rdoc=1&_fmt=high&_orig=gateway&_origin=gateway&_sort*	*UoI*	*No*

									=d&_docanchor=&view=c&_acct=C000059626&_version=1&_urlVersion=0&_userid=7367780&md5=a45da5f838e6d5cee92d54735284d1de&searchtype=a		
19	Energy loss of protons in carbon nanotubes: Experiments and calculations.	Kyriakou, I.	Nuclear Instruments and Methods in Physics Research B	268, June 2010	Elsevier B.V.	Amsterdam, Netherlands	2010	pp.1781-1785	http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TJN-4YGHGK4-8&_user=7367780&_coverDate=06%2F30%2F2010&_rdoc=1&_fmt=high&_orig=gateway&_origin=gateway&_sort=d&_docanchor=&view=c&_acct=C000059626&_version=1&_urlVersion=0&_userid=7367780&md5=8788d379c82619364b8360bede6599ca&searchtype=a	UoI ULSoP	No
20	The alluring potential of functionalized carbon nanotubes in drug discovery	Ménard-Moyon and Bianco	Expert Opinion on Drug Discovery	No 5, July 2010	Informa	UK	2010	pp. 691-707	http://informahealthcare.com/doi/abs/10.1517/17460441.2010.490552	P1 ULSOPP4 CNRS P5 UTr	No
21	Potentiometric titration as a straightforward	Samorì and	Carbon	No 48, August 2010	Elsevier	USA	2010	pp. 2447-2454	http://www.elsevier.com/wps/find/journ	P4 CNRS P5 UTr	No

	method to assess the number of functional groups on shortened carbon nanotubes	*Bianco*							*aldescription.cws_home/258*		
22	*Efficient receptor-independent intracellular translocation of aptamers mediated by conjugation to carbon nanotubes*	*Van den Bossche and Kostarelos*	*Chemical Communication*	*No 39, September 2010*	*RSC*	*UK*	*2010*	*pp. 7379-7381*	*http://pubs.rsc.org/en/journals/journalissues/cc*	*P1 ULSOPP4 CNRS P5 UTr*	*No*
23	*A complementary definition of nanomaterial*	*Kreyling, WG*	*Nano Today*	*5*	*Elsevier B.V.*	*Netherlands*	*2010*	*pp. 165-168*	*http://www.sciencedirect.com/science/article/pii/S1748013210000460*	*P6 GSF*	*No*
24	*Nanoparticles in the lungs*	*Kreyling, WG*	*Nature Biotechnology*	*28(12)*	*Nature Publishing Group / Macmillan Publishers Ltd*	*UK*	*2010*	*1275-1276*	*http://www.nature.com/nbt/journal/v28/n12/full/nbt.1735.html*	*P6 GSF*	*No*
25	*Multifunctional Nanocarriers for diagnostics, drug delivery and targeted treatment across blood-brain barrier: perspectives on tracking and neuroimaging*	*Bhaskar, S.*	*Particle and Fibre Toxicology*	*7*	*BioMed Central Ltd*	*United Kingdom*	*2010*	*3*	*http://www.particleandfibretoxicology.com/content/7/1/3*	*P6 GSF*	*No*
26	*Deposition and Biokinetics of Inhaled Nanoparticles*	*Geiser, M.*	*Particle and Fibre Toxicology*	*7*	*BioMed Central Ltd*	*United Kingdom*	*2010*	*2*	*http://www.particleandfibretoxicology.com/content/7/1/2*	*P6 GSF*	*Yes*

27	*Analytic expressions for the inelastic scattering and energy loss of electron and proton beams in carbon nanotubes.*	*Emfietzoglou, D.*	*J. Appl. Phys. 108*	*108, Sept. 2010*	*American Institute of Physics*	*Melville, NY, USA*	*2010*	*pp. 054312*	http://jap.aip.org/resource/1/japiau/v108/i5/p054312_s1	*P1 ULSoP P7 UoI*	*No*
28	*Enhanced cellular internalization and gene silencing using a series of cationic dendron-multiwalled carbon nanotube:siRNA complexes*	*Al-Jamal, Kostarelos, Bianco and Prato*	*FASEB Journal*	*No 24, November 2010*	*Federation of American Societies for Experimental Biology*	*USA*	*2010*	*pp. 4354-4365*	*www.fasebj.org*	*P1 ULSOPP4 CNRS P5 UTr*	*No*
29	*Energy Loss of Hydrogen- and Helium-Ion Beams in DNA: Calculations Based on a Realistic Energy-Loss Function of the Target.*	*Abril, I.*	*Radiat. Res.*	*175, Feb. 2011*	*Radiation Research Society*	*Washington, DC, USA*	*2011*	*pp. 247-255*	*http://www.bioone.org/doi/abs/10.1667/RR2142.1*	*P7 UoI*	*No*
30	*Oxidative biodegradation of single- and multi-walled carbon nanotubes*	*Russier and Bianco*	*Nanoscale*	*No 3, March 2011*	*RSC*	*UK*	*2011*	*pp. 893-896*	*http://pubs.rsc.org/en/journals/journalissues/nr*	*P4CNRS*	*No*
31	*One-Pot Triple Functionalization of Carbon Nanotubes*	*Ménard-Moyon and Bianco*	*Chemistry: A European Journal*	*No 17, March 2011*	*Wiley*	*Germany*	*2011*	*pp. 3222-3227*	*http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1521-3765*	*P4 CNRS P5UTr*	*No*
32	*HYDRAmers: Design, synthesis and characterization of different generation novel Hydra-like*	*Lamanna and Bianco*	*Chemical Communication*	*No 26, June 2011*	*RSC*	*UK*	*2011*	*pp. 8955-8957*	*http://pubs.rsc.org/en/journals/journalissues/cc*	*P4 CNRS*	*No*

