Increased Throughput and Cryopreservation of Precision-cut Lung Slices Extend the Utility of Human-relevant, 3-Dimensional Pulmonary Test Systems

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ABSTRACT

One of the most physiologically-relevant non-animal models of the lower lung is precision-cut lung slices (PCLS), offering native lung architecture, including small airways and interstitial parenchyma. These substructures within the human PCLS (HUCPS) reflect the presence of the many cell types in the human lung, not present in other non-animal models used for toxicity studies. The combination of these cell types in HUCPS allows for a more realistic interpretation of tissue responses to exposures that evoke complex pulmonary responses. Reports of multi-cell culture longevity and complex responses have positioned PCLS as a candidate model to evaluate key events associated with severe lung disease.

Here we describe modifications that address both the rate of slice creation and also cryopreservation of PCLS tissue. A redesign of the tissue “core sleeve” triples the number of cores passing over the slicing mechanism of the Krumdieck M4400 slicer. Also, a comparison of multiple cryopreservation buffers was evaluated when freezing and maintaining PCLS for 4-days. These initial results suggest an increased scale of PCLS is possible and that researchers may be able to bank frozen PCLS and allow returning to the same donor tissue on multiple occasions.

REFERENCES


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