

Nanotechnology

The future appears to be much closer!

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Nanoshells



***Nanoshells kill tumor
cells selectively***

Reference: Jennifer West, Rice University

U.S. Demand for Nanotechnology Medical Products to Approach \$53 B in 2011

- **Adaptation of nanotechnology** is driven by the critical need for new or improved therapies and diagnostics for
 - cancer, *
 - heart diseases,
 - neurological disorders*
 - viral infections
- **Treatments based** on:
 - humanized monoclonal antibodies,
 - nanopolymers and nanoproteins

*The greatest short-term impact of nanotechnology in health care

Freedonia Group projections

- U.S. marketplace demand for nanotechnology medical products will increase 17% per year **to \$53 B in 2011 and > \$110 B in 2016.**
- The increasing flow of new products:
 - nanomedicines,
 - nanodiagnosics,
 - medical supplies and
 - devices

Advances in NT will contribute to medical diagnostic products:

- Nanosized monoclonal antibody labels and DNA probes will greatly enhance the speed, accuracy, capabilities and cost-effectiveness of **in vitro diagnostic testing, drug discovery and medical research procedures.**
- Nanoparticle formulations of **super paramagnetic iron oxide, gadolinium, perfluorocarbon and specialty polymers** will **broaden in vivo imaging** capabilities.
- Additionally, the development of **monoclonal antibody and nanomaterial vaccines** and, to a lesser extent, **controlled-release nutritional preparations** will create a large **preventive medicine** market.

Advances in NT will contribute to medical diagnostic products: (cont.)

- Nanomaterials as active ingredients of burn dressings, bone cement, bone substitutes, and dental repair and restoration products.
- By 2016, **nanoimplants** will be widely employed in orthopedic procedures and begin to gain experimental uses in tissue and neuron regeneration.
- By 2021, applications that extend into most areas of critical and chronic care.

Future is here!

- All indications are pointing to explosive growth
- Hype is not going away!
- Trade barriers needs to be minimized
- Standards development and their harmonization is a major challenge