	dendrons based on multifunctionalized adamantane										
33	*Monte Carlo calculations of low-energy electron dose-point-kernels in water using different stopping power approximations*	*Bousis, C.*	*Nuclear Instruments and Methods in Physics Research B*	*269, July 2011*	*Elsevier B.V.*	*Amsterdam, Netherlands*	*2011*	*pp. 1650-1654*	*http://www.sciencedirect.com/science/article/pii/S0168583X10007998*	*UoI*	*No*
34	*A combined molecular dynamics and Monte Carlo simulation of the spatial distribution of energy deposition by proton beams in liquid water*	*Garcia-Molina, R.*	*Phys. Med. Biol.*	*56, September 2011*	*IOP Publishing*	*United Kingdom*	*2011*	*pp. 6475-6493*	*http://iopscience.iop.org/0031-9155/56/19/019/pdf/0031-9155_56_19_019.pdf*	*UoI*	*No*
35	*Simple model of bulk and surface excitation effects to inelastic scattering in low-energy electron beam irradiation of multi-walled carbon nanotubes*	*Kyriakou, I.*	*J. Appl. Phys.*	*110, September 2011*	*American Institute of Physics*	*Melville, NY, USA*	*2011*	*pp. 054304*	*http://scitation.aip.org/getpdf/servlet/GetPDFServlet?filetype=pdf&id=JAPIAU000110000005054304000001&idtype=cvips&doi=10.1063/1.3626460&prog=normal*	*UoI ULSoP*	*No*
36	*Making Carbon Nanotubes Biocompatible and Biodegradable*	*Al-Jamal, Kostarelos, Bianco and Prato*	*Chemical Communication*	*No 37, September 2011*	*RSC*	*UK*	*2011*	*pp. 10182-10188*	*http://pubs.rsc.org/en/journals/journalissues/cc*	*P1 ULSOP P4 CNRS P5 UTr*	*No*
37	*Formation of Efficient Catalytic Silver Nanoparticles on Carbon Nanotubes by Adenine Functionalization*	*Lamanna and Bianco*	*Angewandte Chemie International Edition*	*On line September 2011*	*Wiley*	*Germany*	*2011*	*DOI:10.1002/anie.201102976*	*http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1521-3773/*	*P4 CNRS P5 UTr*	*No*

38	*Inelastic scattering of low energy electrons in liquid water computed from optical-data models of the Bethe surface*	*Emfietzoglou D.*	*Int. J. Radiat. Biol.*	*In press*	*Taylor & Francis*	*United Kingdom*	*2011*	*PMID: 21756061*	*http://www.ncbi.nlm.nih.gov/pubmed/21756061*	*P7 UoI*	*No*
39	*Antibody Covalent Immobilisation to Carbon Nanotubes and Assessment of Antigen Binding*	*Venturelli and Bianco*	*Small*	*In press*	*Wiley*	*Germany*	*2011*	*pp. 2179-2187*	*http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1521-3765*	*P1 ULSOPP4 CNRS P5 UTr*	*No*
40	*Ex vivo impact of functionalized carbon nanotubes on human immune cells.*	*Delogu and Bianco*	*Nanomedicine*	*In press*	*Future Medicine*	*UK*	*2011*	*N/A*	*http://www.futuremedicine.com/toc/nnm/6/2*	*P4 CNRS*	*No*
41	*Cellular Uptake and Cytotoxic Impact of Chemically Functionalized and Polymer-Coated Carbon Nanotubes*	*H. Ali-Boucetta, K. T. Al-Jamal, K. Kostarelos, S. Li, A. Bianco, M. Prato*	*Small*	*In press*	*Wiley*	*Germany*	*2011*	*N/A*	*http://www.ncbi.nlm.nih.gov/pubmed/21919194*	*P1 ULSOPP4 CNRS P5 UTr*	*No*
42	*Cytotoxic Assessment of Carbon Nanotube Interaction with Cell Cultures*	*Hanene Ali-Boucetta, Khuloud T. Al-Jamal, and Kostas Kostarelos*	*Methods in Molecular Biology*	*vol. 726, 2011*	*Springer Science+Business Media*	*Netherlands*	*2011*	*N/A*	*http://www.springerlink.com/content/l8323g0813831771/#section=869160&page=1*	*P1 ULSOP*	*Yes*
43	*Functional motor*	*Khuloud*	*PNAS*	*July 5,*	*National*	*USA*	*2011*	*p. 10952-*	*http://www.pnas.or*	*P1 ULSOP*	*Yes*

