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Supporting Information

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A Heart-Breast Cancer-on-a-Chip Platform for Disease Modeling and Monitoring of Cardiotoxicity Induced by Cancer Chemotherapy

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Supplementary Information

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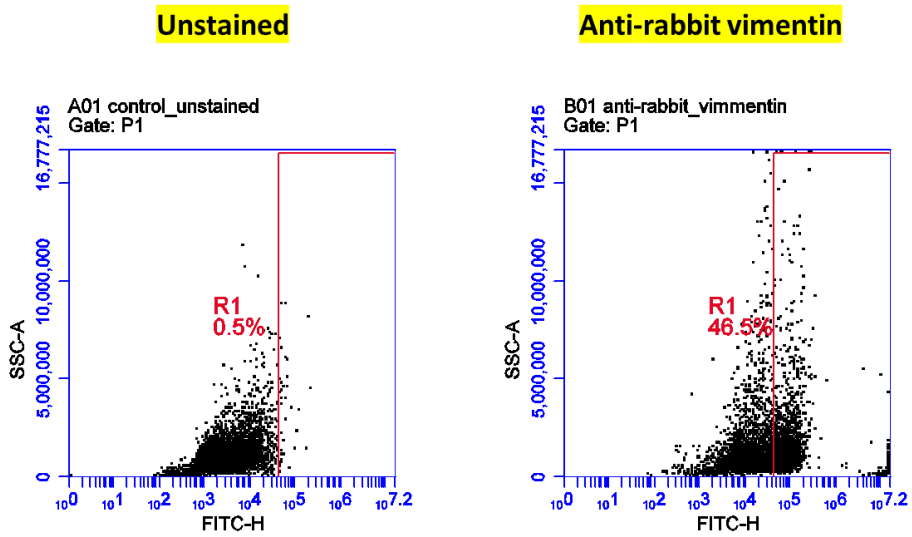

Figure S1. Flow cytometry characterization of Vimentin (cardiac fibroblast marker) in unstained and Vimentin-stained iPSC-derived cardiac cells.

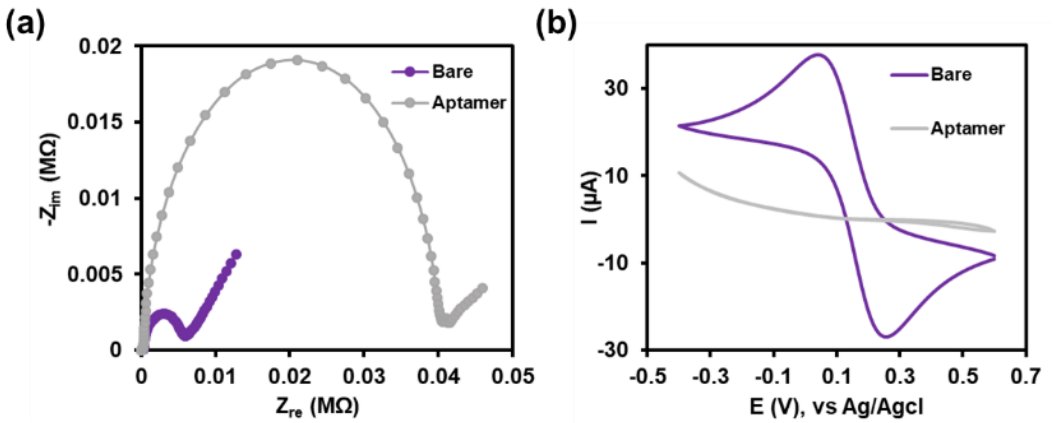

Figure S2. a) EIS plots of the bare and aptamer functionalized electrode and b) the corresponding CV plots for the EC characterization of electrode functionalization process.

Cardiac biomarker	Biomarker	Clinical cut-off levels (ng/mL)	Range (g/mL)	R^2	LOD
Troponin T	Aptamer	0.05 – 0.1	0.1p - 1n	0.987	..
CK-MB*	Aptamer	0.6	10p -100n	0.967	2.4 pg/mL
HER2	Aptamer	8.1 - 75	0.1p - 1n	0.988	..

