A realistic look at the promises and perils of nanomedicine

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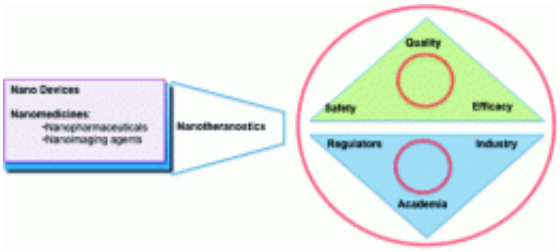

Is the emerging field of nanomedicine a breathtaking technological revolution that promises remarkable new ways of diagnosing and treating diseases? Or does it portend the release of dangerous nanoparticles, nanorobots or nanoelectronic devices that will wreak havoc in the body? A new review of more than 500 studies on the topic concludes that neither scenario is likely. It appears in ACS' journal *Molecular Pharmaceutics*.

Ruth Duncan and Rogerio Gaspar explain that nanomedicine - the application of nanotechnology to health care -often is overhyped as cure-alls or a potential danger. The concept debuted with the visionary notion that robots and electronic devices so tiny that dozens would fit across the width of a human hair could be built and put into the human body to treat disease and repair damaged organs. About 40 nano health care products actually are in use and nano-sized drugs, drug delivery devices,

imaging agents, and other products are on the horizon.

The authors first describe the history of nanomedicine, as well as many of the nanomedicine products available today. Then, they offer suggestions for how best to move a nanomedicine through the drug development process with risks and benefits in mind. Finally, they identify key factors critical for development of practical nanomedical technology that is safe and effective.

More information: Nanomedicine(s) under the Microscope, *Mol. Pharmaceutics,* Article ASAP. DOI: 10.1021/mp200394t

Abstract
Depending on the context, nanotechnologies developed as nanomedicines (nanosized therapeutics and imaging agents) are presented as either a remarkable technological revolution already capable of delivering new diagnostics, treatments for unmanageable diseases, and opportunities for tissue repair or highly dangerous nanoparticles, nanorobots, or nanoelectronic devices that will wreak havoc in the body. The truth lies firmly between these two extremes. Rational design of “nanomedicines” began almost half a century ago, and >40 products have completed the complex journey from lab to routine clinical use. Here we critically review both nanomedicines in clinical use and emerging nanosized drugs, drug delivery systems, imaging agents, and theranostics with unique properties that promise much for the future. Key factors relevant to the design of practical nanomedicines and the regulatory mechanisms designed to ensure safe and timely realization of healthcare benefits are discussed.

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