	recovery from brain ischemic insult by carbon nanotube-mediated siRNA silencing	*T. Al-Jamal,*		*2011, vol. 108, no. 27*	*Academy of Sciences*			*10957*	*g/content/108/27/10952*	*P4 CNRS P5 UTr*	
44	*Activation of complement by therapeutic liposomes and other lipid excipient-based therapeutic products: Prediction and prevention*	*J Szebeni*	*Advanced Dug delivery Reviews*	*Sep 16;63(12):1020-30. Epub 2011 Jul 14.*	*Elsevier B.V.*	*Amsterdam, Netherlands*	*2011*	*p. 1020-1030*	*http://www.sciencedirect.com/science/article/pii/S0169409X11001943*	*P8 SeroS*	*Yes*
45	*Liposome-induced complement activation and related cardiopulmonary distress in pigs: factors promoting reactogenicity of Doxil and AmBisome*	*J Szebeni*	*Nanomedicine, Nanotechnology, Biology, and Medicine*	*In Press*	*Elsevier B.V.*	*Amsterdam, Netherlands*	*2011*	*N/A*	*http://www.sciencedirect.com/science/article/pii/S1549963411002565*	*P8 SeroS*	*No*
46	*Monte Carlo calculations of liquid-phase absorbed fractions for Auger electrons*	*Bousis, C.*	*Int. J. Radiat. Biol.*	*Submitted*	*Taylor & Francis*	*United Kingdom*	*2011*			*UoI*	*No*
47	*Monte Carlo single-cell dosimetry of I-131, I-125 and I-123 for targeted radioimmunotherapy of B-cell Lymphoma*	*Bousis, C.*	*Int. J. Radiat. Biol.*	*Submitted*	*Taylor & Francis*	*United Kingdom*	*2011*			*UoI*	*No*
48	*The structure of the Bragg peak of proton beams in liquid water:*	*Garcia-Molina R.*	*Chapter in Book: "Heavy*	*In press*	*World Scientific Publishing*	*United Kingdom*	*2012*	*Not availabl e yet*		*UoI*	*No*

	A combined Molecular Dynamics and Monte Carlo simulation study		*Particle Energetic Collisions with Atoms and Molecules"*								
49	*Energy Loss of Swift Protons in Liquid Water: Role of optical Data Input and Extension Algorithms*	*Garcia-Molina R.*	*Chapter in Book: "Radiation Damage in Biomolecular Systems"*	*In press*	*Springer and Canopus Academis Publishing Ltd*	*United Kingdom*	*2012*	*Not available yet*		*UoI*	*No*

	TEMPLATE A2: LIST OF DISSEMINATION ACTIVITIES								
NO.	Type of activities[3]	Main presenter	Title	Date	Place	ANTICARB PARTNERS participating	Type of audience[4]	Size of audience	Countries addressed
1	*Workshop on Environmental and Medical Aerosol Nanoparticles and their interaction with the Respiratory System*	*Kreyling, W.G*	*Biokinetics of Inhaled Nanoparticles and Possible Adverse Biological Reactions*	*31 May 2008*	*Jablonna Palace, Poland*	*P6 (GSF)*	*Scientific Community (Research)*	*150*	*International*
2	*Conference: Expertengespräch "Nanotechnologie und Gesundheit" BMBF*	*Kreyling, WG*	*Nanomedicine Symposium 2008 ESF (Biokinetik von inkorporierten Nanopartikeln)*	*24 June 2008*	*Bonn, Germany*	*P6 (GSF)*	*Scientific Community, Industry, Policy makers, Media (Research)*	*100*	*Germany*
3	*Conference: Nanomedicine Symposium 2008 ESF*	*Kreyling, WG*	*Designing Methods for Pro-active Risk Assessment of Nanomaterials: Lessons Learnt from Inhalation Toxicology*	*21 September 2008*	*San Feliu de Guixols, Spain*	*P6 (GSF)*	*Scientific Community, Industry, Policy makers*		*European*
4	*Workshop: 6. BfR-Forum Verbraucherschutz: Nanotechnologie Bundesamt für Risikobewertung (BfR)*	*Kreyling, WG*	*Federal Office for Risk Assessment Consumer Protection Nanotechnology Panel*	*10 November 2008*	*Berlin, Germany*	*P6 (GSF)*	*Scientific Community, Industry, Policy makers, Media (Research)*	*250*	*Germany*

[3] A drop down list allows choosing the dissemination activity: publications, conferences, workshops, web, press releases, flyers, articles published in the popular press, videos, media briefings, presentations, exhibitions, thesis, interviews, films, TV clips, posters, Other.

[4] A drop down list allows choosing the type of public: Scientific Community (higher education, Research), Industry, Civil Society, Policy makers, Medias ('multiple choices' is possible.