*Previously determined in Shin, et al., Anal. Chem., 2016

Table S1. Biomarkers for sensing platform. Calibration curves performed at 37 ºC.

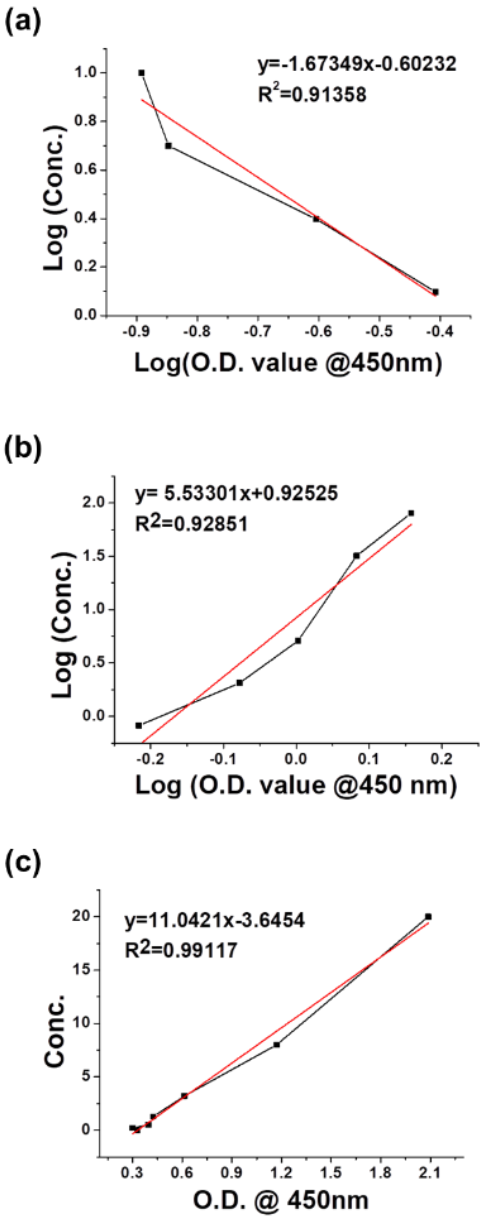

Figure S3. Calibration curves for a) Troponin T, b) CK-MB, and c) HER-2 biomarkers.

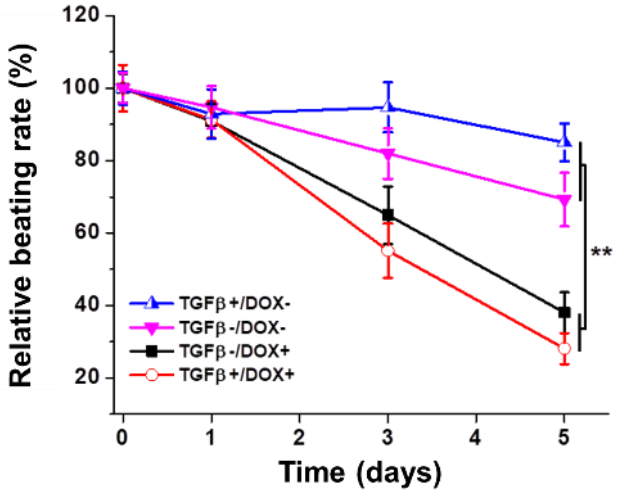

Figure S4. Relative beating frequency rate of healthy or fibrotic cardiac tissues cultured for 5 days with or without DOX (N=3). (One-way ANOVA with Tukey significant difference post hoc test; **p<0.005). Error bars represent standard deviation.

