Nanotechnology for the Enhancement of Human Health

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The application of nanotechnology to the prevention and treatment of human diseases holds great promise, but has great hurdles. Nanomaterials must be biocompatible, non-toxic, functional in biologic (wet) conditions and well enough defined to pass the scrutiny of regulatory agencies. Early applications of nanomaterials will likely involve the development of medications that take advantage of unique aspects of nanostructures to achieve or enhance therapeutic activity. Examples will be provided for the design, synthesis and analysis of therapeutic nanomaterials where distinct kinds of attached molecules allow for unique therapeutic functions. These applications include antimicrobial compounds, drug and gene delivery and functional imaging. Concepts of future nanotechnology applications such as cellular engineering, human performance augmentation and genetic manipulation for the treatment of human disease will be addressed.