

A highly reproducible and precise measurement platform for a 3D engineered cardiac muscle tissue contractility





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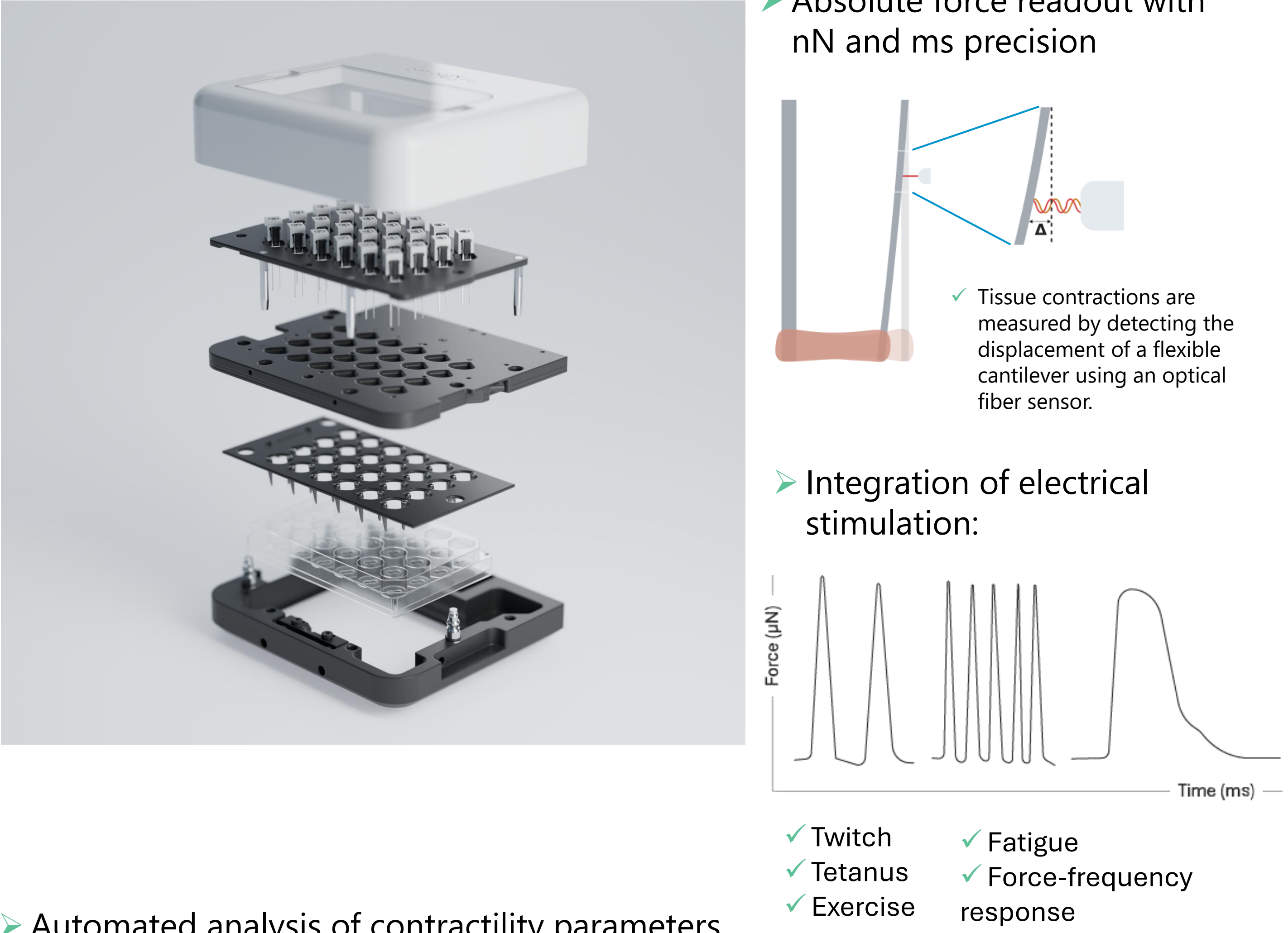
Abstract/Introduction