5	*Workshop: Kommission für Reinhaltung der Luft der Österreichischen Akademie der Wissenschaften*	*Kreyling WG*	*Commission for the Prevention of Air Pollution of the Austrian Academy of Science (Sehr klein und voller Überraschungen: Toxikokinetik inhalierter Nanopartikel)*	*3 December 2008*	*Wien, Austria*	*P6 (GSF)*	*Scientific Community (Research)*	*120*	*European*
6	*Workshop: Joint Research Centre, Institute for Health and Consumer Protection*	*Kreyling, WG*	*Toxicokinetics of Nanoparticles Incorporated by different routes of intake*	*30 January 2009*	*Ispra, Italy*	*P6 (GSF)*	*Scientific Community (Research)*	*150*	*European*
7	*Workshop: Nano tech 2009, Symposium "Designing our Future"*	*Kreyling, WG*	*Biokinetics of incorporated nanoparticles depend on their parameters and the route of intake*	*20 February 2009*	*Tokyo, Japan*	*P6 (GSF)*	*Scientific Community (Research)*	*450*	*International*
8	*Conference: The BioPark Hertfordshire*	*Kreyling, WG*	*Health Implications of Nanoparticles: Toxicokinetic Aspects. Nanotoxicology: Health & Environmental Impacts*	*27 February 2009*	*Hertfordshire, UK*	*P6 (GSF)*	*Scientific Community (Research)*	*200*	*European*
9	*Conference: GRK Symposium des Instituts für Umweltmedizin "Nanoparticles and the GIT"*	*Kreyling, WG*	*Comparative Toxicokinetics of Nanoparticles Incorporated either into Lungs, Gastro-Intestinal Tract or Circulation*	*5 March 2009*	*Düsseldorf, Germany*	*P6 (GSF)*	*Scientific Community (Research)*	*250*	*International*
10	*Workshop: NanoImpactNet: Training School – Handling Protocols and Toxicological Testing Strategies*	*Kreyling, WG*	*Topic 2: Introduction of Nano-Objects into Cell, Tissues and Animals*	*23rd March 2009*	*Lausanne, Switzerland*	*P6 (GSF)*	*Scientific Community,Industry, Policy makers, Media*	*250*	*European*

11	*Conference: 1st NanoImpactNet Conference*	*Stoeger, T*	*Connecting the Dots with intent to develop approaches for a save toxicity prediction of newly developed nanomaterials*	*26 March 2009*	*Lausanne, Switzerland*	*P6 (GSF)*	*Scientific Community (Industry)*	*250*	*International*
12	*Conference: 12th UK Review Meeting on Outdoor & Indoor Air Pollution Research*	*Kreyling, WG*	*Toxicokinetics of Inhaled Nanoparticles*	*20 April 2009*	*Cranfield, UK*	*P6 (GSF)*	*Scientific Community, Industry, Policy makers, Media*	*250*	*European*
13	*Conference: 17th ISAM Congress, Session 6: Aerosolized Nanotechnology*	*Kreyling, WG*	*Biokinetics of Inhaled Nanoparticles*	*12 May 2009*	*Monterey, CA, USA*	*P6 (GSF)*	*Scientific Community, Industry, Policy makers, Media*	*350*	*International*
14	*Workshop: Seminar at Air Quality Research Center at UC Davis*	*Kreyling, WG*	*Toxicokinetics of Nanoparticles Administered to Three Different Primary Organs of Intake: Lungs, Circulation, GI-Tract*	*21 May 2009*	*Davis, CA, USA*	*P6 (GSF)*	*Scientific Community,*	*60*	*United States*
15	*2nd ESF/UB European Summer School in Nanomedicine*	*Ménard-Moyon*	*Multi-Functionalisation Of Carbon Nanotubes With Peptides For The Modulation Of An Autoimmune Disease*	*12-16 June 2009*	*Lisbon, Portugal*	*P4 (CNRS)*	*Scientific Community (Research)*	*200*	*European*
16	*Workshop: International PhD Course in Nanotoxicology*	*Kreyling, WG*	*Toxicokinetics of engineered Nanoparticles*	*21June 2009*	*Ebeltoft, Denmark*	*P6 (GSF)*	*Scientific Community, Industry, Policy makers, Media*	*350*	*International*
17	*IWFAC2009 Conference*	*Da Ros*	*Medicinal Chemistry and Pharmacological Potential of Fullerenes and Carbon Nanotubes*	*6-12July 2009*	*St. Petersburg, Russia*	*P5 UTr*	*Scientific Community (Research)*	*150*	*International*
18	*1st NanoToday Congress*	*Bianco*	*Functionalized Carbon Nanotubes and Their Applications in*	*2-5 August 2009*	*Singapore*	*P4 (CNRS)*	*Scientific Community (Research)*	*500*	*International*

