Conférence du 14 juin 2012 – à 10h30
Amphithéâtre du CNRS LR

Use of High Throughput Discovery at the Nano/Bio interface to Understand and Improve Nano Safety

André Nel, M.D./Ph.D.
Professor of Medicine, Chief of the Division of NanoMedicine, Director of UC CEIN,
David Geffen School of Medicine at UCLA, Los Angeles

In both the safety assessment of commercial nanoparticles (such as metals, metal oxides, carbon nanotubes) and therapeutical use nanoparticles (E.g., mesoporous silica) it is required that we understand how the physicochemical characteristics of the engineered nanomaterials relate to biological responses such as cellular uptake, biodistribution, bioavailability and the catalysis of hazardous biological responses at the nano/bio interface. While this is a potentially rewarding discovery platform, the number of perturbations at the nano-bio interface is potentially overwhelming and requires the use of high content and high throughput screening approaches to perform modeling and predictions. My talk will delineate the implementation of high throughput methodology in cells and zebra fish and describe how high content discovery can be used for the safety assessment of commercial nanomaterials as well as the improvement of nanoparticles that can be used for drug and siRNA delivery. I will describe how the use of compositional and combinatorial nanomaterial libraries is being used to elucidate the material properties that drive biological injury response pathways, as well as how to use safer by design strategies to improve safety of ZnO and CNTs. I will also show how *in silico* data transformation and decision-making tools can help to speed up the rate of discovery for the establishment of a predictive toxicological paradigm.

Conférence du 14 juin 2012 – à 14h00
Amphithéâtre du CNRS LR

Nanomedicine: What is happening and where is this field going in the next decade?

André Nel, M.D./Ph.D.
Professor of Medicine, Chief of the Division of NanoMedicine, Director of UC CEIN,
David Geffen School of Medicine at UCLA, Los Angeles

Over the past decade, nanomedicine and nanobiology has undergone a dramatic transformation from fantasy to real science. The days of discussing advances in the context of "nanobots" are over, and the systems and nanomaterials that have emerged provide major analytical, therapeutic and diagnostic advantages over conventional molecule-based structures and approaches. We have come to recognize that much of biology is executed at the nanoscale level, therefore providing a rational approach to using discovery about the structure and function of engineered nanomaterials at the nano-bio interface for interrogation of disease, diagnosis, treatment, and imaging at levels of sophistication not possible before. Fabrication of a host of nanostructures has been coupled with advanced chemical manipulation to impart biological recognition and interaction capabilities. Early work has provided significant evidence that the properties afforded by nanostructures offer not only different but also better ways of detecting, managing, treating, and preventing disease. Analytical tools have been invented that allow imaging and manipulation of biological structures that can revolutionize the fields of medicine and biology. These tools are dramatically accelerating the fundamental understanding of complex biological systems and providing a basis for understanding the rapid translational advances being made on the nanomedicine front. Through the application of nanomaterials to impact *in vitro* and *in vivo* biological systems, and with sophisticated tools to monitor such nano-bio interactions, it has become increasingly appreciated that such interactions are complex and warrant directed evaluation as we move forward in the next ten years. I will review representative examples of nanotechnology-based tools, materials, and systems that are having major impacts in biology and medicine, including our multi-functional mesoporous silica nanoparticle treatment platform. I will review the major advances that we expect in for nano medicine globally based on the recent series of international workshops and vision we have developed for the US government in the next decade.

CV détaillé

Andre Nel, M.B.Ch.B., Ph.D.

