Supplementary Figures and Tables

A glomerulus and proximal tubule microphysiological system simulating renal filtration, reabsorption, secretion, and toxicity

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Table S1. CIHP-1 ECM Attachment Statistical Analysis.

ECM Conditions	Collagen I (Col I)	Collagen IV (Col IV)	Laminin (Lam)	Heparan Sulfate (HS)	Col I, Lam, Col I	Col I, HS, Col I	Col IV, Lam, Col IV	Col IV, HS, Col IV
Collagen I (Col I)	-	p=0.03 (*)	p=0.006 (**)	p=0.02 (*)	p=0.02 (*)	p>0.99	p=0.86	p>0.99
Collagen IV (Col IV)	p=0.03 (*)	-	p<0.001 (***)	p>0.99	p<0.001 (***)	p=0.004 (**)	p=0.57	p=0.08
Laminin (Lam)	p=0.006 (**)	p<0.001 (***)	-	p<0.001 (***)	p>0.99	p=0.03 (*)	p<0.001 (***)	p=0.006 (**)
Heparan Sulfate (HS)	p=0.02 (*)	p>0.99	p<0.001 (***)	-	p<0.001 (***)	p=0.004 (**)	p=0.3	p=0.04 (*)
Col I, Lam, Col I	p=0.02 (*)	p<0.001 (***)	p>0.99	p<0.001 (***)	-	p=0.07	p<0.001 (***)	p=0.02 (*)
Col I, HS, Col I	p>0.99	p=0.004 (**)	p=0.03 (*)	p=0.004 (**)	p=0.07	-	p=0.46	p>0.99
Col IV, Lam, Col IV	p=0.86	p=0.57	p<0.001 (***)	p=0.3	p<0.001 (***)	p=0.46	-	p=0.95
Col IV, HS, Col IV	p>0.99	p=0.08	p=0.006 (**)	p=0.04 (*)	p=0.02 (*)	p>0.99	p=0.95	-

Table S2. HUVECs ECM Attachment Statistical Analysis.

ECM Conditions	Collagen I (Col I)	Collagen IV (Col IV)	Laminin (Lam)	Heparan Sulfate (HS)	Col I, Lam, Col I	Col I, HS, Col I	Col IV, Lam, Col IV	Col IV, HS, Col IV
Collagen I (Col I)	-	p<0.001 (***)	p=0.28	p=0.71	p<0.001 (***)	p=0.76	p<0.001 (***)	p>0.99
Collagen IV (Col IV)	p>0.99	-	p=0.02	p=0.14	p<0.001 (***)	p=0.001 (**)	p=0.98	p=0.04 (*)
Laminin (Lam)	p=0.28	p=0.02	-	p>0.99	p<0.001 (***)	p=0.96	p=0.14	p=0.88
Heparan Sulfate (HS)	p=0.71	p=0.14	p>0.99	-	p<0.001 (***)	p>0.99	p=0.42	p=0.95
Col I, Lam, Col I	p<0.001 (***)	p<0.001 (***)	p<0.001 (***)	p<0.001 (***)	-	p<0.001 (***)	p<0.001 (***)	p<0.001 (***)
Col I, HS, Col I	p=0.76	p=0.001 (**)	p=0.96	p>0.99	p<0.001 (***)	-	p=0.009 (**)	p>0.99
Col IV, Lam, Col IV	p<0.001 (***)	p=0.98	p=0.14	p=0.42	p<0.001 (***)	p=0.009 (**)	-	p=0.12
Col IV, HS, Col IV	p>0.99	p=0.04 (*)	p=0.88	p=0.95	p<0.001 (***)	p>0.99	p=0.12	-