			Nanomedicine						
19	*Second Summer School on Nanotechnology in Advanced Drug Delivery*	*Bianco*	*Biomedical Applications of Carbon Nanotubes*	*10-14 August 2009*	*NIPER, S.A.S. Nagar, Punjab, India*	*P4 (CNRS)*	*Scientific Community (Research)*	*100*	*India*
20	*LXXIII. Conference of Hungarian Physiological Society*	*R. Urbanics*	*Animal models of complement activation related pseudoallergy*	*27-29 Aug. 2009*	*Budapest Hungary*	*P8 (SeroS)*	*Scientific Community (Research)*	*100*	*Hungary*
21	*LXXIII. Conference of Hungarian Physiological Society*	*Cs. Révész*	*Recognition of carbon nanotubes by complement system and their invitro reactivity*	*27-29 Aug 2009*	*Budapest Hungary*	*P8 (SeroS)*	*Scientific Community (Research)*	*150*	*Hungary*
22	*Conference: GDCh-Wissenschaftsforum 2009, Symposium „Nanochemie“,*	*Kreyling, WG*	*Biokinetik inkorporierter Nanopartikel*	*2 September 2009*	*Frankfurt/Main, Germany*	*P6 (GSF)*	*Scientific Community,Industry, Policy makers, Media*	*500*	*German*
23	*ESF Conference NanoCarb'09*	*Bianco and Venturelli and Fabbro*	*Functionalization of Carbon Nanotubes with Therapeutic Molecules*	*8-13 September 2009*	*Acquafredda di Maratea, Italy*	*P4 (CNRS) P5 UTr*	*Scientific Community (Research)*	*130*	*Mainly Europe*
24	*Conference: Sixth International Key Symposium NANOMEDICINE*	*Kreyling, WG*	*Biokinetics of nanoparticles (NP) in the rat: comparison of different routes of NP administration*	*11 September 2009*	*Stockholm, Sweden*	*P6 (GSF)*	*Scientific Community, Industry, Policy makers, Media*	*250*	*International*
25	*Workshop: Summer School DFG-SPP1313*	*Kreyling, WG*	*Experimental Validation of NP / Biological Effects Using in vivo Testing*	*13th September 2009*	*Tutzing, Germany*	*P6 (GSF)*	*Scientific Community,*	*40*	*German*
26	*Conference: XXXII ReunionBienal de la Real SociedadEspañola de Quimica*	*Prato*	Organic Functionalization of Carbon Nanotubes: Synthesis, Applications and Challenges	*13-17 September 2009*	*Oviedo Spain*	*P5 UTr*	*Scientific Community (Research)*		*Spain*
27	*1st Ukrainian-French School-Seminar "Carbon Nanomaterials: Structure and Properties"*	*Da Ros*	*Fullerenes: Chemistry and Bio-applications*	*13-18 September 2009*	*Beregove Ukraine*	*P5 UTr*	*Scientific Community (Research)*	*50*	*France, Ukraine*

28	*6e Journées de Biologie Cellulaire du Grand Campus Journées du PRES UniverSud, Nano-objets pour l'imagerie du vivan*	*Ménard-Moyon*	*Functionalised Carbon Nanotubes in Drug Delivery*	*24-25 September 2009*	*Paris, France*	*P4 (CNRS)*	*Scientific Community (Research)*	*100*	*European*
29	*International Seminar On Nanocomposite Application In The Plastic SECTOR*	*Stoeger, T*	*Health Effects and safety issues of Engineered Nanomaterials - Lessons from Ultrafine Particulate Matter*	*30 September 2009*	*Valencia, Spain*	*P6 (GSF)*	*Scientific Community, Industry*	*400*	*International*
30	*216th ECS Meeting*	*Prato*	Functionalizationof Carbon Nanotubes	*4-9 October 2009*	*Vienna Austria*	*P5 UTr*	*Scientific Community (Research)*	*100*	
31	*EUROPHARMAT Congress*	*Bianco*	*Nanotubes: le future de biomatériaux*	*13-15 October 2009*	*Strasbourg, France*	*P4 (CNRS)*	*Scientific Community (Research), Industry*	*1500*	*France*
32	*First Annual Conference of the American Society for Nanomedicine*	*Kostas Kostarelos*	*Basic Science Advances Driving Innovation in Nanomedicine*	*22-25 October 2009*	*Maryland, USA*	*P1 (ULSOP)*	*Scientific Community (Research), Industry*	*400*	
33	*Symposium : Minisymposium AltUN "Carbon Nanotubes in Nanomedicine"*	*Da Ros*	*Carbon nanotubes: welcome to nano-world*	*28 October 2009*	*Pavia Italy*	*P5 UTr*	*Scientific Community (Research)*	*100*	*Italy*
34	*Symposium : Minisymposium AltUN "Carbon Nanotubes in Nanomedicine"*	*Fabbro*	*Covalent chemistry on carbon nanotubes: towards bioactive conjugates*	*28 October 2009*	*Pavia Italy*	*P5 UTr*	*Scientific Community (Research)*	*100*	*Italy*
35	*ICU Master Class Agenda - Concorde Conference Centre, Manchester*	*Stoeger, T*	*Mechanisms and Toxicology of Particulates - Lessons from ambient PM -*	*19 November 2009*	*Manchester, UK*	*P6 (GSF)*	*Scientific Community, Industry*	*150*	*International*
36	*Contact forum on Bionanotechnology*	*Bianco*		*8 January 2010*	*Brussels, Belgium*	*P4 (CNRS)*	*Scientific Community*	*80*	*European*