3D Engineered Heart Tissue Contractility Platform

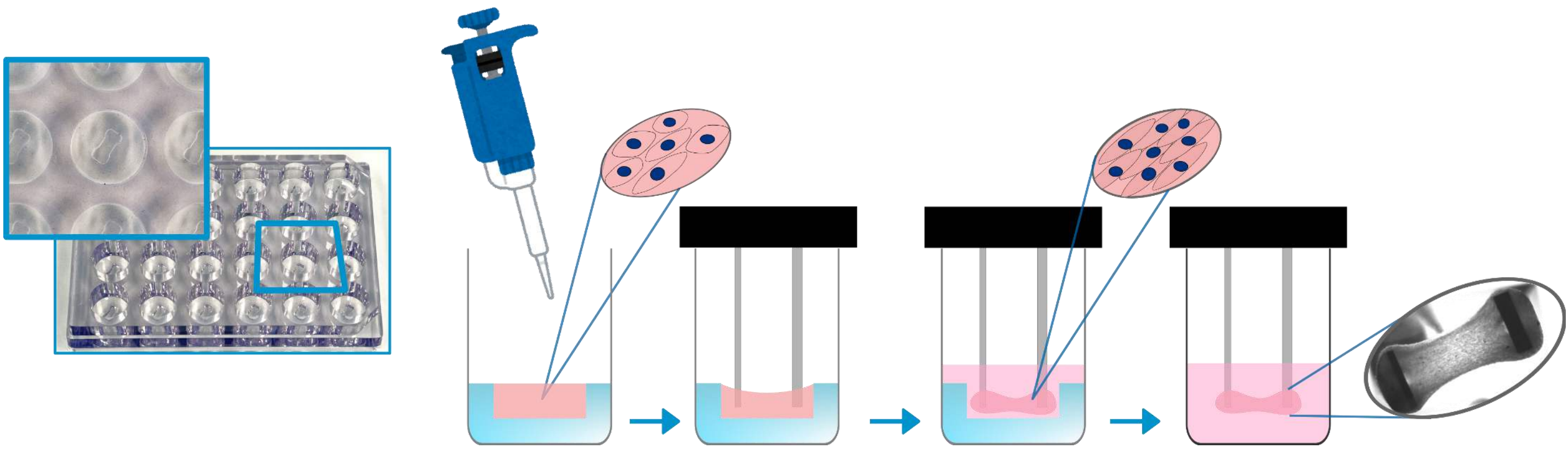
Developing predictive and human-relevant cardiac models that balance accuracy and scalability is a significant challenge in preclinical drug development. Engineered heart tissues (EHTs) can fill this gap but often face issues with reproducibility and throughput. We introduce Cuore, a multi-well contractility platform from Optics11 Life. It allows standardized generation, pacing, and real-time force measurement of 3D cardiac tissues with sub-micronewton precision through optical interferometry. Using human iPSC-derived ventricular cardiomyocytes from Axol Bioscience and primary cardiac fibroblasts, we created a reliable, validated-on-Cuore EHT kit. These tissues showed stable maturation and functionality for up to 42 days. Pharmacological testing confirmed strong, reproducible inotropic responses, indicating sensitivity to drug-induced functional changes.

Optics11 Life's technology

Cuore platform is designed to integrate long-term culturing of 3D engineered muscle tissue with its electrical stimulation and contractility measurements, enabling a broad range of assays.



➤ 24-well casting mold facilitates tissue formation



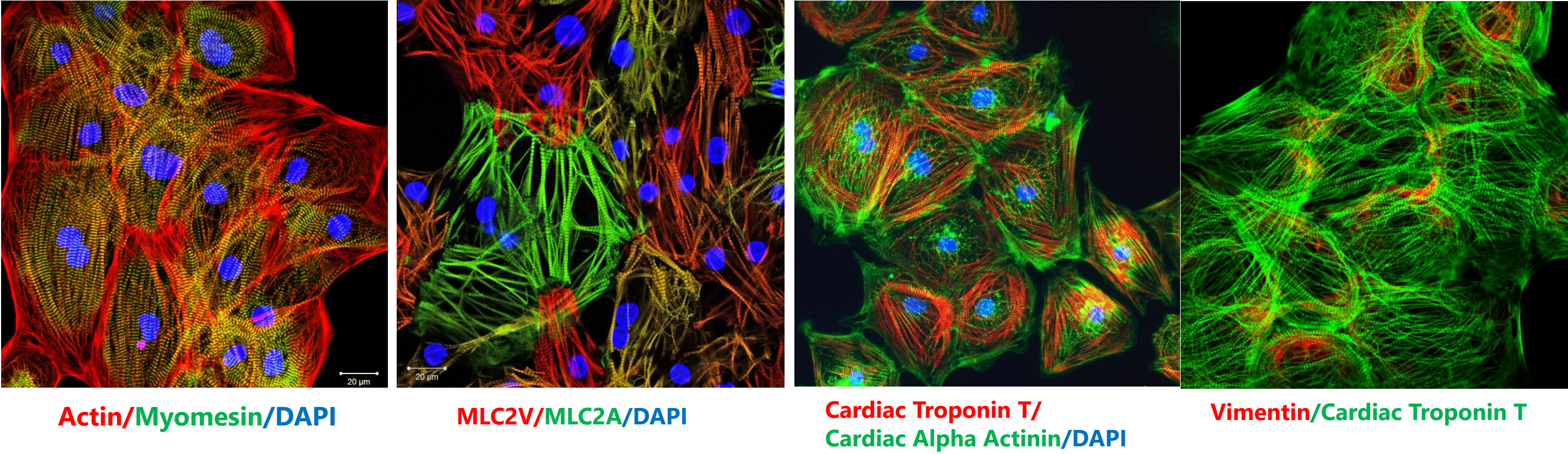
- ✓ Cast cells embedded in hydrogel into the 24-well plate mold (*left*) and insert the cantilevers in the mixture. Cells and matrix compact around the cantilevers into a 3D tissue that can be transferred to a standard 24-well plate (*right*)
- Transparent bottom allows combining contractility measurements with imaging
- Tissues can be harvested for downstream biochemical and molecular analyses

