

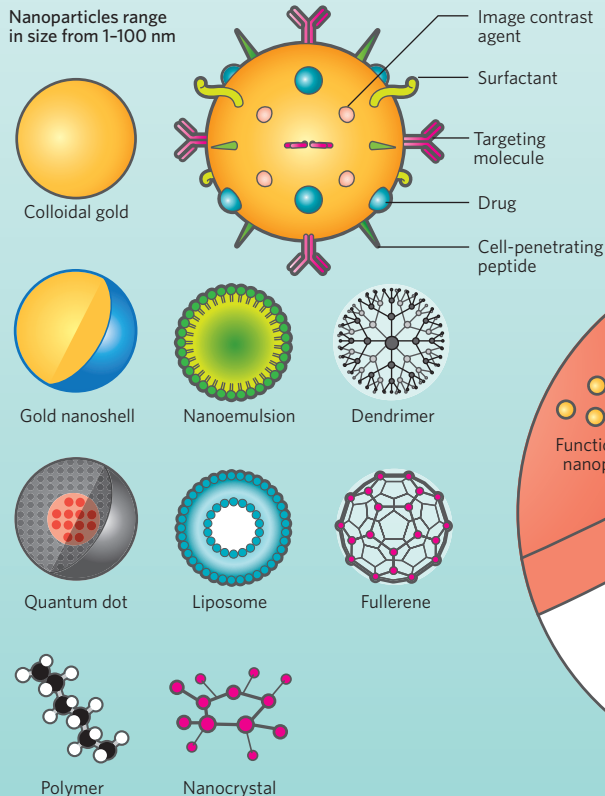
SWALLOWING THE SURGEON

Nanomedicines make use of the new physical properties that materials acquire when miniaturized. With suitable tinkering, the particles can be made ready recipients for an array of molecules including: therapeutic drugs, targeting molecules for cell-specific delivery, surfactants for manipulating the shape of the particle and keeping it in solution, and imaging molecules that track the location of particles in patients.

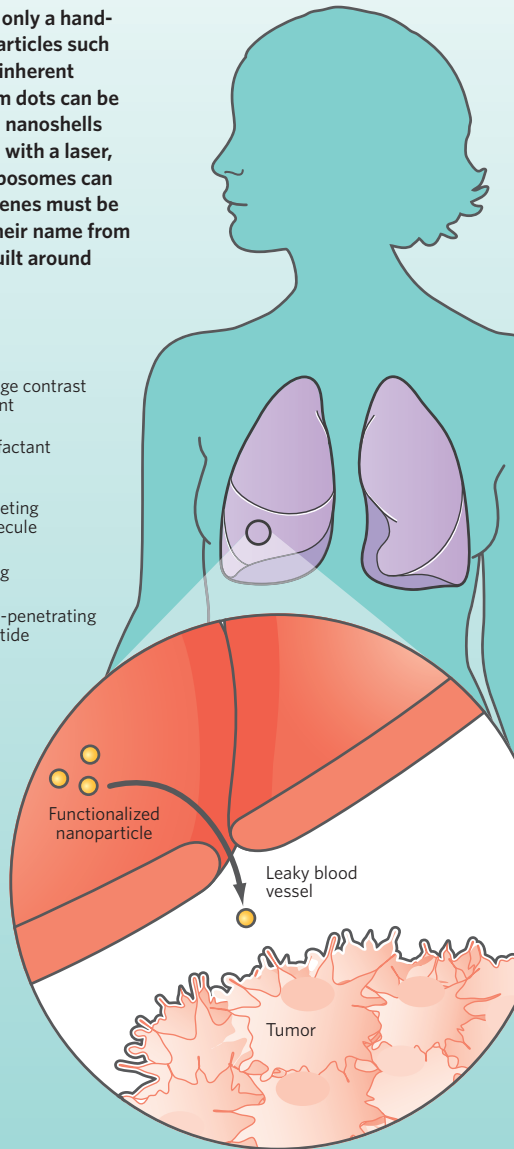
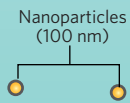
MIX AND MATCH

There is an almost endless variety of nanoparticles, but only a handful have found their way into biomedical applications. Particles such as quantum dots and gold nanoshells make use of their inherent physical properties once inside cells or tissues. Quantum dots can be used to light up specific tissues for surgeons, while gold nanoshells can enter cancer cells where they are selectively heated with a laser, killing tumors with high temperatures. Fullerenes and liposomes can carry cargo inside as well as on their surfaces, but fullerenes must be modified in order to stay in solution. Dendrimers take their name from their fractal-like branches of molecules, which can be built around drugs that might otherwise be insoluble.

Nanoparticles range in size from 1-100 nm



Red blood cell, diameter 8,000 nm



SMALLER IS BETTER

The blood vessels that grow throughout a tumor mass are generally leakier than vessels in the rest of the body. So researchers have designed nanoparticles just small enough to escape through those holes, targeting only the tumor tissue with drugs hitching a ride on their surfaces.