

*Supporting Information for*

**A microfluidic system for monitoring glucagon secretion from human pancreatic islets of Langerhans**

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**Abstract.** Additional tables outlining the human islet donor characteristics and parameters for the finite element analysis simulation. Results showing control experiments and additional glucose-stimulated glucagon release profiles from human islets of Langerhans.

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	<b>Donor 1</b>	<b>Donor 2</b>	<b>Donor 3</b>	<b>Donor 4</b>	<b>Donor 5</b>
<b>Sex</b>	F	M	F	M	F
<b>Age</b>	60	48	39	56	42
<b>Height (inches)</b>	61	73	63	69	65
<b>Weight (lbs)</b>	139	157	124	222	141
<b>BMI</b>	25.8	20.2	22.1	32.8	23.5
<b>HbA1c (%)</b>	5.1	5.2	5.6	5.3	5.4

**Table S-1.** Donor characteristics for human islets.

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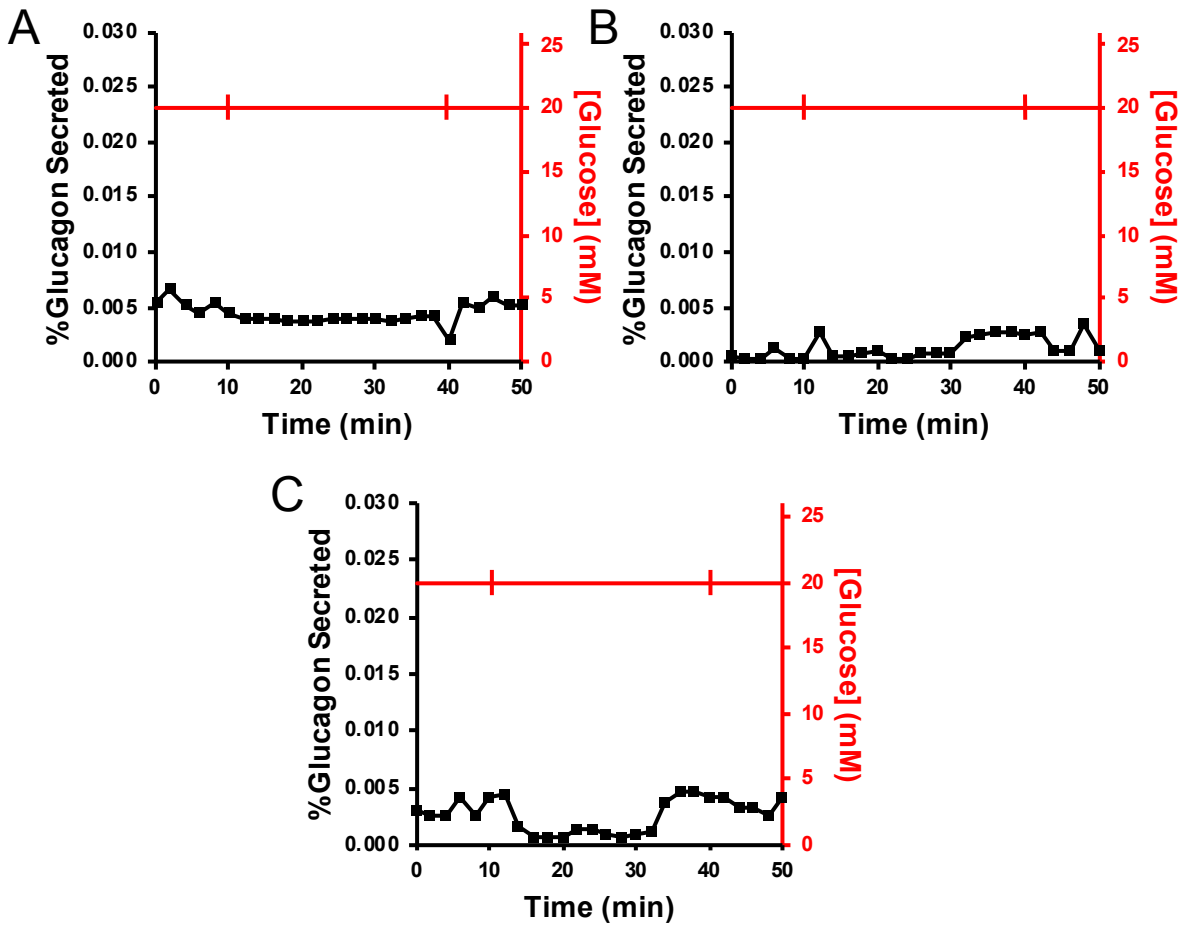
**Parameters of the finite element simulation**

