

LEE Sweeney guards a genetic fountain of youth. In his Pennsylvania laboratory, the elite biotechnologist is testing a muscle-building gene designed to fend off frailty in the elderly. Every day he fields phone calls and emails from people desperate to get their hands on his experimental gene vaccine. They are not nursing home patients too weak to walk, or sufferers of muscular dystrophy, but healthy young athletes planning to cheat their way to victory. They're willing to be treated and they don't care what the risk is.

"I explain we have only worked on mice and rats and are about to work on dogs, but they say that if it works on mice then they will be the human guinea pigs," Sweeney says. "I tell them there are possible side effects and they say they don't care. From what I can tell, most of them are weight-lifters and some are football players, who want to build up muscle mass. I explain that I'm not going to get involved."

Sweeney is not the only scientist being pestered by sports cheats who believe genetic implants will make them faster and stronger for longer than conventional drugs with little risk of detection by the doping police.

The Australian Sports Drug Agency's chief medical adviser Ken Fitch predicts cheats will hijack gene technology as soon as it becomes available to patients. "Today the best teams have the best sports doctors, nutritionists, physiothera-

rists and psychologists," he explains. "Tomorrow they're likely to have the best molecular biologists."

As scientists crack the human genetic code, athletes could soon be injecting genes for strength, speed and stamina or applying cloned stem cells to mend broken bones and torn ligaments. Some day, sports fans might cheer on made-to-order sports stars, genetically engineered in the womb for athletic prowess.

Gary Wadler, who advises the White House Office of National Drug Control Policy on sports doping in the US, predicts Olympic athletes will be cheating with gene implants within a decade. Will there be cheating in Athens? "I don't know," he says. "In Beijing 2008? Probably. By 2012? Absolutely."

Worldwide, scientists are using human subjects in roughly 500 trials of gene technology. At the University of Pennsylvania, Sweeney is testing a synthetic gene that stimulates production of IGF-1, a precursor to human growth hormone. The muscles of mice injected with the gene grow 20 per cent without any exercise and injured mice recover faster.

"There were some Australians who contacted me, thinking it might be good for their racehorses in terms of building their leg muscles and healing tears," Sweeney recalls. "I told them it probably would be useful, but it's a long way off before they'll be able to obtain it."

Sports cheats already inject the drug IGF-1 into their blood, risking severe side effects such as an enlarged heart and prostate cancer. An IGF-1 gene that confines production of IGF-1 to target muscles theoretically would be more efficient, safer and — crucially — untrace-

Genetic fast track to sporting greatness

► **Designer genes:** Sports cheats can hijack the biotechnology boom in many ways. Genes can be injected into the body, transmitted through genetically engineered viruses or implanted via stem cells that can grow into various types of body cells.

► **Stamina:** A synthetic gene that triggers the natural production of erythropoietin (EPO) boosts the number of red blood cells that carry oxygen through the body. Designed to relieve haemophilia and anaemia, EPO genes could give athletes greater endurance. Another gene, tested on patients at risk of losing a limb due to constricted blood vessels, promotes production of vascular endothelial growth factor, which widens blood vessels. Athletes might use the gene to increase the flow of blood to their muscles.

able in a standard doping test. Rather than being an artificial additive, which is detectable, the introduction of a gene becomes part of a human's make-up.

Another experimental gene, intended for sufferers of haemophilia and anaemia, triggers the natural production of erythropoietin (EPO). Doping with EPO is rife in endurance sports such as cycling, swimming and skiing because it gives athletes greater stamina by boosting their levels of oxygen-bearing red blood cells. Now that most sports have introduced blood tests to detect artificial EPO, sophisticated gene technology is

► **Strength:** A gene that activates production of IGF-1, a precursor to human growth hormone, is being trialled to help victims of muscular dystrophy and counter muscle degeneration in the elderly. Athletes might inject the genes to boost muscle size and strength.

► **Injury:** Scientists have used stem cells to grow human heart muscle cells, nerve cells, bone, cartilage, skin and skeletal muscle. Athletes might use the same techniques to repair injured muscles and organs or to enhance them.

► **Designer athletes:** A swimmer engineered to have Ian Thorpe's feet; a batsman with the reflexes of Don Bradman; a runner with the speed of Cathy Freeman? Scientists hope to genetically manipulate embryos to prevent inherited disease — a small step from tinkering with genes for intelligence, beauty or athletic prowess.

even more tempting to the cheats.

International Amateur Athletics Federation vice-president Arne Ljungqvist is well-versed on the extremes some sports stars will go to make it to the top — and stay there. As a member of the International Olympic Committee's medical commission, Ljungqvist was amazed to see three Olympic athletes nabbed for doping with a new drug, novel EPO stimulant protein, at the 2002 Winter Games in Salt Lake City.

"The drug was launched in October last year and by February it was with athletes," he laments. "We have to be

prepared that therapy as a medical misused. We know to test it long before clarified as effective the ambition to boost cost and they take

Geneticist The chairs the US Health's advisory nant DNA, fear money may be lost technologists and

"That combine sports money) success will be some attention the very rigorous procedures." Fitch transfer is done in be done openly, review powers bro not be done in se technologies are n fully developed —

The World Anti-lished in the run- Olympic Games, dopers by paying markers that implanted genes urine test. Govern movement and sp given WADA \$US in research funding movement allowed get away from it in has been playing it admits WADA cha

Found predicts sports may accept letes' use of gene t Olympic Games