Electronic Supplementary Material (ESI) for Lab on a Chip

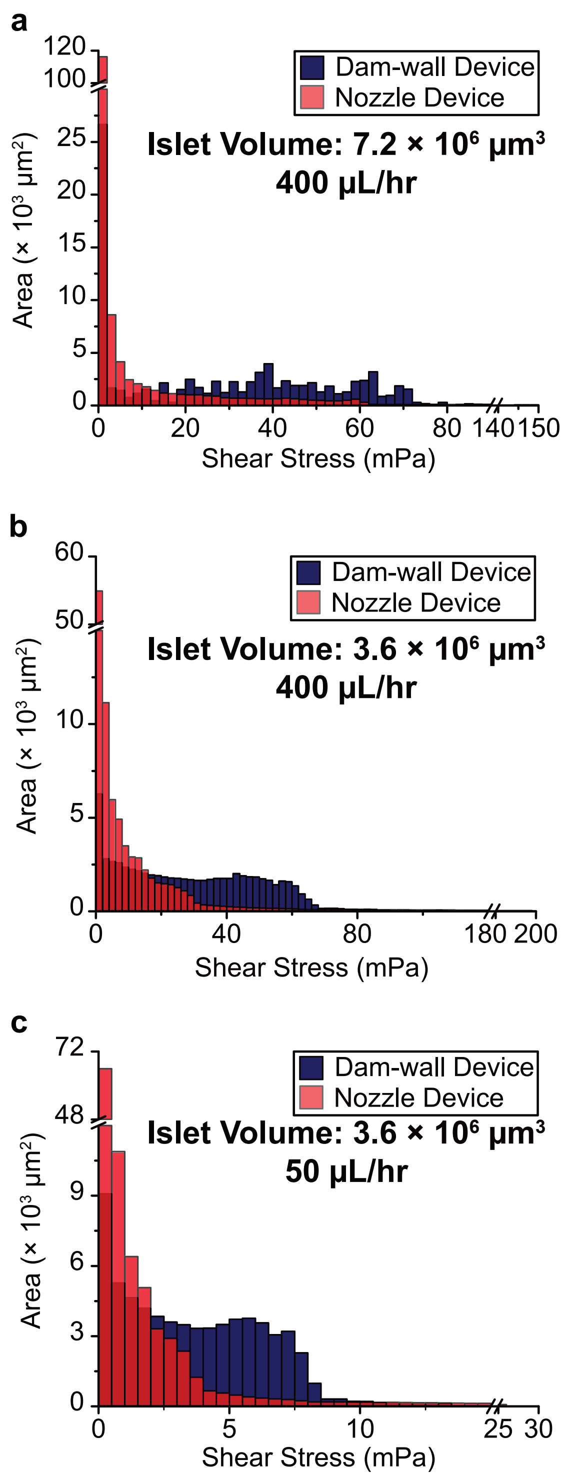

Figure S1

Figure S1. The nozzle device reduces shear stress for large and small-sized islets at slow and fast flow-rates compared to the dam-wall device. We modified the COMSOL model parameters to predict the shear stress around smaller (3.6 x 10^6 µm^3) and larger (7.2 x 10^6 µm^3) islets at slower (50 µL/hr) and faster (400 µL/hr) flow rates. (a) A histogram showing the surface area of the islet versus shear stress (mPa) from large islets in fast flow (400 µL/hr). (b) A histogram showing the surface area of the islet versus shear stress (mPa) from small islets in fast flow (400 µL/hr). (c) A histogram showing the surface area of the islet versus shear stress (mPa) from small islets in slow flow (50 µL/hr). Consistently, smaller islets tended to experience smaller shear stress due to taking up less of the channel and faster flow rates increased shear. In each case, the nozzle device showed less area experiencing higher shear stress compared to the dam-wall device.

Video 1
Title: Flow pattern around islet in Nozzle device
Caption: One µm-diameter fluorescent beads flowed at 50 µL/hr in nozzle device. Beads flow faster in the main and bypass channels than around the islet held in the nozzle.
Key words: microfluidic device, pancreatic islet, nozzle design, fluorescent beads, tissue culturing

Video 2
Title: Flow pattern around islet in Dam-wall device
Caption: One µm-diameter fluorescent beads flowed at 50 µL/hr in nozzle device. Beads flow at approximately the same speed around the islet as in the main channel.
Key words: microfluidic device, pancreatic islet, dam-wall design, fluorescent beads, tissue culturing