Division Chief, NanoMedicine

Professor, Medicine

Director, Center for Environmental Implications of Nanotechnology , California NanoSystems Institute

Director, UC NanoToxicology Research Training Program

Member, California NanoSystems Institute, NanoBiotechnology and Biomaterials

Education:

Degrees:

M.B.Ch.B., University of Stellenbosch, Capetown, R.S.A, 1975
Ph.D., University Stellenbosch, 1987

Certifications:

Certifications:

1991 American Board of Allergy and Immunology
1989 American Board of Internal Medicine

Honors and Awards:

International Nanoparticle Symposium, National Institute for Environmental Studies, Tsukuba, Japan, June 2005. Title: "The Role of Oxidative Stress and Mitochondrial Damage in Mediating the Effects of DEP and Ultrafine Particles", Keynote speaker
NIH Study Section: Allergy, Immunology, and Transplantation Research Committee, NIAID 2004-2005, Chair
2007 International AAAAI Convention, John Salvaggio Memorial Lectureship and Honorary Award for outstanding service to the specialty and science of Allergy and Immunology

Certifications:

Certification Type:

NIH-funded UCLA Asthma and Allergic Disease Clinical Research, Director/PI
UC Lead Campus NanoToxicology Research Training Program, Founder/Director
2009 Foreign Member Chinese Academy of Sciences, Distinguished Professor
2008 - 2013 Center for the Environmental Impact of Nanotechnology (CEIN), Director and PI of the NSF and EPA-funded National Science Engineering Center
1998 - Peer selected inclusion, Best Doctors in America 1998-Present

Contact Information:

Work Email Address: anel@mednet.ucla.edu

Department Address: UCLA Med-NanoMedicine
10833 Le Conte Ave., 52-175 CHS
Los Angeles, CA 90095
UNITED STATES

Mailing Address: Mail Code: 173617
Los Angeles, CA 90095
UNITED STATES

Home Page: http://www.cnsi.ucla.edu/institution/personnel?personnel%5fid=8739

Work: http://www.cein.ucla.edu

Work: http://www.uclahealth.org/AndreNel

Work Phone Number: (310) 825-6011 Clinic
(310) 825-6620 Work
(310) 825-3718 Office
(310) 206-8107 Fax

Research Interests:

Research Interests
Dr. Nel?s chief research interests are: (i) Nanomedicine and Nanobiology, including nanomaterial therapeutic devices and the study of nanomaterial properties that lead to biocompatible and biohazardous interactions in humans and the environment; (ii) The role of air pollutants in asthma, with particular emphasis on the role of ultrafine particle-induced oxidative stress in the generation of airway inflammation and

asthma. The research is funded by personal RO1 grants from the NIH, the NIAID-funded Asthma and Immunology Disease Clinical Research Center, an EPA STAR award, a $24 million NSF award for a NSF Science Engineering Center. Dr Nel is Director of the UC Center for the Environmental Impact of Nanotechnology (CEIN), Director of the UCLA Asthma and Immunology Disease Center, Co-Director of the Southern California Particle Center, and Co-Director of the UCLA Nanomachine Center. The Nanomachine Center (four co-PI?s) develops and utilizes smart nanoparticle delivery systems that can target and control drug release at cancer and disease sites. The mission of the multi-campus UC CEIN is to develop an early warning system for nanomaterial hazards and safe design, particularly as it relates to interactions with biological systems and ecological life forms.

Technical Research Interest:

Dr. Nel?s chief research interests are:

(i) Nanomedicine and Nanobiology, including nanomaterial therapeutic devices and the study of nanomaterial properties that lead to biocompatible and biohazardous interactions in humans and the environment;

(ii) The role of air pollutants in asthma, with particular emphasis on the role of ultrafine particle-induced oxidative stress in the generation of airway inflammation and asthma. The research is funded by personal RO1 grants from the NIH, the NIAID-funded Asthma and Immunology Disease Clinical Research Center, an EPA STAR award, a $24 million NSF award for a NSF Science Engineering Center. Dr Nel is Director of the UC Center for the Environmental Impact of Nanotechnology (CEIN), Director of the UCLA Asthma and Immunology Disease Center, Co-Director of the Southern California Particle Center, and Co-Director of the UCLA Nanomachine Center. The Nanomachine Center (four co-PI?s) develops and utilizes smart nanoparticle delivery systems that can target and control drug release at cancer and disease sites. The mission of the multi-campus UC CEIN is to develop an early warning system for nanomaterial hazards and safe design, particularly as it relates to interactions with biological systems and ecological life forms.