

Will gene therapy make humans masters of own evolution?

Human genetic engineering is not new; it has been going on for a long, long time — naturally. Ancient viruses are really good at inserting themselves and modifying human gene code. Over millennia, constant infections would come to mean that 8 percent of the entire human genome is made up of inserted virus code. All this gene recoding of our bodies occurred under Darwin's rules, natural selection and random mutation. But nonrandom, deliberate human genetic engineering is new, and it is a big deal.

As of 1990, increasingly genetically modified humans walk among us. More and more gene therapies carry new instructions into our bodies and place them in the right spots; in so doing, they modify our most fundamental selves, our core, heretofore slow-evolving DNA. We are still in the very early stages of effectively hijacking viruses for human-driven purposes; just a few years ago it took a long time to identify and isolate a single faulty gene and figure out what was wrong, never mind finding a way to replace it with a properly functioning alternative. Early gene therapy focused on obscure, deadly orphan diseases like ADA-SCID (the immune disease that "Bubble Boy" had), adrenoleukodystrophy (say *that* five times fast), Wiskott-Aldrich syndrome, various leukemias, and hemophilia.

In theory the technique is relatively simple: Take a neutered virus, one that is engineered to not harm you but that readily infects human cells to ferry in new DNA instructions, write a new set of genetic instructions into the virus, and let it loose to infect a patient's cells. And ta?da! You have a genetically modified human. (Think of this as deliberately sneezing on someone but instead of giving them a cold, you give them a benign infection that enters their body, recodes their cells, and fixes a faulty gene.)

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