



Engineered whole cut meat-like tissue by the assembly of cell fibers using tendon-gel integrated bioprinting



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<https://researchmap.jp/read0093431?lang=en>

Abstract

Researchers of Osaka University used 3D-bioprinting to create structured cultured meat like the complex texture of Wagyu beef, which may provide an environmentally friendly and sustainable method for producing cultured meat alternatives.

Significance of the research and Future perspective

A team of scientists led by Osaka University have used 3D-Printing to create synthetic meat that looks more like the real thing. "Using the histological structure of Wagyu beef as a blueprint, we have developed a 3D-printing method that can produce tailor-made complex structures, like muscle fibers, fat, and blood vessels," lead author Dong-Hee Kang says. To overcome this challenge, the team started with two types of stem cells, called bovine satellite cells and adipose-derived stem cells. Under the right laboratory conditions, these "multipotent" cells can be coaxed to differentiate into every type of cell needed to produce the cultured meat.

Individual fibers including muscle, fat, or blood vessels were fabricated from these cells using bioprinting. The fibers were then arranged in 3D, following the histological structure, to reproduce the structure of the real Wagyu meat, which was finally sliced perpendicularly, in a similar way to the traditional Japanese candy *Kintaro-ame*. This process made the reconstruction of the complex meat tissue structure possible in a customizable manner. "By improving this technology, it will be possible to not only reproduce complex meat structures, such as the beautiful *sashi* of Wagyu beef, but to also make subtle adjustments to the fat and muscle components," senior author Michiya Matsusaki says. That is, customers would be able to order cultured meat with their desired amount of fat, based on taste and health considerations.



Patent PCT/JP2021/014104, PCT/JP2021/014105, Japanese Patent Application No. 2019-070137, PCT/JP2018/041659

Treatise Kang, Dong-hee et al. Engineered whole cut meat-like tissue by the assembly of cell fibers using tendon-gel integrated bioprinting. Nat. Commun. 2021; 12(1): 5059. doi:10.1038/s41467-021-25236-9

URL <https://www.reuters.com/lifestyle/science/japanese-scientists-work-up-an-appetite-lab-grown-wagyu-beef-2021-10-08/>

Keyword 3D printing, tissue engineering, cultured meat