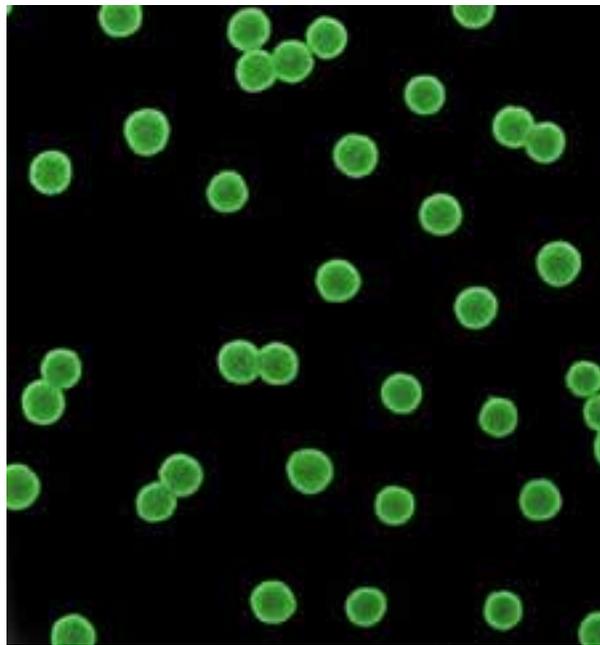


Intro to Nano: Nanomedicine

Where nanotechnology and medicine appear in the same sentence, you'll often hear futuristic tales of impossibly small robots that will one day voyage into our bloodstreams on search-and-destroy missions. Actually, nanomedicine is already with us, albeit somewhat less heroically, and has been for years.

Look no further than your local drugstore, where pregnancy tests rely on gold nanoparticles to reflect red light—or not—and thereby reveal the presence of pregnancy-related hormones in a woman's urine. While you're at the drugstore, you can also pick up sunscreen containing nanoparticles of zinc oxide or insoles infused with silver nanoparticles to kill bacteria.



Gold nanoshells, a possible cancer cure, shown at 15,000X magnification.

But the high hopes for nanomedicine extend far beyond the drugstore. Medicine and nanotechnology are a natural pairing because life itself is a nanoscale phenomenon. Where biology is concerned, the nanoscale is where the action is—amino acids, proteins, DNA, viruses—all are measured in nanometers. The study (and perchance the cure) of disease will increasingly take place where it begins—at the cellular and subcellular level.

The fact that nanomedicine operates at the same scale as our component proteins is cause for sobriety as well as excitement. If little is known so far about the potential for nanoscale medicines to heal, even less is known about their potential to harm. Future research will necessarily walk a careful line, pursuing our hopes for nanomedicine while addressing justifiable concerns.

Among the highest hopes for nanomedicine is nothing less than a cure for cancer. Equally promising is the possibility of extremely targeted and controlled drug delivery, using nanoscale encapsulation methods that are designed to release their medicine at just the right time and place. Nanostructures also seem destined to assist with diagnosis of disease, bringing improvements in imaging and detection of the body's subtlest biochemical signals.

But what, you ask, has nanomedicine done for us lately? Or more to the point, what will it do for us soon? The most intriguing developments in nanomedicine are still just that—under development.