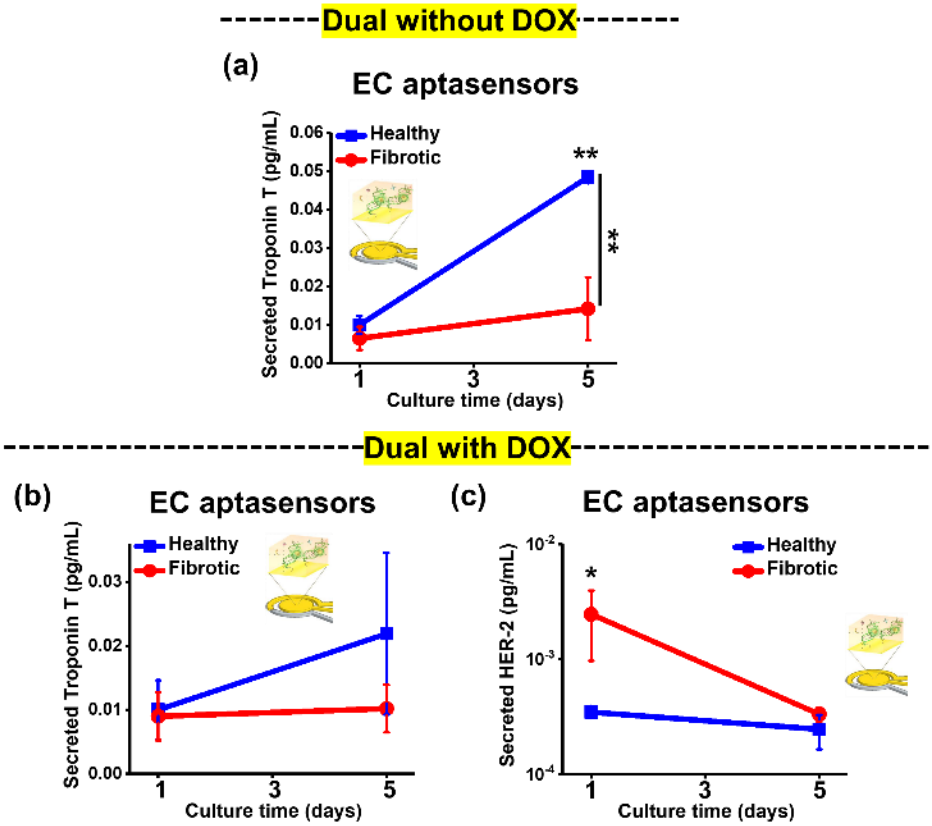

Figure S5. a) EC measurement of Troponin T production in healthy or fibrotic cardiac tissues on dual chips without DOX. EC measurement of b) Troponin T and c) HER-2 rate in healthy or fibrotic cardiac tissues on dual chips with the DOX treatment. (One-way ANOVA with Tukey significant difference post hoc test; *p<0.05 and **p<0.005). Error bars represent standard deviation.

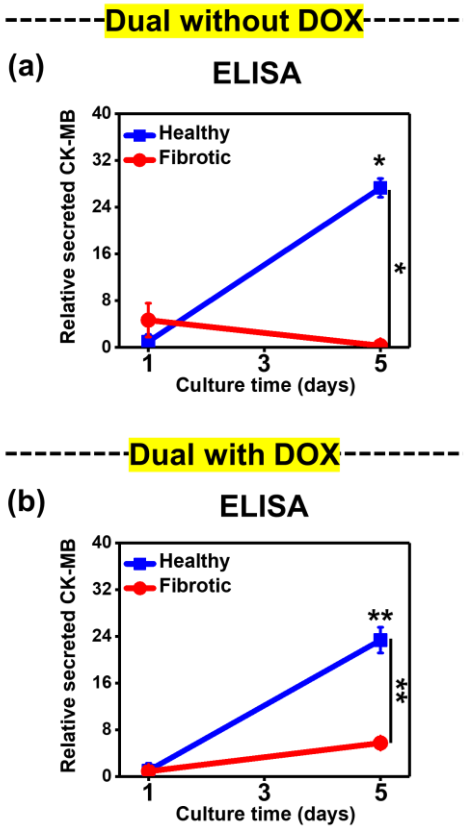

Figure S6. ELISA measurement of CK-MB productions in healthy or fibrotic cardiac tissues on dual chips a) with and b) without the DOX treatment. (One-way ANOVA with Tukey significant difference post hoc test; *p<0.05 and **p<0.005). Error bars represent standard deviation.