							(Research)		
37	*217th ECS Meeting*	*Da Ros*	*Applications of Functionalized Carbon Nanotubes*	*25-30 April 2010*	*Vancouver Canada*	*P5 UTr*	*Scientific Community (Research)*		*International*
38	*217th ECS Meeting*	*Da Ros*	*Carbon Nanostructures: chemistry and biological applications*	*25-30 April 2010*	*Vancouver Canada*	*P5 UTr*	*Scientific Community (Research)*		*International*
39	*3rd European Conference for Clinical Nanomedicine*	*Ménard-Moyon, Kostas Kostarelos*	*Multi-Functionalisation of Carbon Nanotubes for Targeted Drug Delivery*	*10-12 May 2010*	*Basel (Switzerland)*	*P4 (CNRS) P1 (ULSOP)*	*Scientific Community (Research)*	*200*	*European*
40	*3rd Nanotoxicology Conference*	*Stoeger, T*	*Double wall carbon nanotubes (DWCNTs) cause prolonged lung inflammation in mice associated with the expression of profibrotic galectin-3 by alveolar macrophages*	*3 June 2010*	*Edinburgh, UK*	*P6 (GSF)*	*Scientific Community, Industry*	*400*	*International*
41	*3rdNanotoxicology Conference*	*Stoeger, T*	*ESF Exploratory Workshop on Organic Bioelectronics*	*3 June 2010*	*Edinburgh, UK*	*P6 (GSF)*	*Scientific Community (Industry)*		*International*
42	*E-MRS Spring Meeting*	*Prato*	Functionalization and Applications of Carbon Nanotubes and Graphene	*7-11 June 2010*	*Strasbourg France*	*P5 UTr*	*Scientific Community (Research)*	*150*	*International*
43	*ESF Exploratory Workshop on Organic Bioelectronics*	*Ménard-Moyon*	*Carbon nanotubes for biomedical applications: from imaging to drug delivery*	*15 June 2010*	*Trento (Italy)*	*P4 (CNRS)*	*Scientific Community (Research)*	*50*	*European*
44	*Nanotech 2010 Expo & Conference*	*Kostas Kostarelos*	*Doxorubicin-loaded and Antibody-Conjugated Liposome-QD Hybrid Vesicles for Targeted Cancer Therapy and Imaging*	*18-26 June 2010*	*Los Angeles*	*P1 (ULSOP)*	*Scientific Community ,Industry, Policy makers, Media*	*2000*	*International*

45	*Nanotech 2010 Expo & Conference*	*Khuloud Al Jamal*	*Structural Elucidation of Doxorubicin-Loaded Liposomes by Atomic Force Microscopy in air and water*	*18-26 June 2010*	*Los Angeles*	*P1 (ULSOP)*	*Scientific Community (Research & Industry)*	*500*	*International*
46	*3nd International symposium on Cellular Delivery of Therapeutic Macromolecules*	*Dr Chang Guo*	*Cellular internalisation of humanized IgG antibody changes by functionalization onto multi-walled carbon nanotubes*	*26 - 29 June 2010*	*Cardiff, UK*	*P1 (ULSOP)*	*Scientific Community (Research)*	*300*	*International*
47	*NT10 Congress*	*Bianco*	*Exploring functionalized carbon nanotubes for cancer therapy*	*27 June - 2 July 2010*	*Montréal, Canada*	*P4 (CNRS)*	*Scientific Community (Research)*	*700*	*International*
48	*Conference: Workplace Aerosols*	*Kreyling, WG*	*In-vivo Aerosol Dose and Response*	*29 June 2010*	*Karlsruhe, Germany*	*P6 (GSF)*	*Scientific Community, Industry, Policy makers, Media*	*250*	*International*
49	*Conference: Workplace Aerosols*	*Kreyling, WG*	*Aerosol Inhalation and Exposure, Dosimetry and Health Effects*	*29 June 2010*	*Karlsruhe, Germany*	*P6 (GSF)*	*Scientific Community,Industry, Policy makers, Media*	*250*	*International*
50	*6th International Conference on Diffusion in Solids and Liquids – DSL-2010*	*Prato*	Functionalized Carbon Nanotubes: Versatile Building Blocks in Nanomedicine	*5-7 July 2010*	*Paris France*	*P5 UTr*	*Scientific Community (Research)*		*International*
51	*7th International Conference on Nanosciences & nanotechnologies*	*R. Urbanics*	*In Vivo Immunotoxicological Testing of nanodrugs-Nanocarriers*	*11-14 July 2010*	*Greece Ouranoupolis*	*P8 (SeroS)*	*Scientific Community (Research)*	*25*	*International*
52	*7th International Conference on Nanosciences &nanotechnologies*	*J. Szebeni*	*The impact of nanopharmaceuticals on the immune systems*	*11-14 July 2010*	*Greece Ouranoupolis*	*P8 (SeroS)*	*Scientific Community (Research)*	*25*	*International*