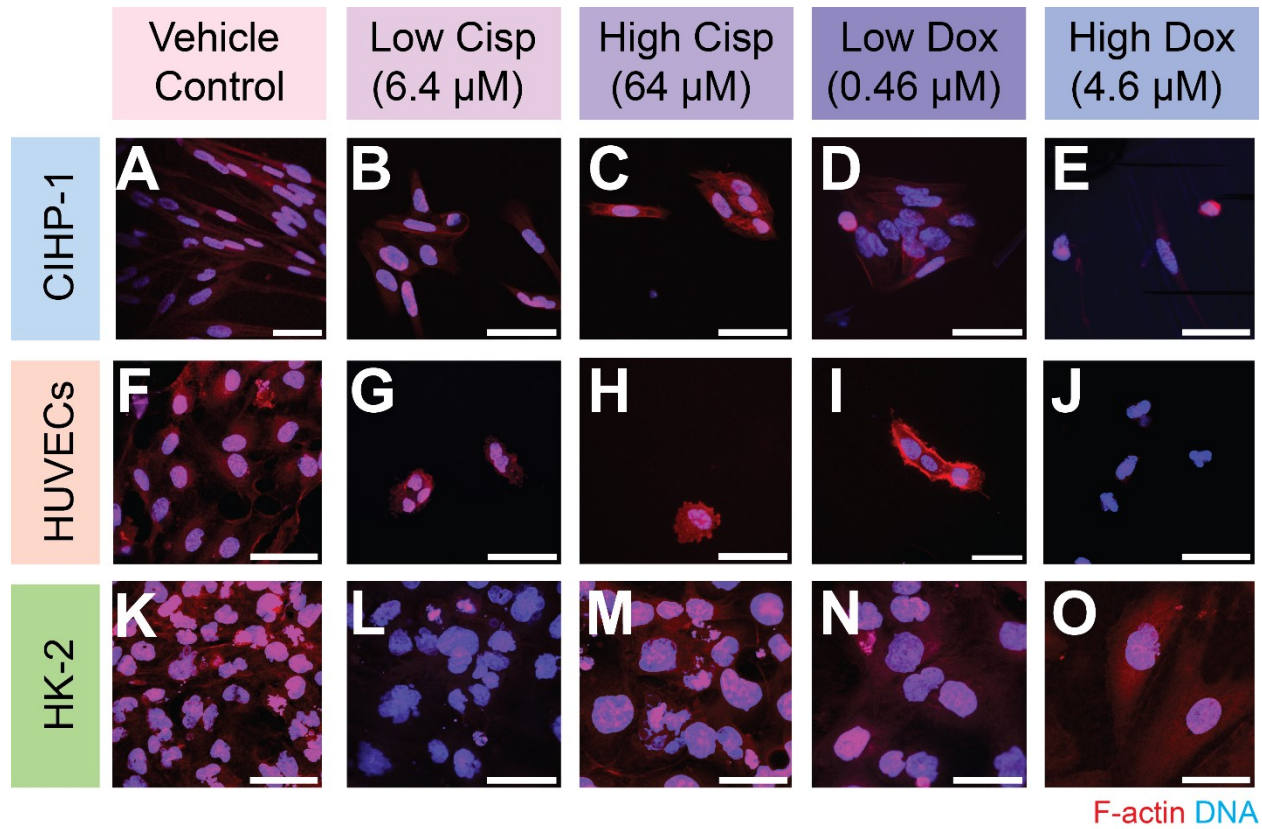|	Vehicle Control	Low Cisp (6.4 μM)	High Cisp (64 μM)	Low Dox (0.46 μM)	High Dox (4.6 μM)
CIHP-1	A	B	C	D	E
HUVECs	F	G	H	I	J
HK-2	K	L	M	N	O

