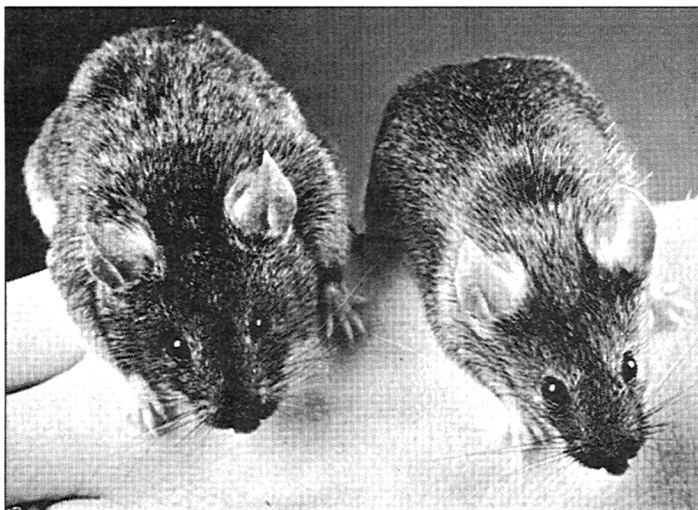


**One buff bull:** Belgian Blue cattle have a naturally occurring genetic mutation that makes them more muscular.

*The New England Journal of Medicine*

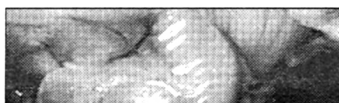
# MUTANT MUSCLE



By Keith Weller, Johns Hopkins Medicine

**Mighty mouse:** Mice have been genetically engineered to have muscles twice the normal size and half the fat.

**Discovery may benefit humans**



## A controversy in its infancy

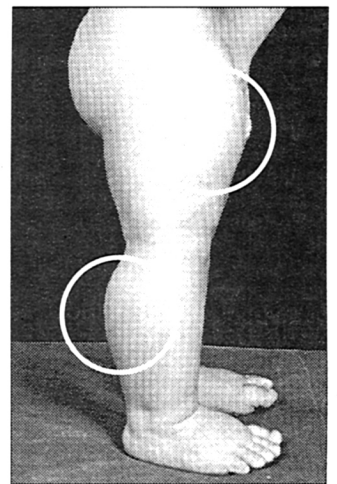
The possibility of people naturally — or artificially — endowed with double the average number of muscle fibers has enormous implications for competitive sports, says scientist Se-jin Lee of Johns Hopkins University.

Lee is researching a genetic mutation, found in a German baby, that facilitates double muscle growth. Wyeth Pharmaceuticals is working on a drug that could one day have the same effect.

Gary Wadler of New York University School of Medicine, a member of the World Anti-Doping Association, says people in the field are already thinking about it.

"Historically, there are those who are determined to take the best of science and abuse it for illicit purposes, and doping is one such purpose. Anything that potentially influences human performance is fair game," Wadler says.

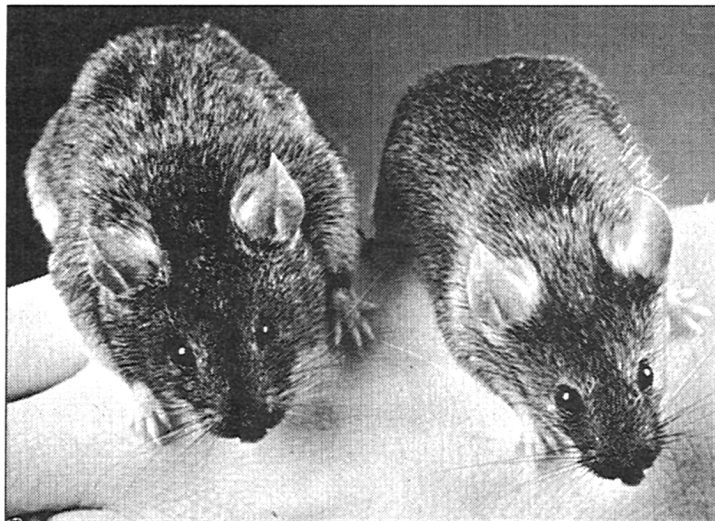
But whether athletes naturally endowed with double muscle



*The New England Journal of Medicine via AP*

**German baby:** Genetic mutation has blocked production of a protein that limits muscle growth.

...come to admit" looking at body



By Keith Weller, Johns Hopkins Medicine

**Mighty mouse:** Mice have been genetically engineered to have muscles twice the normal size and half the fat.

## Discovery may benefit humans with wasting diseases

By Elizabeth Weise  
USA TODAY

Somewhere, perhaps in the next cubicle or maybe at the gym, there's someone — and maybe quite a few someones — who does a mean Charles Atlas imitation without even trying.

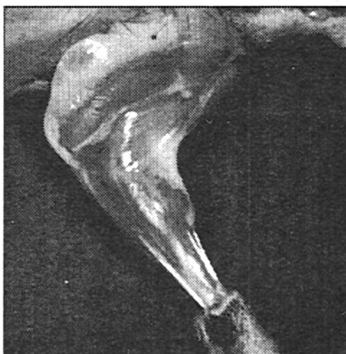
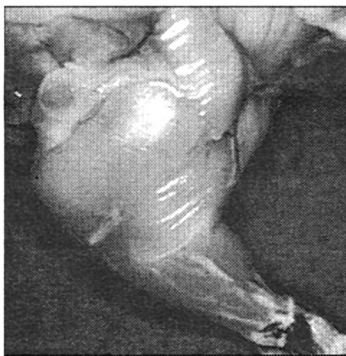
These individuals are lean and extremely muscular no matter how little they exercise or how much they eat. And scientists want very badly to find them.

