Nanotechnology Applied to Medicine

October 11, 2006

James Brien

Nanotechnology is essentially the science of building and/or manipulating things smaller than 100 nm in size. Typically, this involves manipulating things on the scale of atoms and molecules.

As a reference point, the head of a pin is approximately 1,000,000 nm across. A single human hair is 80,000 nm wide, and an average size virus is around 30-100 nm. Finally, a typical molecule is 1 nm, and a single atom is around 0.1 nm.

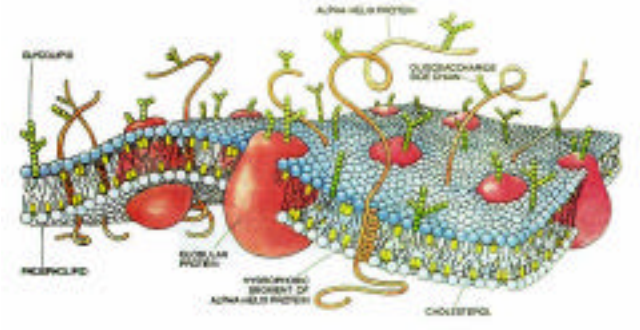
Applications of nanotechnology can be used in virtually every market. Research in nanotechnology has widespread benefits for everyone: from cutting-edge chip designers to large-scale industrial manufacturers. It has the potential ability to impact virtually every area of our lives.

Currently, there are several products that are already on the market that make use of nanotechnology. We are all familiar with the promise of stain and/or wrinkle free pants. There are also sun-block products that are transparent and work for longer periods of time. Perhaps less familiar is the use of nanotechnology in the "Jumbotron" lamps that can be seen in many sports stadiums. One possible application of nanotechnology is that of nanorobots.

These robots would have the advantage of being able to target individual types of cells and treat or destroy them. Ideally, they would allow physicians to treat disease effectively, without adverse side-effects.

The maximum size of these robots would have to be somewhere between 500-3000nm to fit through all of the capillaries of the human body.

Robots of this size would have the distinct advantage of being able to direct their attention to certain types of cells. Cells can be identified by unique glycolipid structures on the outer surface of their cellular membrane. Using this identifier, the nanobots can be designed to recognize these cells and destroy or treat them accordingly.



The end result being the complete destruction of that targeted cell. Once the robots have finished their job, they would be discarded similar to the rest of the bodily waste generated daily.

In order to avoid incorrect targeting, the manufacturing process has to be virtually perfect, and as always, potentially adverse immune responses have to be investigated.

While the technology is still far from being realized, it is perhaps one of the most promising applications of nanotechnology on the horizon.

Sources:

- http://en.wikipedia.org/wiki/Image:CellMembraneDrawing.jpg
- http://www.nano.gov/index.html
- http://en.wikipedia.org/wiki/Glycolipids
- http://glycoforum.gr.jp/science/word/glycolipid/GLD01E.html