F-actin DNA

Fig. S1 **7-Day Static Drug-Induced Tri-culture Attachment Test.** (A-E) Images of CIHP-1 with all drug conditions. (F-J) Images of HUVECs with all drug conditions. (K-O) Images of HK-2 with all drug conditions. Red= F-actin and blue = DNA. Scalebar = 50 μm.
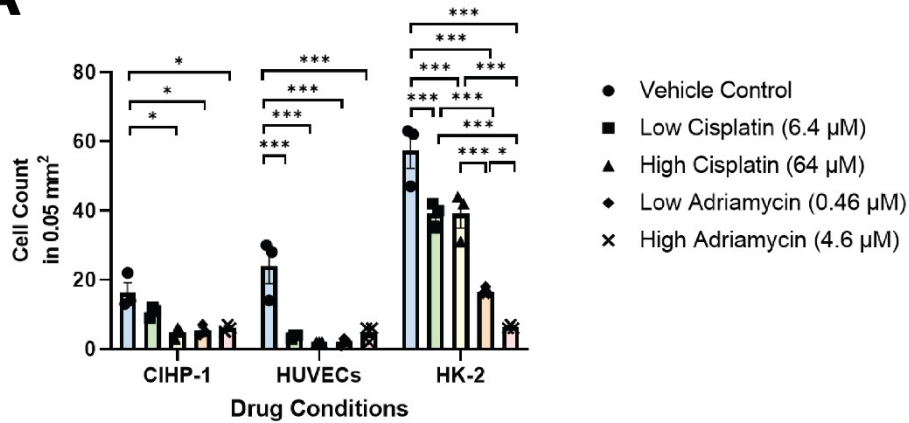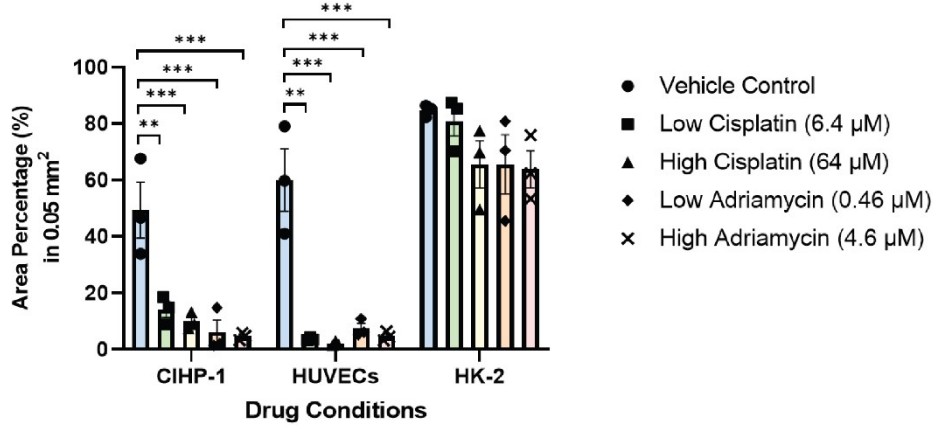
Fig. S2 **7-Day Static Nephrotoxicity Image Analysis (n=3 MPS per condition)**. (A) Cell count of all cell types with all drug conditions. (Comparison of cell count of each cell type with each drug condition, *** p<0.001, ** p<0.01, * p<0.05 ordinary