emulate

Protocol for Emulate Organ-Chips:

Albumin Quantification Assay

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EP139 v2.0

Goals:	Key Steps:	Required Materials:
Quantify albumin levels from Emulate human Organ-Chip effluent samples	• Prepare all reagents, samples, and standards • Run the assay • Read the plate	• Human Albumin SimpleStep ELISA® Kit (Abcam, Cat No. ab179887) • Microplate reader capable of measuring absorbance at 450 or 600 nm. • Plate shaker for all incubation steps.

Introduction

Albumin is synthesized in the liver and is the most abundant protein in blood plasma. It carries vital nutrients, hormones, and compounds and is critical to maintain plasma oncotic pressure and prevent edema. Serum albumin level is accepted as clinical indication of liver or kidney disorder. Albumin secretion in hepatocytes is used as an endpoint for viability and hepatotoxicity. This protocol uses the Liver-Chip as a reference point. Methods and assay conditions could change with different Organ-Chips.

Method

Sample type	Organ-Chip effluent See Protocol EP124 Effluent Sampling.
Recommended assay flow rate (Liver-Chip)	30 µL / h
Recommended effluent dilution (Liver-Chip)	1:500 Note: Albumin levels will change depending on cell injury status or based on donor-to-donor variability. Therefore, sample dilutions may need to be modified to accommodate different experimental conditions or cells from different donors.
Run assay as described on supplier site	https://www.abcam.com/human-albumin-elisa-kit-ab179887.html Note: Store kit at 2–8ºC immediately upon receipt.
Sample concentration range (Liver-Chip)	850 – 2,300 ng / mL or 15 – 40 µg / day / million cells. Note: Range is based on hepatocyte lot numbers: HU8298, Hum4116, QHum15063 up to 14 days in culture. Albumin secretion levels will vary from donor to donor.
Converting ng / mL to µg / day / million cells (Liver-Chip)	Multiply determined ng / mL value (after multiplying by dilution factor) by 1 million cells divided by 42 thousand cells in chip and by total volume collected in mL divided by 1,000. X = determined ng / mL value (after multiplying by dilution factor) $V_{total\ collected\ [in\ mL]}$ = 0.72 mL in 24 hours with a flow rate of 30 µL / h **µg / day / million cells** = X*(1,000,000/42,000)*($V_{total\ collected\ [in\ mL]}$ /1000)