Editorial

As this special issue of *Audiology & Neurotology* ushers in a new year, the focus on nanotechnology is intended to provoke thoughtful discussion of new areas for research and development in our field. A broad definition of nanotechnology provides the backdrop for this issue:

‘The creation of functional materials, devices and systems through control of matter on the nanometer length scale and exploitation of novel phenomena and properties (physical, chemical, biological) at that length scale’ (<http://www.ipt.arc.nasa.gov/nanotechnology.html>).

Given that the scale of a nanometer is less than 1/1000 of the width of a human hair, the field of nanotechnology naturally conjures up a myriad of questions about application and feasibility.

Some background and explanation for why the topic of nanotechnology is both contemporary and momentous may be useful to our readers. The origins of nanotechnology arose from the theoretical work of several scientists. In the 1950s, Richard Feynman proposed a new small scale future that included manipulating and controlling atoms. Feynman’s theory has been confirmed by the discovery of new shapes for molecules of carbon including carbon nanotubes, which are far lighter but stronger than steel with superior heat and conductivity characteristics. In 1974, Norio Taniguchi coined the term ‘nano-technology’ to refer to production technology or micromachining with accuracy and fineness on the scale of the nanometer.

Around the same time, Eric Drexler proposed that the biological machinery that already exists in nature could be adapted through molecular manufacturing. He also called this approach ‘nanotechnology’ and envisioned manufacturing high-performance machines out of a molecular carbon lattice. Even as some scientists have anticipated the revolutionary changes that nanotechnology might bring, controversies associated with nanotechnology have not been small scale – particularly as warnings surfaced of the potential for developing a self-replicating nanorobot with the capacity to destroy the environment.

Even as scientific debate continues regarding the usefulness and safety of nanotechnology, some principles of nanotechnology are already shaping biomedical research. For example, innovative research is already funded and underway on creating synthetic ciliated surfaces through the creation and actuation of sheets of nanorods and investigating the impact of light-driven molecular motors for use in artificial muscle systems. In this issue, we are publishing seven articles that describe how various principles and practices of nanotechnology are being applied to the human ear and hearing. Our goal is to both enlighten our readers about this new research and to stimulate questions and dialogue about the possibilities for nanotechnology in our field.

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