

## Re: Genetically engineered micro-organisms to fight disease?

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In article <7kjie0pdj34ov327m4sjtr048avpb5bo0g@4ax.com>, klsk <laksdjk@jasjh.com> wrote:

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>*Gene therapy as I understand it, (I'm not a doctor of any kind, just an engineer)*

>*works by changing patients own gene to do some beneficial work.*

It works by extracting cells from a patient who lacks functional copies of a particular gene, using a virus carrier to insert a functional copy, propagating the transformed cells and then infusing them back into the patient, where they will ideally provide some of the missing functionality. This has to be repeated at intervals of months.

While there have been a few successes, they've unfortunately been only for a few rare genetic conditions that are particularly amenable to the technique. Several common and serious genetic diseases like muscular dystrophy, sickle cell anemia and cystic fibrosis are much less amenable to gene therapy so far.

>*I was thinking along the lines of creating a micro-organism (virus, bacteria, phage whatever) that homes in on cancer cells or whatever and destroys it. I assume changing ones own gene is more difficult and carries more risk.*

If only it were so easy to distinguish a patient's cancer cells from his normal cells! This is the goal of chemotherapy and other methods, especially the extensive efforts to develop immunotherapies for cancer. Immunotherapy, in which the patient's immune system is induced to attack the cancer, is very promising, but it's been promising for a long time, and never seems to get out of clinical trials. The immune system is capable of being exquisitely tuned to identify molecular markers, far more than any microorganism could be. There's substantial evidence that the immune system normally recognizes cancer cells and extirpates them, and it's only when this mechanism fails that the cancer can develop. Spontaneous remissions are rare but real, and one theory is that the immune system suddenly recognizes the abnormal cells and attacks them. Immunotherapies try to induce this mechanism.

> *Something*

> *like this would probably be easier to test externally.*

It would be tested in vitro, then in animals. Alas, many promising results in vitro fail in the vastly more complex milieu of a living animal, and others that work in a genetically defined mouse or rat with a uniform cloned cancer fail in the "wild" with genetically diverse humans and their unique cancer cell lines.

There has been talk of developing bacteriophages to attack pathogenic bacteria now that antibiotic resistance has become such an important problem, but there's the problem of the immune system attacking the phage much more successfully than it attacks the target bacteria themselves.

Your ideas are good, but the current state of the science and technology are not up to implementing them yet. While techniques are well established for introducing a gene into a bacterium so it will produce something useful like human insulin or growth hormone, and it's not too difficult to patch a human gene into an adenovirus and use it to insert that gene into human cells in vitro, creating a microorganism or virus to do something as complex as distinguishing a cancer cell from a normal cell and attack the one but not the other, simultaneously evading the immune system and not causing other damage, even if it mutates, is far below the horizon. It will be very interesting to see what happens over the next few decades.