That's because of last week's announcement in *The New England Journal of Medicine* of the discovery of a German child who's the first known human example of a "double-muscling" genetic mutation well known in mice and cattle.

And if it exists in one child, it is likely thinly scattered throughout the population. These people could help scientists develop treatments to fight the body wasting that cancer and AIDS patients endure. Such treatments could make the elderly stronger and give strength, and time, to people with muscular dystrophy.

The finding has galvanized scientists who research muscle development and disease. "If there's a large group of people out there who've essentially had this done to them naturally, then we'll know what (the mutation) does and how it affects them," says Se-jin Lee, a professor of molecular biology and genetics at Johns Hopkins University who co-authored the research paper.

Pat Furlong believes she may already have met a child with double the number of muscle fibers. Furlong lost two sons to a form of muscular



By Keith Weller, Johns Hopkins Medicine

**Dissected:** The muscular leg on the top is from a mouse that didn't produce myostatin.

dystrophy called Duchenne's. When her boys took part in a clinical trial in the 1980s, there was one little boy among the patients who stood out.

"You know how some football players are so muscle-bound that they lumber? He lumbered," she said from her home in Middletown, Ohio, where she now directs Parent Project Muscular Dystrophy.

The disease causes an inexorable weakening of the muscles, resulting in death by the late teens. But if someone with muscular dystrophy were born with double the normal number of muscle fibers, that weakening might take longer. And Furlong remembers that the little boy she's now trying to track down was still playing basketball when the others

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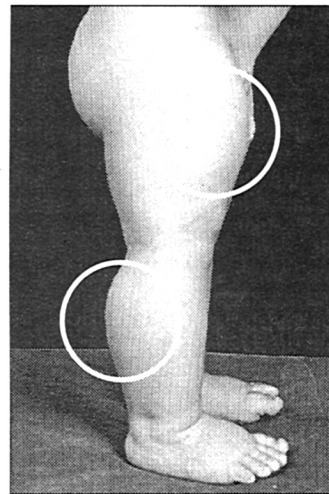
"Historically, there are those who are determined to take the best of science and abuse it for illicit purposes, and doping is one such purpose. Anything that potentially influences human performance is fair game," Wadler says.

But whether athletes naturally endowed with double-muscling would be cheating isn't so clear. Sports-oversight bodies may have to decide whether it's an unfair advantage or simply part of the distribution of what's normal. "That is what sports, in many ways, are all about. To maximize what you were endowed with, as long as it's not artificial," Wadler says.

People who think they may have the double-muscle mutation are e-mailing neurologist Markus Schuelke in Germany and asking to be tested. "They're very muscular without training," he says.

Schuelke prefers that they be referred by their doctor. Meanwhile, Lee is collecting names for future studies.

"I've spent more time than I



The New England Journal of Medicine via AP

**German baby:** Genetic mutation has blocked production of a protein that limits muscle growth.

care to admit" looking at body-building magazines for people who might carry the mutation, he says.

That's exactly where H. Lee Sweeney, chair of the physiology department at the University of Pennsylvania, thinks those with the mutation are to be found.

He was surprised that it was initially found in a child. "I thought they'd find it in world-class weight lifters, especially ones with a family history of strength."

That was the case in the German boy's family. The mother was a professional athlete, and her brother, father and grandfather were unusually strong. No information about the father's family is available.

were having trouble walking.

"Maybe I'm crazy. But his legs looked like the picture in *The New England Journal*," she says. "You spend your time trying to figure out how you can buy another five more minutes with your kids, and this may certainly pave the way."

That hope springs from a serendipitous bit of journal reading by a German neurologist named Markus Schuelke. Five years ago, he was called in to see a newborn who was having fits of twitching. When Schuelke, who is a professor of molecular biology at Charité University Medical Center in Berlin, saw the baby, he was struck by the pronounced muscling in his arms and legs.

The child turned out to be healthy, and the twitching went away on its own. But Schuelke had recently read an article by Lee about a mutation found in mice that caused production of a protein called myostatin to be turned off. It started him thinking.

Myostatin puts a brake on muscle development in the womb and muscle growth after birth. Mice with the

gene that shuts off myostatin were twice as muscled as normal mice, with half the fat. There are also several cattle breeds that carry the mutation and are exceptionally well-muscled and lean.

"We just thought it might be worthwhile testing" the baby, says Schuelke. "We found the mutation."

Finding people whose myostatin production is naturally shut off is important because they will help scientists see if the blockage is safe long-term, says H. Lee Sweeney, chair of the physiology department at the University of Pennsylvania.

"It might put an excessive burden on the cardiovascular system," Sweeney says. "On the other hand, as you get old, your muscles get weaker. Maybe interfering with myostatin action would make you stronger and more able to get around."

Wyeth Pharmaceuticals is working on a drug to block myostatin production, but it is "years from fruition," says spokesman Douglas Petkus.