two-way ANOVA, Tukey's test). (B) Area percentage of all cell types with all drug conditions. (Comparison of confluence of each cell type with each drug condition, *** p<0.001, ** p<0.01, * p<0.05 ordinary two-way ANOVA, Tukey's test).
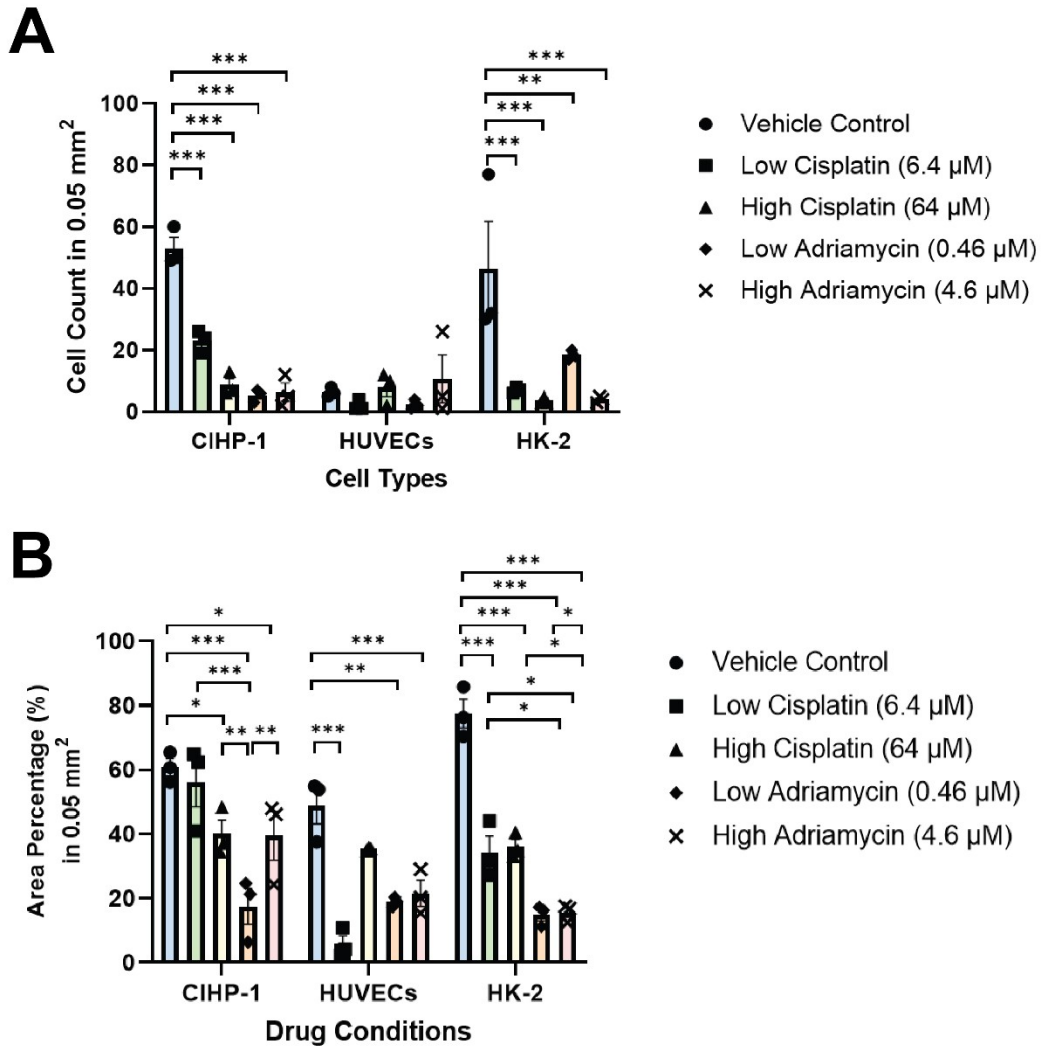
Fig. S3 **7-Day Dynamic Nephrotoxicity Image Analysis (n=3 MPS per condition).** (A) Cell count of all cell types with all drug conditions. (Comparison of cell count with each cell type, *** $p<0.001$, ** $p<0.01$, ordinary two-way ANOVA, Tukey's test). (B) Area percentage of all cell types with all drug conditions (Comparison of area