Erratum to Body-in-a-Cube: a microphysiological system for multi-tissue co-culture with near-physiological amounts of blood surrogate

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This article that appeared in: Vol 4 (June 2020) Issue of the *Microphysiological Systems* (*MPS*) (1), was miscategorized as review article. The content of the article justify it as an Original Article. For correction, the abstract of the paper should be replaced by a structured abstract and the correct abstract is presented below:

Background: Decreasing the amount of liquid inside microphysiological systems (MPS) can help uncover the presence of toxic drug metabolites. However, maintaining near-physiological volume ratios among blood surrogate and multiple organ mimics is technically challenging. Here, we developed a body cube and tested its ability to support four human tissues (kidney, GI tract, liver, and bone marrow) scaled down from in vivo functional volumes by a factor of 73,000 with 80 µL of cell culture medium (corresponding to ~1/73,000th of in vivo blood volume).

Methods: GI tract cells (Caco-2), liver cells (HepG2/C3A), bone marrow cells (Meg-01), and kidney cells (HK-2) were co-cultured inside the body cube with 80 µL of common, recirculating cell culture medium for 72 h. The system was challenged with acetaminophen and troglitazone, and concentrations of aspartate aminotransferase (AST), albumin, and urea were monitored over time.

Results: Cell viability analysis showed that 95.5%±3.2% of liver cells, 89.8%±4.7% of bone marrow cells, 82.8%±8.1% of GI tract cells, and 80.1%±11.5% of kidney cells were viable in co-culture for 72 h. Both acetaminophen and troglitazone significantly lowered cell viability in the liver chamber as indicated by viability analysis and a temporary increase of AST in the cell culture medium. Both drugs also lowered urea production in the liver by up to 45%.

Conclusions: Cell viability data and the production of urea and albumin indicate that the co-culture of GI tract, liver, bone marrow, and kidney tissues with near-physiological volume ratios of tissues to blood surrogate is possible for up to 72 h. The body-cube was capable of reproducing liver toxicity to HepG2/C3A liver cells via acetaminophen and troglitazone. The developed design provides a viable format for acute toxicity testing with near-physiological blood surrogate to tissue volume ratios.

Keywords: Multi-organ microphysiological system; microphysiological systems (MPS); body-on-a-chip; body cube; microfluidic cell culture

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References

1. Chen L, Yang Y, Ueno H, et al. Body-in-a-Cube: a microphysiological system for multi-tissue co-culture with near-physiological amounts of blood surrogate. Microphysiol Syst 2020;4:1.

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