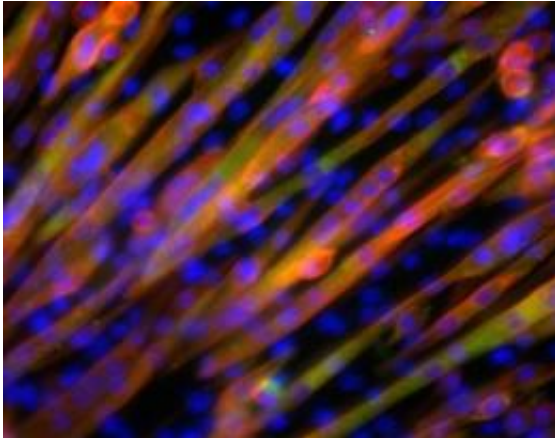


# Scientists turn stem cells into pork

15 January 2010, By MARIA CHENG , AP Medical Writer



In this handout photo made available on Friday Jan. 15, 2010, a photomicrograph of muscle tissue is seen. The muscle fibers are seen diagonally from lower left to upper right. The blue dots are the nuclei of the cells, the yellow color is the result of an overlay (green and red) of two of the most important proteins in skeletal muscle, actin and myosin. Dutch scientists have been growing pork in a laboratory, call it pork in a petri dish, a technique to turn pig stem cells into strips of meat that scientists say could one day offer an environment-friendly alternative to raising livestock. (AP Photo/Eindhoven University of Technology/TUE)

(AP) -- Call it pork in a petri dish - a technique to turn pig stem cells into strips of meat that scientists say could one day offer a green alternative to raising livestock, help alleviate world hunger, and save some pigs their bacon.

Dutch scientists have been growing pork in the laboratory since 2006, and while they admit they haven't gotten the texture quite right (the lab-grown meat has the consistency and feel of scallop), they say the technology promises to have widespread implications for our [food supply](#).

"If we took the [stem cells](#) from one pig and multiplied it by a factor of a million, we would need one million fewer pigs to get the same amount of meat," said Mark Post, a biologist at Maastricht University involved in the In-vitro Meat Consortium,

a network of publicly funded Dutch research institutions that is carrying out the experiments.

Several other groups in the U.S., Scandinavia and Japan are also researching ways to make meat in the laboratory, but the Dutch project is the most advanced, said Jason Matheny, who has studied alternatives to conventional meat at the Johns Hopkins Bloomberg School of Public Health in Baltimore and is not involved in the Dutch research.

In the U.S., similar research was funded by NASA, which hoped astronauts would be able to grow their own meat in space. But after growing disappointingly thin sheets of tissue, NASA gave up and decided it would be better for its astronauts to simply eat vegetarian.

To make pork in the lab, Post and colleagues isolate stem cells from pigs' [muscle cells](#). They then put those cells into a nutrient-based soup that helps the cells replicate to the desired number.

So far the scientists have only succeeded in creating strips of meat about 1 centimeter (a half inch) long; to make a small pork chop, Post estimates it would take about 30 days of [cell replication](#) in the lab.

There are tantalizing health possibilities in the technology.

Fish stem cells could be used to produce healthy omega 3 fatty acids, which could be mixed with the lab-produced pork instead of the usual artery-clogging fats found in livestock meat.

"You could possibly design a hamburger that prevents heart attacks instead of causing them," Matheny said.

Post said the strips they've made so far could be used as processed meat in sausages or hamburgers. Their main problem is reproducing the protein content in regular meat: In livestock meat, protein makes up about 99 percent of the product;

the lab meat is only about 80 percent protein, giving it the softer, flimsier consistency of a scallop. The rest is mostly water and nucleic acids.

None of the researchers have actually eaten the lab-made meat yet, but Post said the lower protein content means it probably wouldn't taste anything like pork.

The Dutch researchers started working with pork stem cells because they had the most experience with pigs, but said the technology should be transferable to other meats, like chicken, beef and lamb.

Some experts warn lab-made meats might have potential dangers for human health.

"With any new technology, there could be subtle impacts that need to be monitored," said Emma Hockridge, policy manager at Soil Association, Britain's leading organic organization.

As with genetically modified foods, Hockridge said it might take some time to prove the new technology doesn't harm humans. She also said organic farming relies on crop and livestock rotation, and that taking animals out of the equation could damage the ecosystem.

Some experts doubted lab-produced meat could ever match the taste of real meat.

"What meat tastes like depends not just on the genetics, but what you feed the animals at particular times," said Peter Ellis, a biochemistry expert at King's College London. "Part of our enjoyment of eating meat depends on the very complicated muscle and fat structure...whether that can be replicated is still a question."

If it proves possible, experts say growing meat in laboratories instead of raising animals on farmland would do wonders for the environment.

Hanna Tuomisto, who studies the environmental impact of food production at Oxford University said that switching to lab-produced meat could theoretically lower greenhouse gas emissions by up to 95 percent. Both land and water use would also

"In theory, if all the meat was replaced by cultured meat, it would be huge for the environment," she said. "One animal could produce many thousands of kilograms of meat." In addition, lab meat can be nurtured with relatively few nutrients like amino acids, fats and natural sugars, whereas livestock must be fed huge amounts of traditional crops.

Tuomisto said the technology could potentially increase the world's meat supply and help fight global hunger, but that would depend on how many factories there are producing the lab-made meat.

Post and colleagues haven't worked out how much the meat would cost to produce commercially, but because there would be much less land, water and energy required, he guessed that once production reached an industrial level, the cost would be equivalent to or lower than that of conventionally produced meat.

One of the biggest obstacles will be scaling up laboratory meat production to satisfy skyrocketing global demand. By 2050, the Food and Agriculture Organization predicts meat consumption will double from current levels as growing middle classes in developing nations eat more meat.

"To produce meat at an industrial scale, we will need very large bioreactors, like those used to make vaccines or pasteurized milk," said Matheny. He thought lab-produced meat might be on the market within the next few years, while Post said it could take about a decade.

For the moment, the only types of meat they are proposing to make this way are processed meats like minced [meat](#), hamburgers or hot dogs.

"As long as it's cheap enough and has been proven to be scientifically valid, I can't see any reason people wouldn't eat it," said Stig Omholt, a genetics expert at the University of Life Sciences in Norway. "If you look at the sausages and other things people are willing to eat these days, this should not be a big problem."

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