percentage with each cell type, *** $p<0.001$, ** $p<0.01$, * $p<0.05$, ordinary two-way ANOVA, Tukey's test).
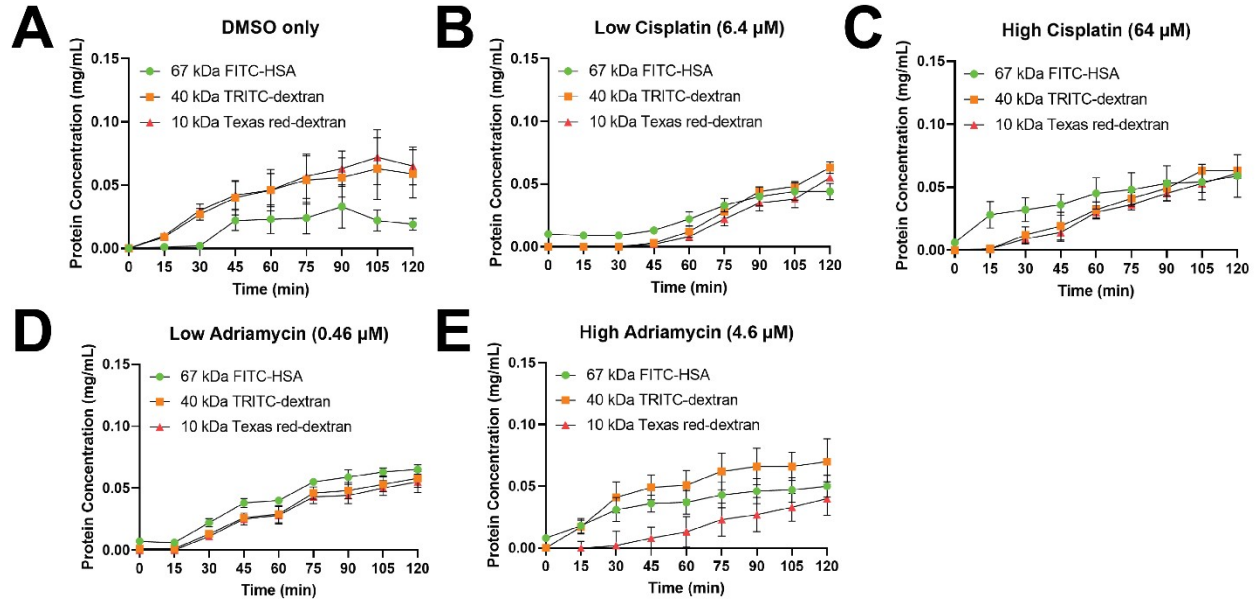
Fig. S4 **Protein and Dextran Filtration (n=3 microphyiological system [MPS] devices/condition).** (A) Filtrate output of FITC-HSA, Texas red, and TRITC in 1% DMSO Condition. (B) Filtrate output of FITC-HSA, Texas red, and TRITC in 6.4 μM of cisplatin. (C) Filtrate output of FITC-HSA, Texas red, and TRITC in 64 μM of cisplatin. (D) Filtrate output of FITC-HSA, Texas red, and TRITC in 0.46 μM of adriamycin.
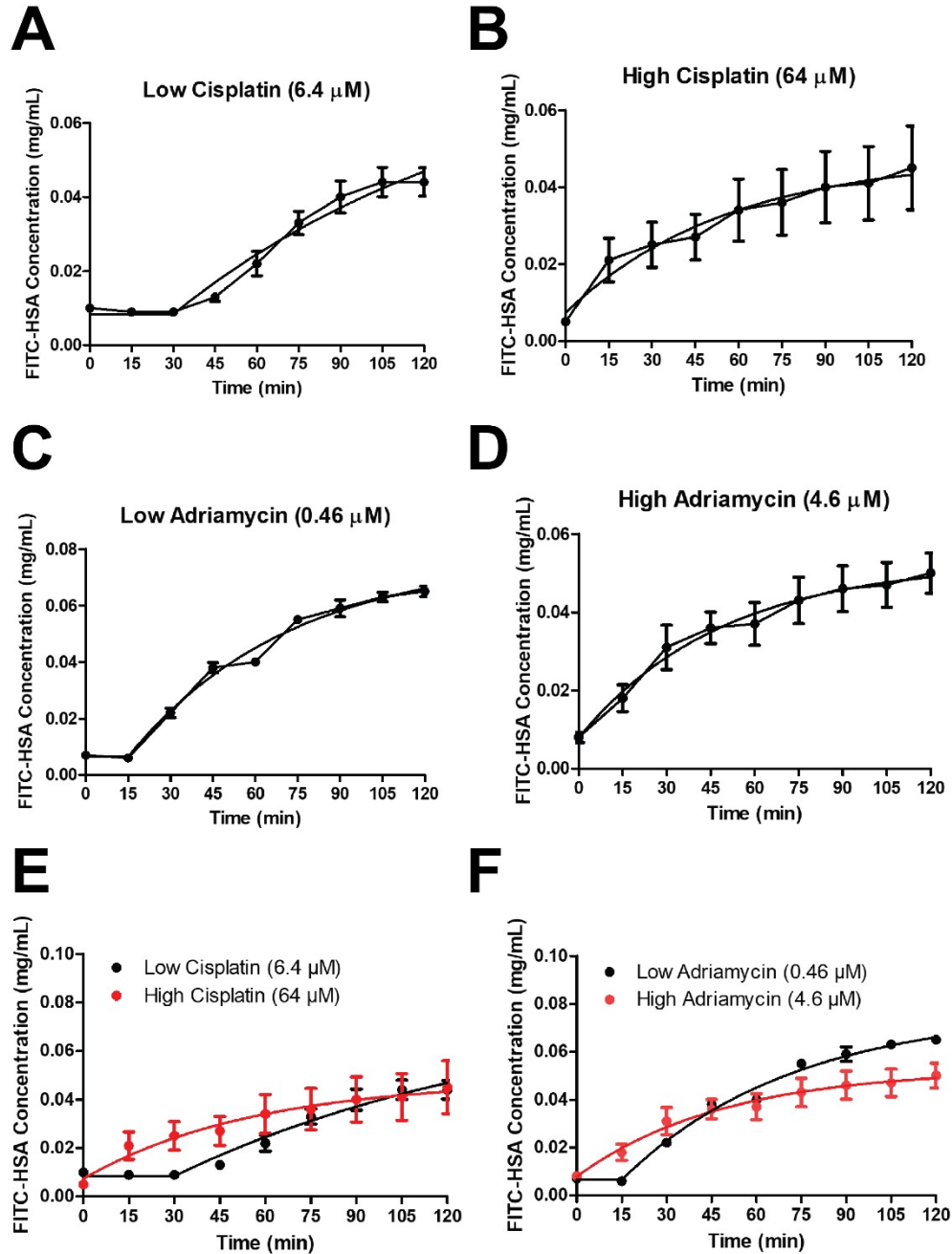
A