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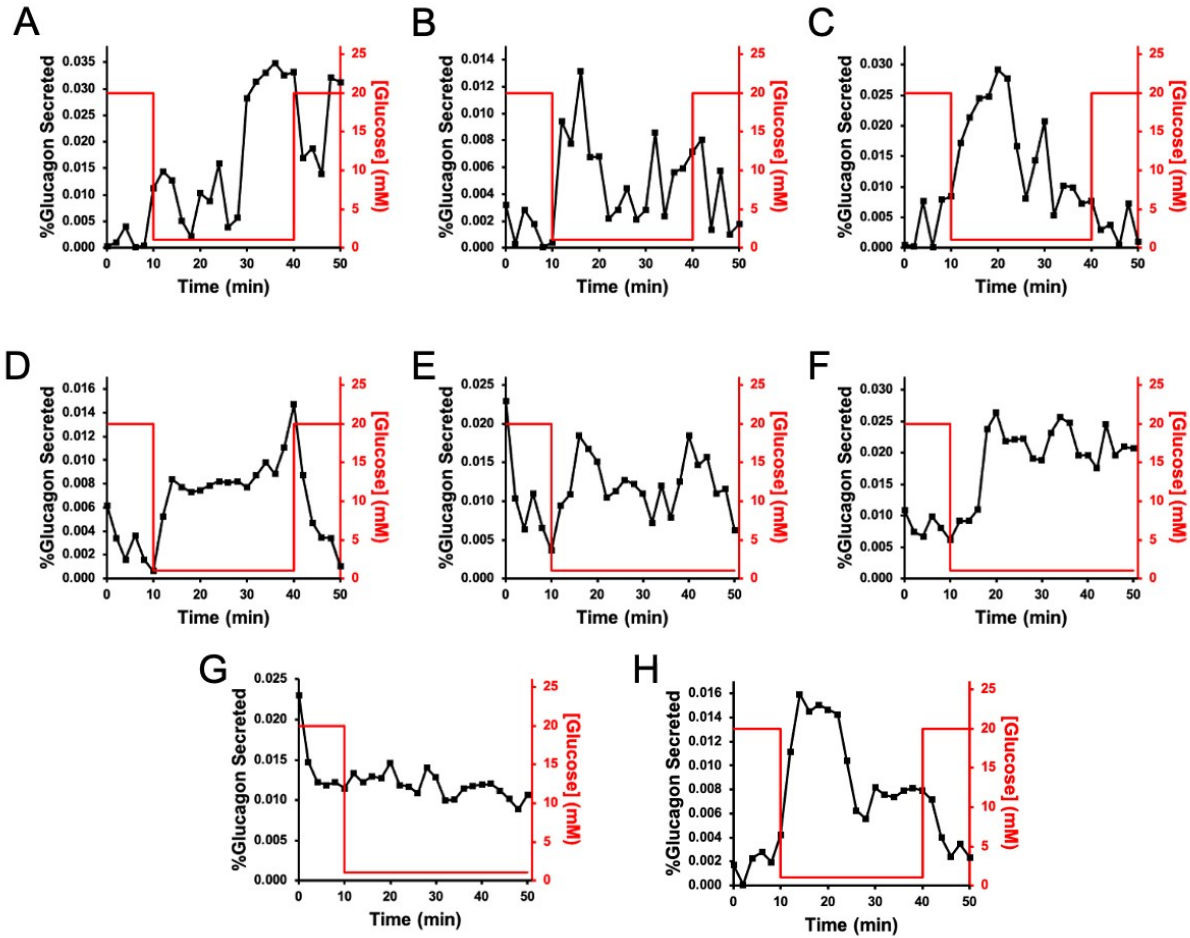
<b>Temperature (T)</b>	310.15 K
<b>Viscosity (<math>\eta</math>)</b>	$1 \times 10^{-3} \text{ N s m}^{-2}$
<b>Density (<math>\rho</math>)</b>	$1 \times 10^3 \text{ kg m}^{-3}$
<b>Volumetric Flow Rate (V)</b>	$5 \mu\text{L min}^{-1}$
<b>Porosity (<math>\phi</math>)</b>	0.1
<b>Permeability (<math>\mu</math>)</b>	$1 \times 10^{-15} \text{ m}^2$

