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Supplemental Information

Enhancing Irreversible Electroporation by Manipulating Cellular Biophysics with a Molecular Adjuvant

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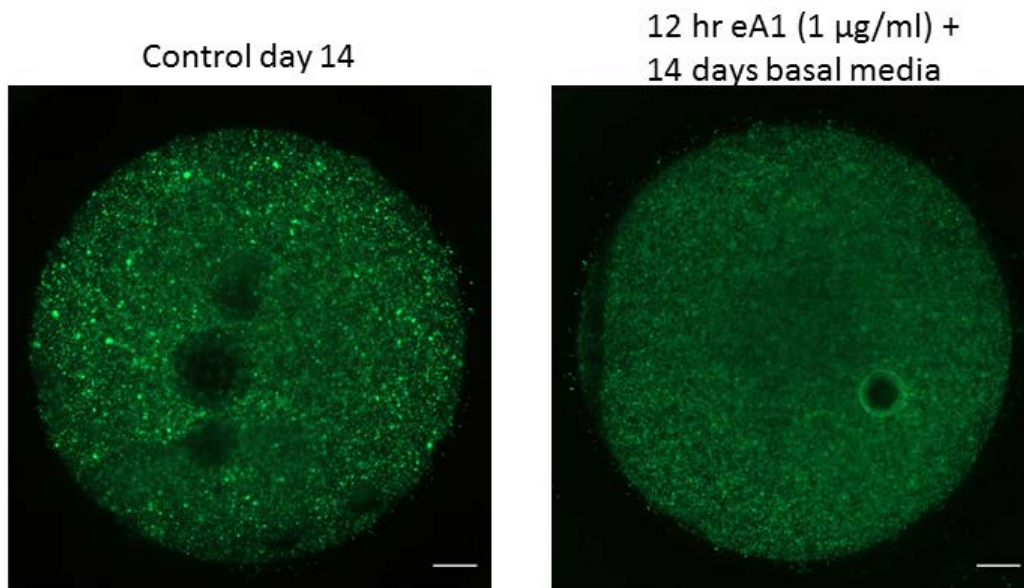


Figure S1. Live dead staining of cells cultured with eA1 in hydrogels. Cells were cultured in collagen hydrogels with 1 $\mu\text{g}/\text{ml}$ eA1 media for 12 h, which was then replaced with basal media and cells were cultured out to 14 days. Calciin AM staining of the live cells (green) and ethD-III staining of dead cells (red) shows no visible cell death for eA1 treatment. Scale bar 1 mm.

Table S1: Physical properties used in finite element models of hydrogel treatments. * measured values, ‡ default material values in COMSOL

Parameter	Symbol	Value	Unit	Reference
IRE Voltage	V_{IRE}	450	[V]	*
H-FIRE Voltage	V_{HFIRE}	450-700	[V]	*
Electrode Density	ρ_e	7850	[kg/m ³]	‡
Electrode Specific Heat Capacity	Cp_e	475	[J/(kg·K)]	‡
Electrode Thermal Conductivity	k_e	44.5	[W/(m·K)]	‡
Electrode Conductivity	σ_e	4.03×10^6	[S/m]	‡
Electrode Permittivity	ϵ_e	1		‡
Hydrogel Density	ρ_h	997.8	[kg/m ³]	(45)
Hydrogel Specific Heat Capacity	Cp_h	4181.8	[J/(kg·K)]	(45)
Hydrogel Thermal Conductivity	k_h	0.6	[W/(m·K)]	(45)
Hydrogel Conductivity	σ_h	1.2	[S/m]	(45)
Hydrogel Permittivity	ϵ_h	0		(45)

Table S2: *Physical properties used in finite element models of single cells. * measured values, ‡ approximation based on water composition*

Parameter	Symbol	Value	Units	Reference
Media Conductivity	σ_m	0.98	[S/m]	*
Media Permittivity	ϵ_m	$80\epsilon_0$	[F/m]	‡
Cytoplasm Conductivity	σ_{cyt}	0.3	[S/m]	(46)
Cytoplasm Permittivity	ϵ_{cyt}	$154.4\epsilon_0$	[F/m]	(47)
Nucleoplasm Conductivity	σ_{nuc}	1.35	[S/m]	(46)
Nucleoplasm Permittivity	ϵ_{nuc}	$52\epsilon_0$	[F/m]	(46)
Cell Membrane Thickness	t_{mem}	5×10^{-9}	[m]	(48)
Nuclear Membrane Thickness	t_{Nmem}	40×10^{-9}	[m]	(46)
Cell Membrane Conductivity	σ_{mem}	3×10^{-7}	[S/m]	(49)
Cell Membrane Permittivity	ϵ_{mem}	$8.57\epsilon_0$	[F/m]	(50)
Nuclear Membrane Conductivity	σ_{Nmem}	6×10^{-3}	[S/m]	(46)
Nuclear Membrane Permittivity	ϵ_{Nmem}	$28\epsilon_0$	[F/m]	(46)
Domain Side Length	L_d	300×10^{-6}	[m]	-
Benign Cell Radius	R_c	20×10^{-6}	[m]	*
Benign Nuclear Radius	R_n	6.2×10^{-6}	[m]	*
Malignant Cell Radius	R_{mc}	20×10^{-6}	[m]	*
Malignant Nuclear Radius	R_{mn}	14.7×10^{-6}	[m]	*
Malignant Cell Radius (post-ephrin)	R_{mce}	16.7×10^{-6}	[m]	*
Malignant Nuclear Radius (post-ephrin)	R_{mne}	14.7×10^{-6}	[m]	*

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