Low Cisplatin (6.4 μM)

B

High Cisplatin (64 μM)

C

Low Adriamycin (0.46 μM)

D

High Adriamycin (4.6 μM)

E

- Low Cisplatin (6.4 μM)
- High Cisplatin (64 μM)

F

- Low Adriamycin (0.46 μM)
- High Adriamycin (4.6 μM)

Fig. S5 **Curve Fit Model of Serum Albumin Filtration for Drug Conditions.** (A) Filtrate output of FITC-HSA only in low cisplatin (6.4 μM). (Nonlinear regression: $y = 8.4 \times 10^{-3} + (7.29 \times 10^{-2}) \times \left(1 - \exp\left(-8.3 \times 10^{-3} \times (t - 30)\right)\right)$, $R^2 = 0.9063$) (B) Filtrate output of FITC-HSA only in high cisplatin (64 μM). (Nonlinear regression: $y = 7.3 \times 10^{-3} + (4.08 \times 10^{-2}) \times \left(1 - \exp\left(-1.7 \times 10^{-2} \times t\right)\right)$ $R^2 = 0.5193$. (C) Filtrate output of FITC-HSA only in low adriamycin (0.46 μM). (Nonlinear regression: $y = 6.42 \times 10^{-3} + (7.75 \times 10^{-2}) \times \left(1 - \exp\left(-1.7 \times 10^{-2} \times (t - 15)\right)\right)$, $R^2 = 0.9743$). (D) Filtrate output of FITC-HSA only in high adriamycin (4.6 μM). (Nonlinear regression:

$y = 7.8 \times 10^{-3} + (4.51 \times 10^{-2}) \times (1 - \exp(-2.0 \times 10^{-2} \times t))$, $R^2 = 0.7736$). (E) Comparison of FITC-HSA output in low and high cisplatin. (F) Comparison of FITC-HSA output in low and high adriamycin.