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Thomas J Webster

Division of Engineering, Brown University, and Division of Orthopedic Surgery, Brown University Medical School, Providence, RI, USA

Welcome to the international journey to improving human health

It is with great excitement that I welcome you to the *International Journal of Nanomedicine* (IJN). This new journal has been launched to bring you the latest, exciting, up-to-date research conducted at the intersection of nanotechnology and medicine. As you will see in this issue alone, researchers from around the world are actively pursuing numerous efforts to improve human health through nanotechnology; it is truly an *international* effort! A recent survey found that governmental nanotechnology programs were funding research worldwide up to an estimated US$5 billion (€3 billion) in 2004 alone (Wagner V and Zweck A 2005 September 30, pers comm). Three countries in particular, the US, Germany, and Japan, have recently given clear commitments to nanomedicine by establishing focused nanomedicine research funding programs. These trends will only increase as the global interest in nanomedicine is only in its infancy. In fact, the projected nanotechnology business market to enhance medical products is expected to be about US$25 billion (or €15 billion) in 2012 (Wagner V and Zweck A 2005 September 30, pers comm).

Not only is nanomedicine a growing area of interest for business, but it is also a growing area of interest for researchers. Nanomedicine research has surged over the past decade, in particular, publication numbers have jumped from about 10 per year in the late 1980s to more than 1200 in 2004 (Wagner V and Zweck A 2005 September 30, pers comm). Again, the equal global commitment to nanotechnology is shown by the fact that 39%, 28%, and 22% of these publications originated from research conducted in the US, Europe, and Asia, respectively (Wagner V and Zweck A 2005 September 30, pers comm). Nanomedicine now accounts for about 5% of nanotechnology publications worldwide. To date, the dominant research field in nanomedicine has been drug delivery, contributing 72% of the scientific papers, followed by in vitro diagnostics contributing about 15% (the remainder come from implants, tissue engineering, and other medical applications) (Wagner V and Zweck A 2005 September 30, pers comm). Clearly, ample global research is being conducted at the intersection of nanotechnology and medicine to warrant a journal specifically dedicated to nanomedicine; this is the void that IJN will fill.

When introducing this journal to colleagues, however, one question that I was often asked was: "What is nanomedicine?" While I believe this definition will continue to evolve over the coming years, IJN uses the definition that nanomedicine is the incorporation of nanotechnology into medicine. This did not satisfy many of my colleagues as they quickly rebutted: "Well then, what is nanotechnology?" Again, while I believe the definition of nanotechnology will continue to evolve over the coming years, nanotechnology is generally defined as the use of materials whose components exhibit significantly changed properties by gaining control of structures at the atomic, molecular, and supramolecular levels.

Of particular importance in this definition is not only the fabrication of nanomaterials (such as self-assembled chemical structures, particles, fibers, and grains), but also the importance of doing so. That is, we as scientists must continue to emphasize the usefulness of and reason to fabricate nanomaterials in the first place. Only through such concerted efforts will others understand the novelty of nano. IJN is committed to highlighting these novelties as they pertain to medicine.

Our inaugural issue shows a number of examples of how nanotechnology is being used to advance medicine: the design of novel drug delivery systems to treat diseases, the development of imaging tools that could assist a clinician in diagnosis, the synthesis of better implants to bond to bone and vascular, and the fabrication of tools that help researchers better understand molecular events. All of these examples show how a fundamental event at the nanoscale is being exploited.

While it is true that researchers have long sought to understand nanoscale events, the new era of merging nanotechnology and medicine will advance human health. For example, it has been suggested that as early as 370 BC, the Greek philosopher Democratis proposed the theory of atomic matter (Kumar 2005); this could certainly be our first indication of the desire to understand nanoscale events. Since then many scientists have followed this train of thought, and in 1959 Richard Feynman predicted the possibility of maneuvering matter atom by atom. Today, we see the impact of nanotechnology in many traditional disciplines, such as the computer industry. However, little comprehensive attention has been paid to nanotechnology applications in medicine; this is the specific focus of IJN – to emphasize the ever-changing advancements in nanotechnology that are being used to prevent, diagnose, and treat diseases.

With this brief introduction, I hope you will join me in reading every issue of IJN to continuously learn and discover the numerous daily advancements being made in nanomedicine. I welcome you to this important, timely, new journal and hope you will enjoy this exciting journey of how nanomedicine is improving, and will continue to improve human health!

References

Kumar CSSR. 2005. Welcome to the journal of biomedical nanotechnology. *J Biomed Nanotech*, 1:1–2.