European Science Foundation (ESF-UB) Summer School in Nanomedicine

2nd European Summer School in Nanomedicine
Quinta Da Marinha Hotel
Lisbon (Portugal), 12th-16th June 2009

http://www.ff.ul.pt/nanoschool2009/

SCIENTIFIC REPORT

Introduction (up to 2 pages)

Introduction on the topic in non-specialist terms (especially for highly technical subjects)

'Nanomedicine' is the application of basic nanoscience to the development of nanotechnologies for diagnosis, treatment and prevention of disease, and to relieve pain and traumatic injury. Thus nanomedicine provides the foundations needed to advance healthcare, and bring improved treatments for life-threatening and debilitating diseases.

The ESF Forward Look on Nanomedicine (2005; www.esf.org) concluded that nanomedicine comprises five overlapping sub-themes including (i) analytical techniques and ex vivo diagnostic tools (ii) technologies for nano-imaging - from imaging subcellular events to imaging diseases in patients; (iii) underpinning chemistry, materials science and engineering currently generating nanomaterials and nanodevices; (iv) those "*nanomedicines"* administered to patient as treatments of disease, including both biologically active therapeutics and drug delivery systems and systems designed to promote tissue repair, and (v) of particular importance, all the issues relating to translation from bench to clinic including industrial scale-up, validation and regulation, and evaluation of safety and efficacy of these innovative technologies. Bioinformatics tools support the holistic approach required to allow mathematical simulation and modelling. Translation of medical nanotechnology into clinical use raises other important issues including the need for proactive risk management, an adequate regulatory context, and not least, ethical review of the societal implications of nanotechnology.

The ESF Forward Look on Nanomedicine recommended an urgent need to establish Pan-European interdisciplinary training in 'nanomedicine'. This 1st ESF-UB Summer School in Nanomedicine was designed as a foundation course to promote learning and to foster networking and exchange, particularly for early career researchers and those new to the field (including industrialists, medical doctors and public stakeholders). The **2nd ESF-UB Summer School in Nanomedicine** (full programme at http://www.ff.ul.pt/nanoschool2009/) built on the success of the first event, and was designed as a unique integrated Advanced Training programme that is complementary to other ESF Research Conferences and Schools that are more specialised technical meetings. The aim for this Nanomedicine School is to have equal participation (delegates and speakers *across all* the component core disciplines) and to emphasise the interdisciplinary links and moreover the opportunity to bring together convergent nanoscience and technologies to further improved healthcare, i.e. is ultimately patient centric.

2nd ESF-UB Summer School in Nanomedicine, Lisbon (Course Director: Rogerio Gaspar)

The recent summer school covered all the topics that underpin Nanomedicine. To embrace the concept of interdisciplinarity, the course was pitched at a level to be accessible to those coming from a diverse range of backgrounds, including, but not exclusively, Chemistry, Physics, Engineering, Materials Science, Biology, Pharmaceutical Sciences, Computer Simulation/Modelling, Medicine, and Sociology and Ethics. The meeting was heavily oversubscribed and this necessitated increasing the intake to 210 delegates (including ~ 40 faculty and guest lecturers). There was a waiting list to attend.

The meeting programme comprised 3 Plenary Lectures (experts from USA-Japan-Europe) to give a

global, truly leading edge perspective, 22 expert lectures (these world renown speakers were asked to introduce their field at undergraduate level and progress to specific research level examples) and 48 short presentations from the poster communications chosen to complement each of the core sessions with real ongoing research examples. There were 105 posters and they were by necessity split into 2 sessions. Optional tutorials and discussion groups were offered in the afternoons (>12) and the delegates selected the topics for these. At the start of the meeting, during a unique introductory session (over 1 h), all delegates were invited to introduce themselves, their background and research interests. This is an extremely productive platform to ensure all integrate immediately both socially and scientifically and it promotes a sense of collegiality.

Participants at the 2nd ESF-UB Summer School in Nanomedicine
The reputation established at the 1st Summer School in Nanomedicine obviously certainly helped to draw delegates to this 2nd event. Delegates came from ~40 countries, mostly from Europe, but also the USA, Argentina, Japan, Singapore, South America, Africa and Australia. Importantly for the first time there were delegates from the Middle East e.g. Iran, Iraq, Saudi Arabia, Palestine. The popularity of the meeting is clearly due to the uniqueness of this Summer School – still the ***first globally*** to properly embrace the multidisciplinarity of nanomedicine and provide a fully integrated course.
It should be noted that we are introducing the same format in Singapore and Moscow. The delegates included PhD students, early career researchers (postdoctoral scientists, young academics and industrialists, as well as ~ 15 % of medical doctors (from the UK, Europe, Japan and Africa) together with some more experienced senior scientists (Faculty Professors) and industrialists entering this new field.

The perceived need for such integrated training (laboratory to clinic) of converging sciences also helped to attract considerable additional sponsorship from companies (Merck, GSK, Novartis Alliance Healthcare, Schering Plough, Medinfar) academic institutions (iMed.UL of the Faculty of Pharmacy University of Lisbon, Cardiff University, Zaragoza ICMA, CDDN University of Nebraska, University of Utrecht, CICECO University of Aveiro), national funding bodies (EPSRC Platform in Nanomedicine) and national academies (Academy of Pharmaceutical Science and Technology of Japan). This support enabled the award of over 73 grants to aid participation of young academic scientists and medical doctors.

The Faculty :- The course was supported by > 30 of the world leading experts in Nanomedicine representing all areas of nanomedicine – from materials science and engineering, analytical tools, to the medical challenges, the regulatory perspective, clinical trial design and societal & ethical aspects of this newly emerging field. The teachers (also local faculty from Portugal) represented many different generations. This mix of interest, age, expertise and enthusiasm led to many great discussions, with fruitful exchanges of ideas thus providing opportunities for international networking as well as learning. Plenary lectures given by the Head of the Cancer Nanotechnology programme USA Dr Piotr Grodzinski (National Cancer Institute), Professor Kazunori Kataoka (Tokyo University Japan) and Professor Viola Vogel (ETH Europe). Of particular note was the presentation of Mary Baker describing the patient's perspective.

Commitment to Advanced Training in Nanomedicine in Portugal was evidenced by the attendance of the Rector of the University of Lisbon (Prof António Sampaio da Nóvoa), the Dean of the Faculty of Pharmacy University of Lisbon (Prof José Morais) and colleagues involved in current EMEA (European Medicines Agency) activities. This is an area of particular importance to EMRC.

The Course Director 2009 was Professor Rogerio Gaspar (Pharmacy, Lisbon) supported by Professor Ruth Duncan Course Director 2007). The Course Director 2011 will be Professor Karsten Maeder (Martin-Luther University Halle) and the next Summer School will be held Halle in June 2011 (contact Maeder@pharmazie.uni-halle.de for information). It will be supported by the University of Lisbon and other sponsors shortly to be announced.