Conclusion

Optics11 Life, in partnership with Axol Bioscience, has developed a plug-and-play solution for the long-term assessment of engineered cardiac tissues. This platform integrates Axol's axoCells™ ventricular cardiomyocytes with the Optics11 Life Cuore contractility system and includes a standardized workflow for creating and analyzing 3D engineered heart tissues. The solution enables reliable data collection on contractility, tissue morphology, and pharmacological responses, streamlining workflows to support more accurate drug development decisions. Additionally, it promotes enhanced tissue maturation and consistent performance over time, making it a valuable tool for predictive drug safety and efficacy screening in cardiac research.

axoCells™ ventricular cardiomyocytes

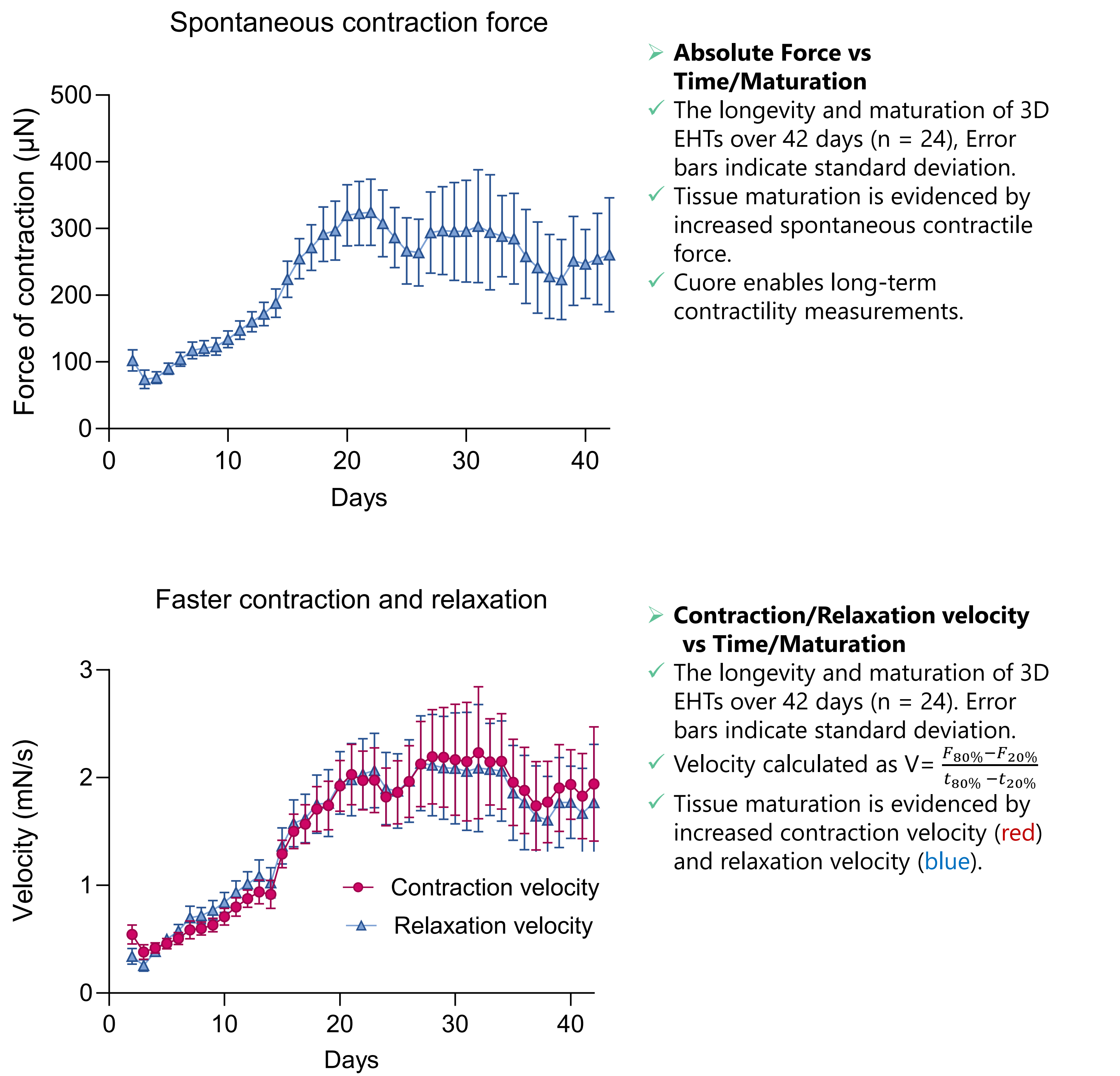
2D cultures stained for key markers and displaying morphological hallmarks, including sarcomere alignment.



