BIOENGINEERING SEMINAR

“Making 3D Models That Matter: Engineering Skeletal Muscle Tissue in a Dish“

Thursday – June 8, 2017 – 13h15
EPFL – room SV1717

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host: Prof. Matthias Lutolf

Abstract

Skeletal muscle tissue is found throughout the human body and allows for actions such as walking, swallowing, and breathing. A skeletal muscle is comprised of bundles of long cylindrical muscle cells that are often attached to bones via tendons and that contract in unison in response to human intent (i.e. thought). Numerous genetic and acquired conditions can impact skeletal muscle performance, but the lack of robust culture models to study contractile skeletal muscle tissues outside of the body has made it challenging to study this tissue. Using a 3D printing and tissue engineering approach, we developed methods to grow arrays of tiny human skeletal muscle tissues in a dish. By combining the muscle tissues with post-mitotic motor neurons derived from human pluripotent stem cells, we show that it is possible to study developmental processes and diseases that impact the communication between motor neurons and muscle that cannot be studied using classic two-dimensional co-cultures. Furthermore, by establishing methods to model and study human exercise and skeletal muscle tissue endogenous repair in a dish we uncover novel regulators of skeletal muscle hypertrophy. Together, this body of work highlights the value of biologists and engineers working side-by-side to create robust culture models in order to advance knowledge and improve tissue health.

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