

# NANO MEDICINE

*Dr. SAAD .S. HaMadi*

**Smalley had jump-started the entire field back in 1985, promise as discovered a novel form of carbon that showed promise as a raw material for miniature devices**

**“Twenty years ago,” he told the subcommittee, “ without even this crude chemotherapy I would already be dead. But twenty years from now, I am confident we will no longer have to use this blunt tool. By then, nanotechnology will have given us specially engineered drugs... that specifically [ target ] just the mutant cancer cells in the human body, and [leave] everything else blissfully alone... I may not live to see it. But , with your help, I am confident it will happen. Cancer at least the type that I have will be a thing of the past”..**

**Smalley was referring to a new discipline known as nanomedicine: the science of diagnosing, treating and preventing disease with the use techniques of novel molecular from “smart drugs” that target specific organs or cells, to miniature robots that can ferry materials into and out of cells, and even enter cell nuclei to repair damaged genes**

**The prefix nana- comes from the Greek word nanas, or “dwarf,” and means one-billionth ( $10^{-9}$ ) of something: nanotechnology operates at the scale of a nanometer, about the width of six carbon atoms.**

**1- One innovation is the so-called smart drug. Unlike most of today, medicines, which enter the bloodstream and travel around the body indiscriminately, smart drugs act selectively targeting specific cells (such as tumor cells) or becoming active only under certain circumstances.**

**2- One novel drug molecule developed by the pharmacologist Yoshihisa Suzuki of Kyoto University in Japan releases antibiotic only in the presence of an infection.**

**Nanomedicine and in particular, nanorobotics, can sound like science fiction something out of Fantastic Voyage, the classic 1966 movie in which a microscopic submarine enters the bloodstream of a patient on a mission of repair. But many experts put great stock in nanomedicine.**

**There are two main approaches to building at the nanometer scale: positional assembly and self-assembly.**



**Although early mechanical nanorobots might be made of Mitch as nanorods and connectors, they might also be built out of DNA. The idea of using the stuff genes are made of as a nonsocial building material has been pioneered by Nadrian C. Seaman, a chemist at New York University.**

## Nanotechnology in Medicine (Nan medicine)

**Nanomedicine** is the medical use of molecular-sized particles to deliver drugs other substance to specific cells in the human body . Engineering particles to way allows detection and/ or treatment of disease or injuries within the tag thereby minimizing the damage to healthy cells in the body.

**Halas reported in the journal cancer letters that the nanoshells' ability to capture light and convert it to heat has in lab tests on mice, destroyed tumors.**

**The researchers from Harvard medical school and the Massachusetts institute of technology developed a range of nanoparticles (around 150nm in diameter) made of the biodegradable polymer poly(d,l-lactide-co-glycolic acid) and poly (ethylene glycol). They encapsulated the chemotherapy drug docetaxel in these nanoparticles and attached artificial RNA strands known as aptamers to the surface of each particle**

**The success of bone graft depends on the ability of the scaffold to assist the natural healing process. Artificial bone scaffolds have been made from wide variety of materials, such as polymers or peptide fiberers but they have a number of drawbacks, including low strength and the potential for rejection in body.**

**"Compared with these scaffolds, the high mechanical strength, excellent flexibility and low density of carbide nanotubes make them ideal for the production of lightweight, high-strength materials such as bone.**

**"This research is particularly notable in the sense that it points the way to a possible new direction for carbon annotate applications, in the medical treatment of broken bones".**

**Interactions of these artificial materials with the systems of the human body are very important factors in determining clinical use".**



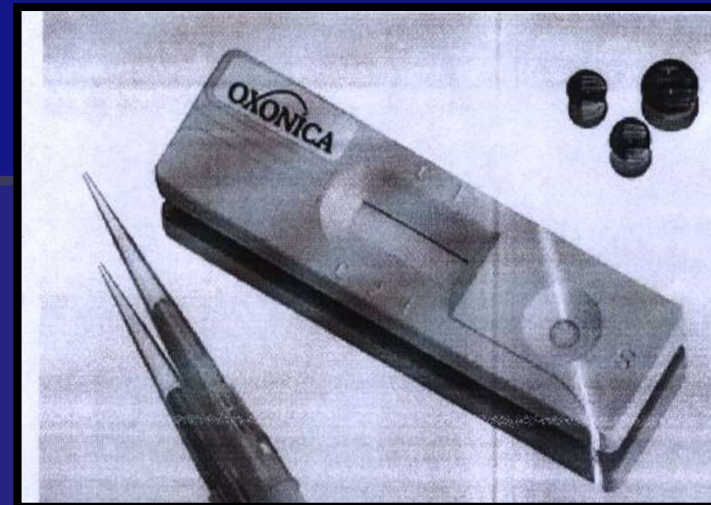
**Having completed dosing of its phase 1 trial, the early clinical data indicate that:**

**(1). cytImmune safely and systemically delivered TNF in humans far beyond concentrations attained in previous human studies and**

**(2) based on tissue biopsies from treated patients, Aurimmune accumulates in and around tumor sites, avoids uptake by the liver and spleen, and is essentially absent from surrounding healthy.**

**The evolution over the last two decades of the nanocrystals known as quantum dots has been the growth of the science to far-reaching biological application that will allow researchers to study cell processes at the level of ways to diagnose and treat cancers.**

**Oxonica pic (AIM: OXN) , a leading international nanotechnology group, today announce that it has received Nanotech Briefs Nano 50 Award for powerful diagnostics platform product**



**The idea of placing millions of autonomous nanorobots inside one is body might seem odd, even alarming. But the fact is that the body already teems with a vast number of mobile nanodevices, built not by human hands but by nature.**

**Odets that identify the location -  
of cancer cells in the body.**

**◆ Nanoparticles that deliver  
chemotherapy drugs directly  
to cancer cells to microbiology  
healthy cells.**

**◆Nanoshells that concentrate the heat from infrared light to destroy cancer center damage to surrounding healthy cells. For a good visual explanation of nanotechnology this slide.**

- ◆ **Nanotubes used in broken bones to provide a structure for a new bone material**

◆ **Nanoparticles that can attach to cells infected with various diseases and identify, in a blood sample, the particular disease.**



**◆ Nanorobots that can eliminate viral or bacterial infections and may be able reverse aging, allowing much longer lifetimes.**

<b>Company</b>	<b>Product</b>
<b>CytImmune</b>	<b>Gold nanoparticles for targeted delivery of drugs</b>
<b>Nucryst</b>	<b>Antimicrobial wound dressings silver nanotechnology</b>
<b>Nanobiotix</b>	<b>Nan particles for targeted delivery of drugs to diseased</b>
<b>Oxonica</b>	<b>Disease identification using gold nanoparticles</b>
<b>Nanotherapeutics</b>	<b>Nanoparticles for improving the performance of drug</b>
<b>Nanobio</b>	<b>Antimicrobial nanoemulsions for nasal delivery to fight the flu and colds and bacteria</b>
<b>Biodelivery Sciences</b>	<b>Oral drug delivery of drugs encapsulated in a nanocryst called a cochleate</b>
<b>NanoBioMagnetics</b>	<b>Magnetically responsive nanoparticles for targeted drug other applications</b>