Would you eat printed meat?

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3D printing is a hot topic issue in the tech world with everything from printed guns to printed arms making headlines around the world.

The newest 3D item to hit the scene? Printed meat.

Modern Meadows [1],a firm looking to develop “high value, food grade animal protein” using 3D printers, received a $350,000 grant from Breakout Labs, an organization created by Pay-Pal founder Peter Thiel that promotes scientific innovation. Breakout labs also granted money to 3Scan to develop 3D digital reconstruction of brain tissue and several other medicine--meets --technology ventures.

Essentially, a designer will create the blueprint for a product, whether it’s a titanium hip or a plastic fish. She can then choose what materials to use, usually a plastic or metal. (or pasta dough) The printer then slices that design into cross sections and begins, layer by layer, to build or “print” the object. The objects can be incredibly complex like a human skull or simple like a ball. There has even been some chatter about printed robotics that move after they’re printed.

This isn’t the first time 3D printed food has made the news. Google’s Exhibition Chef, Bernard Faucher [2]is using a 3D printer to make his pasta creations. Faucher puts pasta dough and veggies in the printer and he is able to control temperature and time, in addition to design, to print customized pasta shapes.

There has also been some interest in the medical world [3] about 3D printers with the ability to print skin, organs, bone, or anything made of a living cell. The medical applications for a product like this are slowly being realized and put into play.

Obviously, this has great promise for the medical and industrial fields. Imagine a world where you could print entire body parts in a few hours or car frames in a day.

The possibilities are limited only by the imagination.

But, as a self-proclaimed major cheeseburger aficionado, I'm having a little trouble with printed meat.

While I recognize the environmental considerations—livestock farms take a massive toll on land and resources—and social concerns, imagine being able to "print" food in 3rd world countries; getting this "meat" through the FDA may be quite a battle and a little unnerving. Logically, I know that this product could, if developed correctly, change the world.

So what's the difference between the pasta and the meat?

This is different, as the creators are literally designing the meat from the cells up. At this point, Modern Meadows is attempting to create an edible prototype less than 1 inch long. The company [4]hopes to show that their product will demonstrate "bio-printing-based in vitro meat production is feasible, economically viable and environmentally practical."

As for how they're going to do it, the team has submitted an explanation to the USDA:

"Bio-ink units composed of 3 cell types (muscle cells, fibroblasts, adipocytes) will be prepared and deposited in three-dimensional (3D) sheet arrangement, using agarose as support material (but not part of the final construct). Solid sheets will form during the post-printing fusion of the bio-ink units. We will systematically vary the ratios of the three cell types to optimize the quantity of fibroblasts necessary for sufficient extracellular matrix (ECM) production for easy-to-handle sheet formation…. Cylindrical units of 2 cm length and 500 micrometer in diameter will be printed side by side into an agarose mold using the NovoGen MMX Bioprinter. Upon post-printing fusion of the cylindrical bio-ink units, sheets will be transferred into the bioreactor and subjected to chronic (i.e. persistent) low frequency stimulation. The amplitude and frequency of the simulation will be varied to determine which parameters produce mature aligned muscle fibers. Electric stimulation will be evaluated by its effect on the biophysical (Water holding capacity (WHC), pH, tenderness) and biochemical (proximate analysis) properties of the bioprinted strip. These properties will be measured and compare to values obtained for meat. "

(You can read their entire proposal for the USDA, here [5])

The 3D meat printing idea follows the theory if people can replicate living cells from 3D printers for organs, then printing what's essentially dead meat (yum!) should be a possibility as well. It eliminates the need for slaughterhouses and also eliminates the waste aspect of meat production. So, if you don't eat the bone or the thigh, then don't print it.

This isn't a new idea. Replicated meat has made appearances everywhere from science fiction novels to Star Trek, but it's still a little unnerving to think someone is essentially "building" the meat.

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