53	Conference Micro and Nano Fabrication: from Lithography to Self Assembly	Prato	Functionalized Nanocarbons: Versatile Building Blocks for Materials Science and Nanomedicine	20-23 July 2010	Freiburg, Germany	P5 UTr	Scientific Community (Research)		International
54	Liposome Research Days 2010	Stoeger, T	Toxicological responses to nanoparticles	6 August 2010	Vancouver, BC, Canada	P6 (GSF)	Scientific Community, Industry	350	International
55	20th International Conference on PhysicalOrganicChemistry	Prato	Functionalizationof Carbon Nanotube	22-28 August 2010	Busan Korea	P5 UTr	Scientific Community (Research)		International
56	CARBIO Workshop on Biomedical Applications of Functionalised Carbon Nanotubes	Ménard-Moyon	Multi-functionalisation of Carbon Nanotubes for Targeted Drug Delivery	6-9 September 2010	Dresden (Germany)	P4 (CNRS)	Scientific Community (Research)	50	European
57	Conference/Exhibition "Industrial Technologies 2010"	Amadou	Nanocyl participated in the "Company visits" scheme.	7-9 September 2010	Brussels	P3(NANOCYL)	Scientific Community (Research) Industry	1000	International
58	Conference: 8th Central European Symposium on Pharmaceutical Technology	Kreyling, WG	Toxicokinetics of Insoluble Nanoparticles in Rodents after Different Routes of Administration	17 September 2010	Graz, Austria,	P6 (GSF)	Scientific Community, Industry, Policy makers, Media	400	International
59	Panhellenic Conference on Solid State Physics and Materials Sciente	Prato	Carbon nanotubes in materials science and nanomedicine	26-29 September 2010	Ioannina, Greece	P5 UTr	Scientific Community (Research)		Greece
60	Fullerene Silver Anniversary Symposium, FSAS 2010	Montellano	Synthesis of PAMAM-fullerene derivatives for siRNA delivery	4-10 October 2010	Crete, Greece	P5 UTr	Scientific Community (Research)		International
61	Fullerene Silver Anniversary Symposium, FSAS 2010	Prato	Functionalization and Applications of Carbon Nanotubes	4-10 October 2010	Crete, Greece	P5 UTr	Scientific Community (Research)		International
62	Workshop: NNRC Symposium at Health Protection Agency	Kreyling, WG	Biokinetics Studies Using Radiolabelled Nanoparticle Aerosols	15 October 2010	Didcot, UK	P6 (GSF)	Scientific Community,	35	European
63	7th ERA-CHEMISTRY	Bianco	The alluring potential of	24-27 October	Santiago de	P4 (CNRS)	Scientific	150	European

			functionalized carbon nanotubes in drug discovery and delivery	*2010*	*Compostela, Spain*		*Community (Research)*		
64	*XXXIX. Conference of HungarianImmunological Society*	*Cs. Révész*	*Characterization of natural immune reactions against carbon nanotubes*	*3-5 Nov 2010*	*Szeged Hungary*	*P8 (SeroS)*	*Scientific Community (Research)*	*120*	*Hungary*
65	*8th iCeMS International Symposium "Meso-Control of Functional Architecture"*	*Da Ros*	*Carbon nanostructures: functionalization, applications and their interactions with cells*	*9-11 November 2010*	*Kyoto Japan*	*P5 UTr*	*Scientific Community (Research)*	*100*	*International*
66	*International Symposium on Multimodal imaging of the tissue microvasculature in health and disease*	*Bianco*	*Carbon nanotube chemistry and potential applications in nanomedicine*	*25-26 November 2010*	*Madrid, Spain*	*P4 (CNRS)*	*Scientific Community (Research)*	*100*	*European*
67	*Pacifichem, International ChemicalCongree of Pacific Basin Societies*	*Prato*	*Functionalized Carbon Nanotubes: Versatile Building Blocks in Nanomedicine and Materials Science*	*15-20 December 2010*	*Honolulu USA*	*P5 UTr*	*Scientific Community (Research)*		*International*
68	*Advances in OrganicMaterials, A Symposium in Honor of Fred Wudl's 70th Birthday*	*Prato*	Carbon Nanotubes in Materials Science and Nanomedicine	*7-8 January 2011*	*Santa Barbara, USA*	*P5 UTr*	*Scientific Community (Research)*		*International*
69	*GDR-GNT'11 Annual meeting*	*Venturelli*	*Antibody-functionalised carbon nanotubes towards a targeted anticancer therapy*	*7-11 February 2011*	*Dourdan, France*	*P4 (CNRS)*	*Scientific Community (Research)*	*150*	*European*
70	*5° Meeting Nuove Prospettive in Chimica Farmaceutica (NPCF)*	*Maurizio Prato*	*Biomaterials and Nanomedicine*	*28-30 March 2011*	*Trieste, Italy*	*P5 UTr*	*Scientific Community (Research)*		*European*
71	*5° Meeting Nuove Prospettive in Chimica Farmaceutica (NPCF)*	*Fabbro*	*Covalent antibody-carbon nanotubes conjugates for improved anticancer therapy*	*28-30 March 2011*	*Trieste, Italy*	*P5 UTr*	*Scientific Community (Research)*		*European*
72	*GFEC 2011*	*Bianco*	*Carbon nanotubes: a*	*4-7 April 2011*	*Orbey, France*	*P4 (CNRS)*	*Scientific*	*80*	*France*