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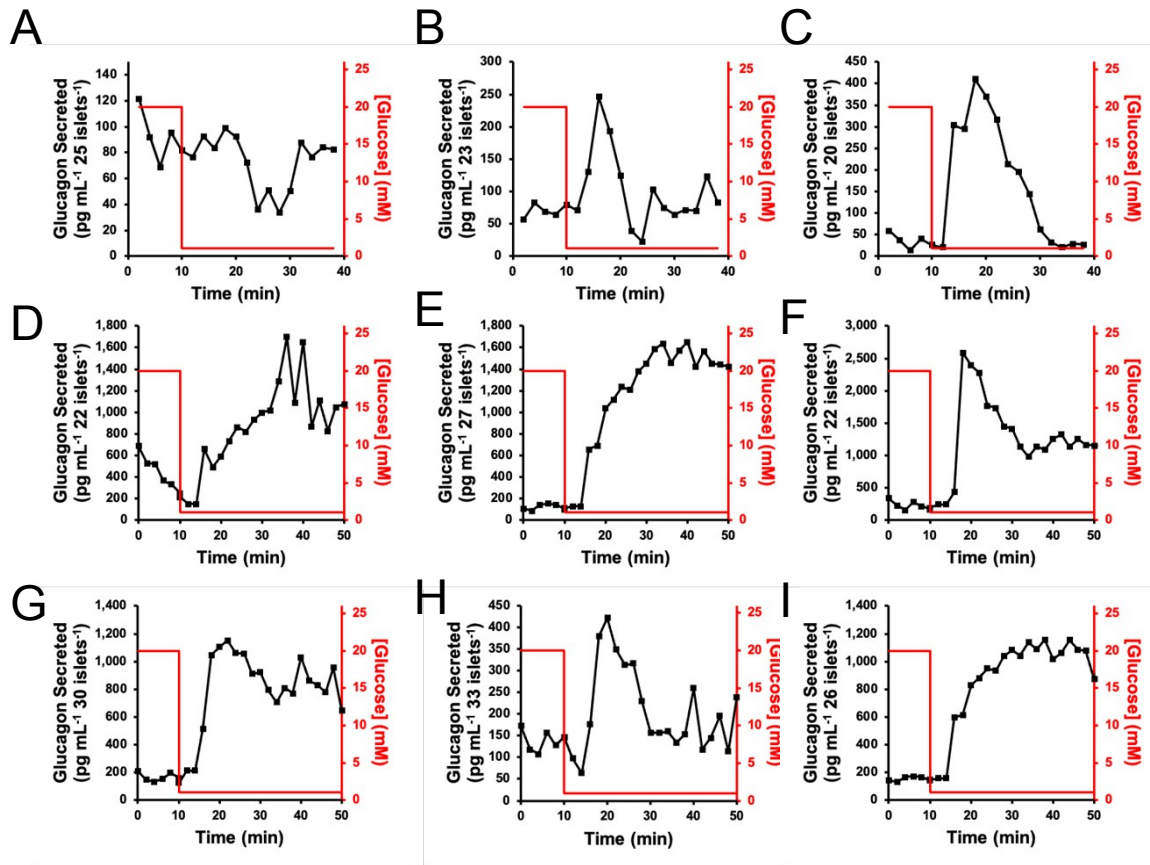
**Table S-2.** Model parameters for the finite element simulation.



**Figure S-1. Control experiments.** 25 islets from Donor 5 were exposed to a constant 20 mM glucose for the duration of the experiment. At 10 and 40 min, the flow rates from the two syringe pumps were switched to mimic the experiment for initiating glucagon release (for example, the experiment shown in Figure 4).



**Figure S-2. All glucagon secretion profiles.** All secretion profiles are shown where the total glucagon content from the islets were assayed after the experiment. The number of islets and donor for each panel were: **A)** 30 islets, donor 4 (burst), **B)** 20 islets, donor 4 (burst); **C)** 30 islets, donor 4 (burst); **D)** 45 islets, donor 4 (sustained); **E)** 30 islets, donor 3 (burst); **F)** 25 islets, donor 3 (sustained); **G)** 28 islets, donor 3 (no response); **H)** 25 islets, donor 5 (burst).



**Figure S-3. Additional glucagon secretion profiles.** Shown are additional experiments that were performed on batches of islets but the islets were not collected after the experiment. These are provided to show more of the profiles, but were not included in the data shown in **Figure 5**. **A-C)** donor 1; **D-E)** donor 2. The secretion values were not normalized to the islet number, and the islet number is given in the y-axis.