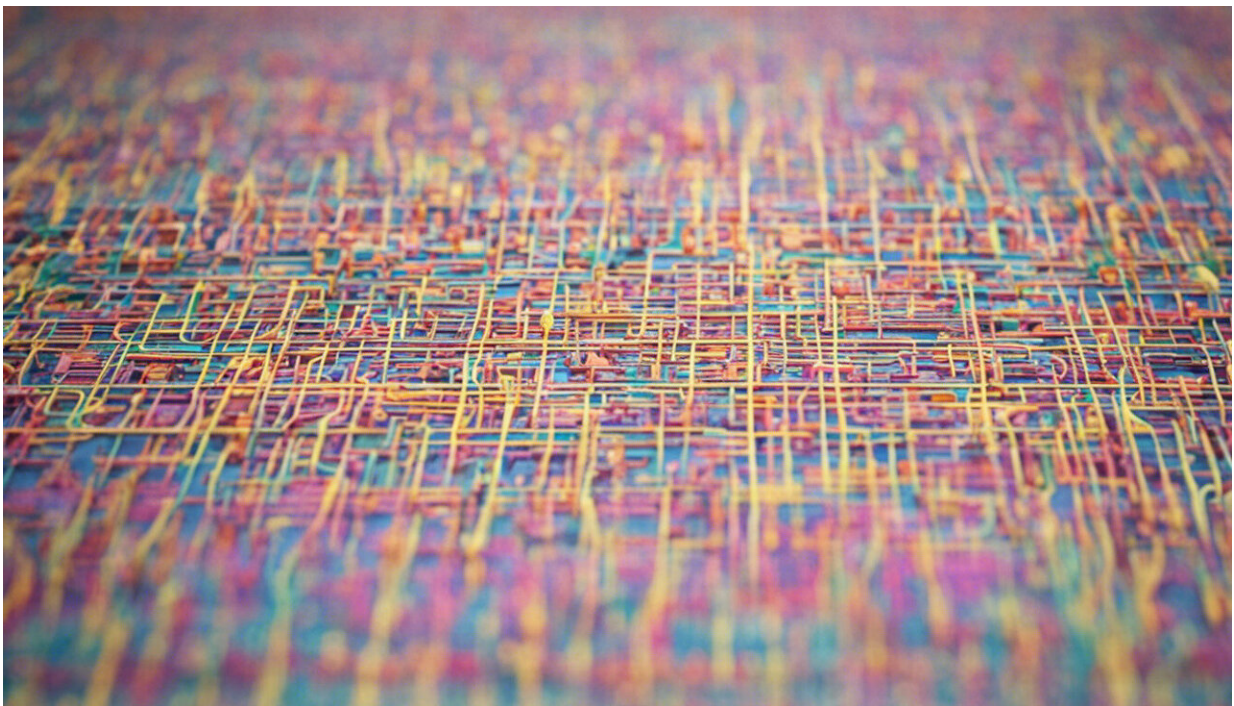


# How 3-D food printers could improve mealtimes for people with swallowing disorders

May 2 2017, by Bronwyn Hemsley, Abbas Kouzani, Russell Oliver, Scott Adams, Stuart Palmer And Susan Balandin

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Credit: AI-generated image ([disclaimer](#))

It's hard to imagine food prepared in a printer can be tasty and look good. But a presentation at a 3-D food printing [conference today](#) shows how printed foods could improve the lives of people with swallowing

disorders. These people are only able to eat foods textured in a particular way, which often don't look very nice on the plate.

But while 3-D printing may make foods safer and more appealing to the eye, we still don't have enough evidence to ensure this is the case.

## **What are swallowing disorders?**

Swallowing disorders, or [dysphagia](#), affect around [8% of the world's population](#). This includes [people](#) with physical or intellectual disability, cancers of the mouth or throat, neurological conditions such as stroke or Parkinson's disease, and most people living in aged care.

A swallowing disorder can affect nutrition, breathing and quality of life including [mental health](#). Speech pathologists often recommend people with dysphagia eat [texture-modified foods](#), which include [soft and bite-sized, minced, moist and pureed foods](#). They may also advise people to avoid stringy, chewy, crumbly, crunchy and solid foods.

Unfortunately, even well-made texture-modified foods can [look unappealing](#). This affects the person's enjoyment of their meal, and leads to reduced appetite and eating less food. People with dysphagia also report feeling angry and depressed about a [loss of choice and control over the foods they eat](#).

This is where 3-D food printing might help. Printed food could improve the visual appeal, as well as the safety, of texture-modified foods.

