

Bioengineering skeletal muscle: how to build an intact human motor unit

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In vitro three-dimensional culture systems are emerging as novel tools with which to study tissue development, organogenesis and stem cell behaviour *ex vivo*. These tissues promote higher levels of cell differentiation and tissue organisation and can recapitulate tissue-tissue interfaces and mechanical microenvironments of living organs; allowing the study of human physiology in an organ-specific context. We have developed a high-throughput micro-tissue screening platform that enables the culture of human skeletal muscle tissues in combination with human pluripotent stem cell-derived motor neurons; forming an intact motor unit. A fundamental advantage of this system is the ability to obtain real-time functional readouts; analysing active contractile force in a semi-automated manner. Bioengineering approaches can result in enhanced maturation and function of *in vitro* engineered skeletal muscle; recapitulating the features of an intact human skeletal muscle, as well as demonstrating the utility and screening capabilities of our platform.