

Drug Testing on Engineered Human Muscle Tissue

In the pharmaceutical industry, it is often that drugs intended for humans are tested on human cells in 2 dimensional traditional cells culture or on animals. By testing drugs on animals, the exact effects on humans is unknown until clinical trials are conducted. As many as 90% of drugs undergoing this development path, fail in phase II clinical trials due to either excessive side effects/toxicity or lack of efficacy. Although engineered muscle can be produced from human cells, the tissue formed is immature since the newly formed muscle must be “exercised” in order to grow and function like tissue found in people. First of its kind, a new technology at Worcester Polytechnic Institute (WPI) has been developed to apply mechanical conditioning (exercise) on engineered muscle in a format compatible with high content drug screening apparatus (e.g. 96 well plates). Using this new technology, mimetics of human muscle functional units are produced using the minimal amount of tissue needed to function without a blood source using only human cells. As the muscle tissues develop, grow and gain strength, they can be stimulated to contract and their contractile force can be measured and correlated with the effect of drug and their dosage on muscle weakness and fatigue, which are common side-effects of many drugs. This can be further used to create muscle tissue mimetics using cells from patients with disorders such as muscular dystrophies and sarcopenia (age related muscle wasting) This provides both a resource with which to study the progression of such conditions in molecular detail and perhaps discover novel therapeutic targets, as well as testing of therapeutic strategies on tissue that actually mimics the muscle disorder, This multi-purpose technology has the potential become a service offered by WPI or licensed out to drug and research companies.

Key Features

- Testing on actual engineered human muscle tissue cells
- First to study the passiveness of engineered muscle tissue on a large scale form
- Analyzes effects of several different types and doses of drugs on engineered muscle tissue
- Scalable
- Work in conjunction with a service or licensed out to companies

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