



The Next Big Thing: Nanotechnology

Robots in Our Bodies?

JIM

I think, at the moment okay, certainly we're going to have more and more information going back and forward but are we going to imagine a world you know where every piece of information goes from here to there and a decision is made here by a process of that sends the information back to this point, or are we going to reach, and I believe that will be the initial thing that nano technology will achieve, perhaps simpler devices that are more autonomous, that they work out, you know, this is what we should do. The environment's bad here, let's change it, or whatever, and they are autonomous devices and probably nano technology, the first applications will be these simple devices, so information won't be shooting back and forward.

JACKIE

You mean it'll be biology taking over.

JIM

It'll be more, yeah.

HARRY

What's happening is that physics and chemistry and biology and even the theory in biology of how the brain works are all coming together in a very exciting day. I mean I really wish I could start all over again as a youngster and the modern scientists will have to understand or be at the middle between all these different areas, and they're now talking to each other.

COLIN

Peter, robots that are going to go into the body, autonomous devices to seek out pathogens or whatever?

PETER

I think we'll probably see something intermediate first. I think there's already some nano particles that can be introduced into the body perhaps, that would seek out cancerous cells, and then by producing free radicals around their surface they will destroy the cancerous cells. I think that is probably closer to reality.

COLIN

They have to identify the cells, they have to have some kind of sensor mechanism?

PETER

True, they'll have to have some sensor molecule on the surface, that can enable them to goad the cancerous cell. Perhaps they they'll identify that cancerous cells produce more lactate than normal cells and there will be a lactate sensitive molecule on the surface. It's got to be a functionalised nano particle, but when it gets there, it's got to change its functionality and start producing free radicals and destroying the cell, so....

COLIN

...sounds like a kind of artificial extension of the immune system, really, essentially.

JACKIE

Very targeted.

COLIN

Very targeted with exact molecular recognition, carrying literally the magic bullet.

PETER

Right, correct.

HARRY

Well living systems have already done it. So what we seen historically, that you know scientists have learned from what's been done before, and have gone on to achieve that and I think what you're saying over these little robots, well we already to some extent have that. I mean these, in the body they target particular areas, and you can see them moving around. Now what we have to do is to engineer the ones that are going to solve our medical problems and I think that's on.

JACKIE

But that's interesting though about engineering sorry, is that I mean you've said that how difficult it is to manufacture, I mean we're going to have to have different production systems. And it strikes me that really what you're saying is we really should be turning to biological systems to manufacture these new kinds of products that perhaps...

JIM

...well between this abiotic means non biological, and biological, that is where all the excitement lies and we will certainly be able to achieve the lower levels of biological function in the next you know number of years.

COLIN

I mean Peter can you envisage a new generation of nano drugs which actually consist of little manufactured devices, machines or whatever, which can target cells using the surface properties of those cells attached to them, and then achieve some interaction with the cell which might be therapeutic or killing the cell or whatever?

PETER

Yes I can, and I think whilst we're developing those we'll be using nano particles as biotags, biolabels to identify the cells or parts of the cells in the first instance. There's already a company in California producing quantum dots functionalised with different biomolecules for such a purpose and indeed it's part of my company's remit that we're developing these biotags. They have the advantage that they're small enough to enter into biological systems without perturbing them and yet they're more robust chemically than some of the organic molecules that have been used up to the present time for labelling. So I think once we've got used to the concept of labelling and identifying bits of cells or viruses or what, whatever, the natural next step is to start controlling it, and engineering it and, destroying or modifying.