- Immunocytochemistry of axoCells™ ventricular cardiomyocytes stained for key markers
- ✓ Key morphological features are demonstrated, including the sarcomere alignment
- ✓ Magnification 63x for images 1,2 and 4; 40x for image 3. Scale bar = 20 µm.

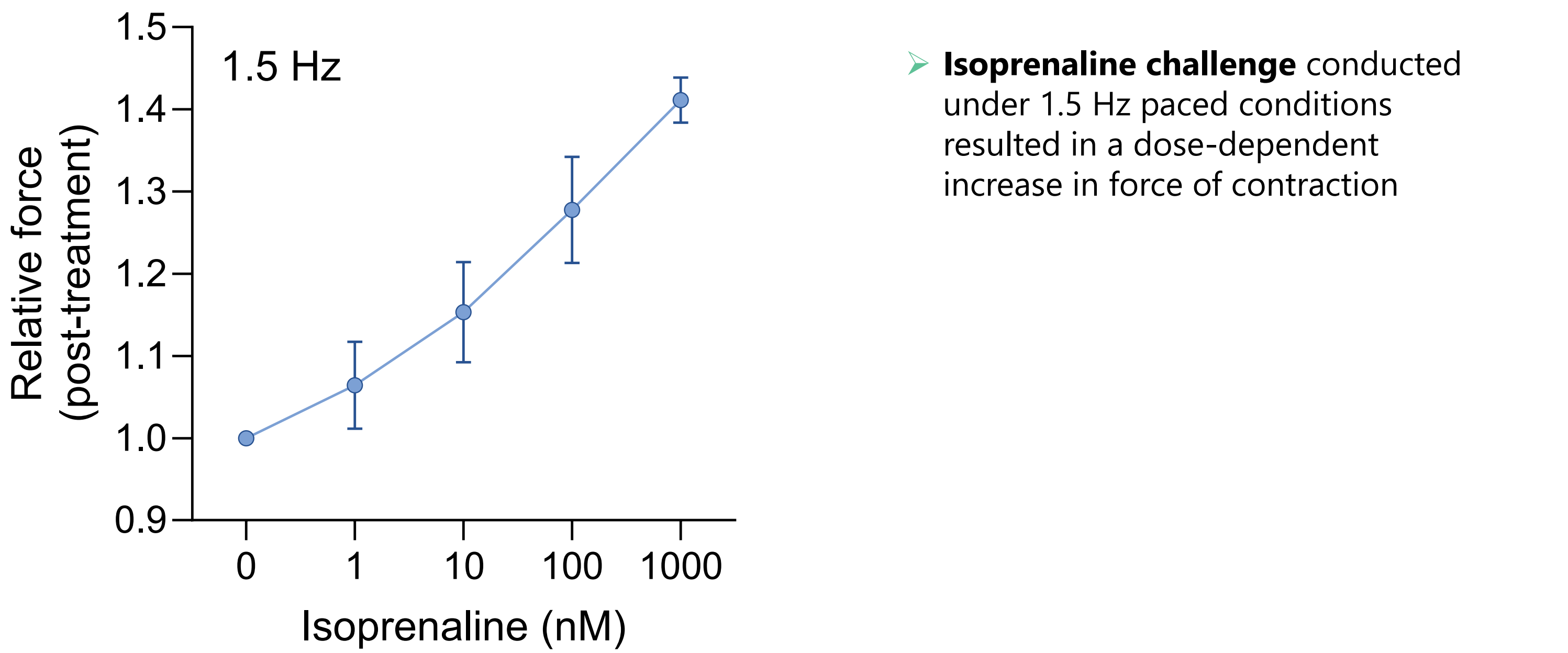
EHT maturation increases force and speed

Cuore enables long-term measurement of force development



EHTs respond to drugs

Cuore measures druag-induced functional modulations



References

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