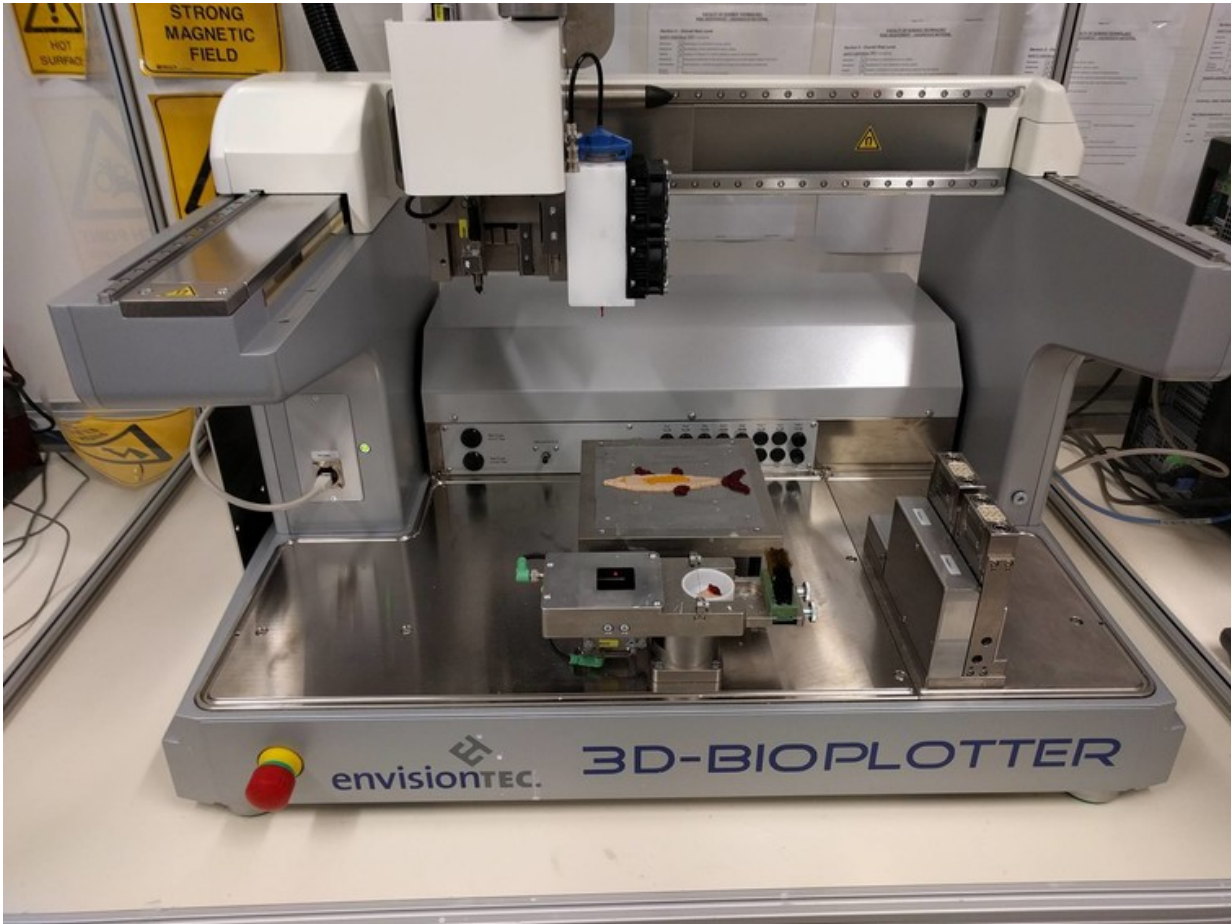
It could also give people with dysphagia some control by allowing them to be part of the design and creation of the 3-D-printed food. People in residential care could help design foods to be printed for them in-house.

## How could 3-D printing help?

Printing food starts with having an idea of a food in a particular shape for printing. The shape is then designed on computer-assisted design software, and translated into a pattern for the printer. The food material is prepared, loaded into the printer, printed, and cooked afterwards if necessary.

At the moment, 3-D food printing is a [futuristic](#) venture in the [research and development](#) stage. But [improved technologies](#) mean more food textures, flavours and colours can be combined as they are printed into edible shapes.

3-D food printing also allows layering of different tastes, textures and colours into the desired shape, without needing food additives.



3D printing a tuna fish using tuna, beetroot and pumpkin. Credit: Prof Abbas Kouzani lab, CADET 2016

Researchers have printed a variety of regular foods. Among these are pizza, pasta, hamburgers, chocolate, cookies and even a [pavlova](#) using beaten egg meringue. [Pureed foods](#) have also been printed.

Our team of engineers and speech pathologists recently designed and printed a [3-D tuna fish](#). It consisted of layers of pureed tuna for protein in the fish body, pureed beetroot for purple vegetable fins, and pureed pumpkin for an orange eye and gills.

If people with dysphagia are given food of the wrong texture, or are not provided with appropriate [mealtime assistance](#), they face an increased risk of choking. In some cases this can be [fatal](#).

3-D food printing could reduce such risks for people with dysphagia. If the printing [produced modified food textures consistently](#) to [international standards](#), it could improve the quality of texture-modified foods.

## Is it as good as it sounds?

Given the hype and [potential benefits](#) of 3-D food printing, there's a startling lack of evidence on the experiences of people with dysphagia eating these foods.

We don't know if these foods would be acceptable or safe for people to swallow. The [European Food Safety Authority](#) has warned there are no rigorous examinations of the safety of food made by 3-D printing.

And a recent [European report](#) details an alarming inventory of potential hazards and subsequent risks of 3-D printed foods. These include forming [heat-generated compounds](#) that [could be hazardous](#) to health; microbiological risks that could come from a contaminated or dirty printer cartridge; physical risks such as printer fragments breaking off; and food fraud through the marketing of sub-standard raw materials in cartridges.

The authors of the [report](#) also found no scientific publications or guidelines on the food safety aspects of 3-D food printing. So it's not known how these risks might be reduced or removed in preparing 3-D foods for people with dysphagia.



## We need to know more

People with dysphagia and their supporters need to be included in the design of 3-D-printed foods. Modifying food textures by 3-D printing without consulting with them, or considering the [food's](#) safety, [could do more harm than good](#).

In the absence of convincing evidence, it remains to be seen whether 3-D [printing](#) texture-modified foods will help people with [dysphagia](#).

*People who have trouble swallowing should seek medical advice and [find a speech pathologist](#). For those providing mealtime assistance to people with dysphagia, first aid courses are recommended. First aid facts can be found [here](#), and advice on responding to choking [here](#).*

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