

## Graphene & Derivatives: The G Point in Regenerative Medicine?

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### Abstract

Graphene, a 2-D nanomaterial, is an exciting and excitable allotrope of carbon whose structure is a single planar sheet/layer of sp<sup>2</sup>-bonded carbon atoms that are densely packed in a honeycomb crystal lattice (i.e. regular hexagonal pattern). A key advance in the science of graphene came in 2004 when A. Geim and K. Novoselov, winners of the Nobel Prize in Physics for 2010, managed to extract single-atom-thick crystallites/graphene from bulk graphite, a 3-D nanomaterial. The discovery of the extraordinary intrinsic properties of graphene (e.g. electronic, thermal, mechanical, chemical) has boosted further research and development for various types of applications from electronics to biomedicine. Thereby, since the last decade, graphene and derivatives (e.g. graphene oxide, fluorinated graphenes, 3-D graphene foams) are being extensively explored for the manufacturing of biosensors, the development of innovative theranostics and/or to remotely control cell-substrate interfaces, notably because of their remarkable electro-conductivity. To date, despite the intensive progress in human stem cell research, only a few attempts to use carbon nanotechnology in regenerative medicine have been reported. Interestingly, most of the recent *in vitro* studies indicate that graphene-based nanomaterials can promote stem cell adhesion, growth, expansion and differentiation. Although the cell viability *in vitro* is not affected, the potential nanocytotoxicity in a clinical setting using humans remains unknown. Therefore, rigorous internationally-standardized clinical studies in humans that would aim to assess the nanotoxicology of graphene-nanobiomaterials are requested. My speech will report and discuss recent and pertinent findings, R&D trends and prospects about graphene and derivatives as valuable nanomaterials for regenerative medicine, personalized and translational medicine, tissue engineering and stem cell research.

### Biography

Dr. Farid Menaa (Bsc. Eng., Bsc. Bio., Msc. Genetics, Master Gerontology/Geriatry, PhD Radiation Oncology and Gerontology, EMBA Entrepreneurship and MD candidate), is an inter- and multi-disciplinary professional. Professor, Principal Investigator, Director, Consultant Editor, Reviewer, Event Organizer and Entrepreneur, Dr. Menaa earned his degrees with highest distinctions from prestigious French universities and institutions. Dr. Menaa followed a post-doctoral in Oncology as a NIH-fellow (San Diego, California, USA; 2004-2007). Subsequently, Dr. Menaa pursued his career in Dermatology, and Stem Cells as a DFG-Fellow (Wuerzburg, Germany; 2007-2009). Then, Dr. Menaa was promoted as Chief Scientific Officer and Vice-President R&D at Fluorotronics, Inc. (CA, USA; 2009-2010), a nanotechnology and fluorine chemical company. Eventually, Dr. Menaa was appointed Principal Investigator in Hematology and Genomics as a FAPESP-Fellow (São Paulo, Brazil; 2010-2012).

During his career, Dr. Menaa also followed complementary formations (e.g. Medicine, Pharmacy, Biochemistry, Biophysics, Food Sciences and Technology, Marine Biology, Nano-Biotechnology, Bio-Computation, Bio-Statistics, Business Development and Management, Technological Innovation and Quality). Overall, Dr. Menaa was involved in various R&D projects in multiple areas of medicine/nanomedicine, pharmacy/pharmacology/toxicology, biology, stem cells/tissue engineering, genetics/genomics, fluorine chemistry/biochemistry, biophysics/biophotonics, food science, technology/nanotechnology, and business). His main current focuses are related to preventive, personalized, translational, integrative and nanomedicine, especially in the areas of oncology, regenerative medicine and gerontology, in order to prevent and implement early diagnosis and efficient therapy. Dr. Menaa authored and co-authored more than 100 publications (including peer-reviewed ISI research and review articles, books, book chapters, conference proceedings, patents). Dr. Menaa is often invited as a speaker, keynote/featured speaker and (co-) chairman to reputed world congresses and institutions, where he is offering speeches in various areas of medicine, sciences and technology.