Novel microplate 3-D bioprinting platform for muscle and tendon tissue engineering

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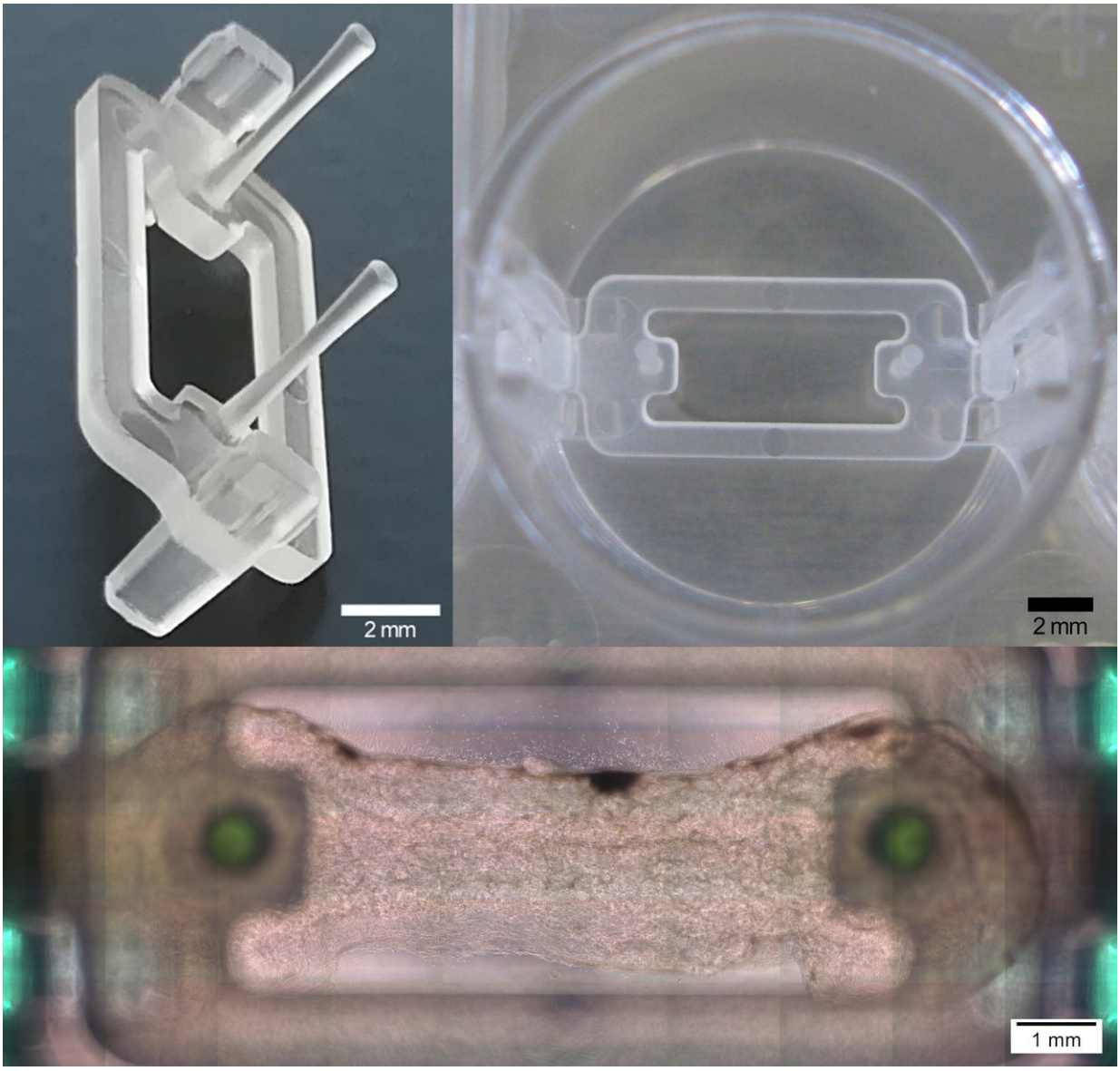

Postholder insert for the printing of dumbbell-shaped muscle-tendon tissues in a

24-well plate (left above: postholder, right above: postholder in 24-well plate [top view], bottom: bioprinted muscle tissue in 24-well well plate differentiated for 14 days [top view]). Credit: Zurich University of Applied Sciences (ZHAW)

There is a strong need for medication that treats age-related degenerative muscle and tendon diseases. A critical bottleneck in the discovery and development of novel drugs for skeletal muscle is the lack of efficient and robust functional in vitro assays for compound screening.

In a new *SLAS Technology* original research article available now for free ahead-of-print, researchers in Switzerland describe the development of a novel screening platform with automated production of 3-D muscle- and tendon-like tissues using 3-D bioprinting. The novelty and importance of this new approach is the combination of the automated musculoskeletal tissue production using 3-D bioprinting with a new microwell plate addressing the specific tissue attachment requirements. Thus, this screening platform represents a promising new tool for musculoskeletal drug discovery and development.

Muscle and tendon tissue models are fabricated by printing alternating layers of photo-polymerized gelatin-methacryloyl-based bioink and cell suspensions in a dumbbell shape onto a newly designed cell culture insert in 24-well plates containing two vertical posts. The cells show high viability after printing in culture and good tissue differentiation based on marker gene and protein expressions.

In addition, functionality of the muscle tissue models is demonstrated by calcium signaling of Fluo4-loaded cells and myofiber contractility induced by electrical pulse stimulation. Finally, the authors successfully fabricate tendon-muscle-tendon co-cultures by printing tenocytes around the posts of the cell culture inserts and myoblasts between the posts.

More information: Sandra Laternser et al, A Novel Microplate 3D Bioprinting Platform for the Engineering of Muscle and Tendon Tissues, *SLAS TECHNOLOGY: Translating Life Sciences Innovation* (2018). DOI: 10.1177/2472630318776594

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