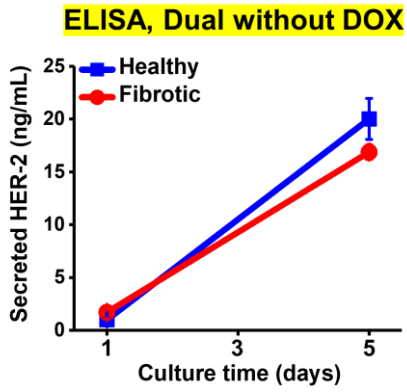

Figure S7. ELISA measurement of HER-2 production in healthy or fibrotic cardiac tissues on dual chips without DOX. Error bars represent standard deviation.

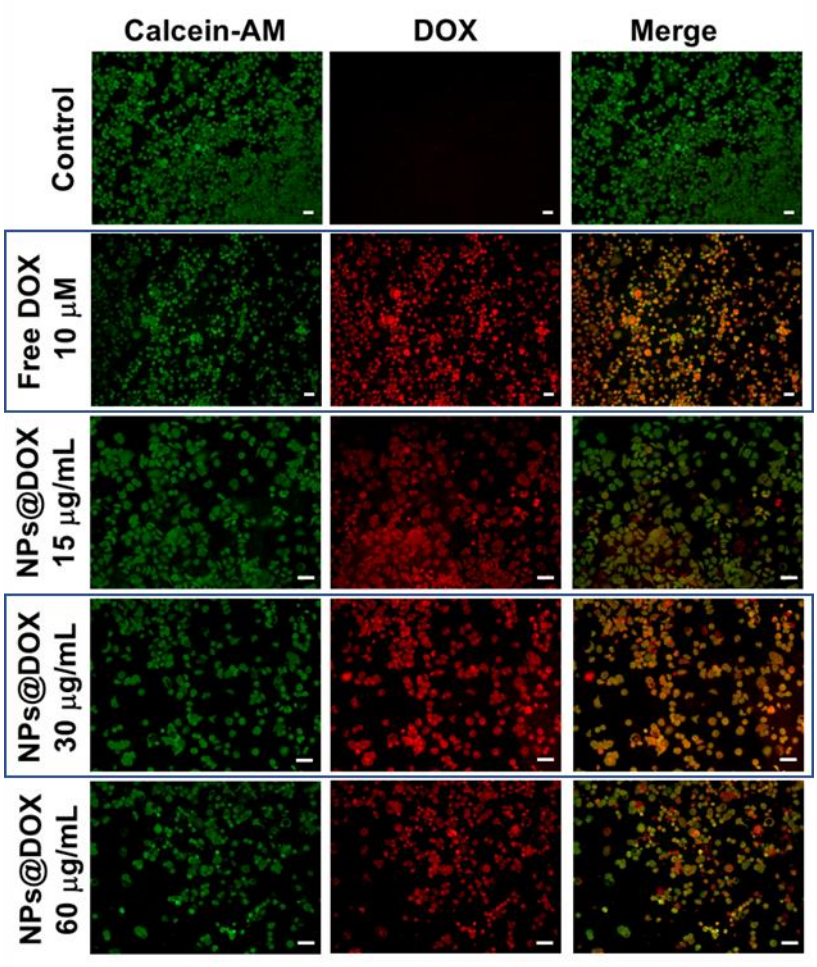

Figure S8. Representative immunofluorescence images of live/dead staining for breast cancer cells after 24 hours in culture with the addition of free DOX or NP-conjugated DOX for the determination of optimal concentration compared with the free DOX treatment (10 μM). Scale bar: 50 μm.

Primer	Forward	Reverse
Troponin T (cTnT)	TTC ACC AAA GAT CTG CTC CTC GCT	TTA TTA CTG GTG TGG AGT GGG TGT GG
Cx43	GGC TGC TCC TCA CCA ACG GCT	AGG TCA TCA GGC CGA GGC CTG
α-SMA	ACT GCC TTG GTG TGT GAC AAT GG	TGG TGC CAG ATC TTT TCC ATG
Col1A1	GGA CAC AGA GGT TTC AGT GGT	CAC CAT CAT TTC CAC GAG CA
GAPDH	CAG AAC ATC ATC CCT GCC TCT AG	TTG AAG TCA GAG GAG ACC ACC T

Table S2. Primer sequences used for gene expression analysis