	(GroupeFrançaisd'Etude des Carbones)		*platform for biomedical applications*				*Community (Research)*		
73	*219th ECS Meeting*	*Da Ros*	*Fulleropyrrolidines as drug vectors*	*1-6 May 2011*	*Montreal, Canada*	*P5 UTr*	*Scientific Community (Research)*		*International*
74	*NOIS 2011*	*Bianco*	*Carbon-based nanomaterials: biomedical applications*	*16-20 May 2011*	*Biarritz, France*	*P4 (CNRS)*	*Scientific Community (Research)*	*150*	*France*
75	*4th European Conference for Clinical Nanomedicine*	*R. Urbanics*	*Immunotoxicity testing of Nanodrugs, nanocarriers – new in vivo approaches*	*23-25 May 2011*	*Switzerland, Basel*	*P8 (SeroS)*	*Scientific Community (Research)*	*250*	*International*
76	*4th European Conference for Clinical Nanomedicine*	*Z Rozsnyay*	*Natural immune reactions against intravenous nanoformulations*	*23-25 May 2011*	*Switzerland, Basel*	*P8 (SeroS)*	*Scientific Community (Research)*	*250*	*International*
77	*22ème colloque de l'IFSBM : Nanotechnologies et Applications Biomédicales*	*Ménard-Moyon*	*Multi-functionalisation of Carbon Nanotubes for Targeted Drug Delivery*	*25 May 2011*	*Villejuif, France*	*P4 (CNRS)*	*Scientific Community (Research)*	*100*	*France*
78	*Nanotech 2011 Conference & Expo*	*Kostas Kostarelos*	*Symposium on "Nano Medical Sciences". Symposium on "Materials for Drug & Gene Delivery"*	*13-16 June 2011*	*Boston USA*	*P1(ULSOP)*	*Scientific Community, Industry, Policy makers, Media*	*2000*	*International*
79	*Carbon2011 Congress*	*Bianco*	*Carbon Nanotubes: from Organic Functionalization to Biomedical Applications*	*24-29 July 2011*	*Shanghai, China*	*P4 (CNRS)*	*Scientific Community (Research)*	*600*	*International*
80	*Congress: Controlled Release Society's 38th Annual Meeting*	*Bianco*	*Advanced Carbon-based Nanomaterials: Opportunities and Challenges in Drug Delivery*	*30 July-3 August 2011*	*National Harbor, Maryland, USA*	*P4 (CNRS)*	*Scientific Community (Research)*	*2000*	*International*
81	*13th European Meeting on Complement in Human Disease*	*J. Szebeni, R. Urbanics P. Bedőcs, B. Fodor, T.Mészáros*	*Complement-Mediated Hypersensitivity to Nanomedicines*	*21-24 August 2011*	*Leiden, The Netherlands*	*P8 (SeroS)*	*Scientific Community (Research)*	*200*	*International*

		M. Toth L. Rosivall							
82	*ESF Research Conference Nanocarbons 2011*	*Russier*	*In vitro oxidative degradation of single- and multi-walled carbon nanotubes*	*6-11 September 2011*	*Maratea, Italy*	*P4 (CNRS)*	*Scientific Community (Research)*	*45*	*European*
83	*2nd Symposium on Phospholipids in Pharmaceutical Research*	*J. Szebeni*	*Hypersensitivity reactions to liposomes and other lipid-based nanoparticles*	*12 -13 September 2011*	*University of Heidelberg, Heidelberg, Germany*	*P8 (SeroS)*	*Scientific Community (Research)*	*120*	*International*
84	*SAFENANO Course: Safety of nanoparticles for biomedical use*	*J. Szebeni*	*Complement activation and biomimicry*	*20-21 Sept. 2011*	*Milan- Italy*	*P8 (SeroS)*	*Scientific Community (Research)*	*40*	*International*
85	*Symposium Xèmecolloque de la section 30 du CNRS*	*Ménard-Moyon*	*Multi-fonctionnalisation de Nanotubes de Carbone pour la Vectorisation de Molécules d'Intérêt Thérapeutique*	*22-23 September 2011*	*Strasbourg France*	*P4 (CNRS)*	*Scientific Community (Research)*	*100*	*France*

Section B (Confidential[5] or public: confidential information to be marked clearly)
Part B1

The applications for patents, trademarks, registered designs, etc. shall be listed according to the template B1 provided hereafter.

The list should, specify at least one unique identifier e.g. European Patent application reference. For patent applications, only if applicable, contributions to standards should be specified. This table is cumulative, which means that it should always show all applications from the beginning until after the end of the project.

[5]Note to be confused with the "EU CONFIDENTIAL" classification for some security research projects.

TEMPLATE B1: LIST OF APPLICATIONS FOR PATENTS, TRADEMARKS, REGISTERED DESIGNS, ETC.					
Type of IP Rights[6]:	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	Application reference(s) (e.g. EP123456)	Subject or title of application	Applicant (s) (as on the application)

[6] A drop down list allows choosing the type of IP rights: Patents, Trademarks, Registered designs, Utility models, Others.

Part B2
Please complete the table hereafter:

Type of Exploitable Foreground[7]	**Description of exploitable foreground**	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	**Exploitable product(s) or measure(s)**	**Sector(s) of application**[8]	**Timetable, commercial or any other use**	**Patents or other IPR exploitation (licences)**	**Owner & Other Beneficiary(s) involved**
	Ex: New supercond uctive Nb-Ti alloy			*MRI equipment*	*1. Medical 2. Industrial inspection*	*2008 2010*	*A materials patent is planned for 2006*	*Beneficiary X (owner) Beneficiary Y, Beneficiary Z, Poss. licensing to equipment manuf. ABC*

In addition to the table, please provide a text to explain the exploitable foreground, in particular:

- Its purpose
- How the foreground might be exploited, when and by whom
- IPR exploitable measures taken or intended
- Further research necessary, if any
- Potential/expected impact (quantify where possible)

[19] A drop down list allows choosing the type of foreground: General advancement of knowledge, Commercial exploitation of R&D results, Exploitation of R&D results via standards, exploitation of results through EU policies, exploitation of results through (social) innovation.
[8] A drop down list allows choosing the type sector (NACE nomenclature) : http://ec.europa.eu/competition/mergers/cases/index/nace_all.html