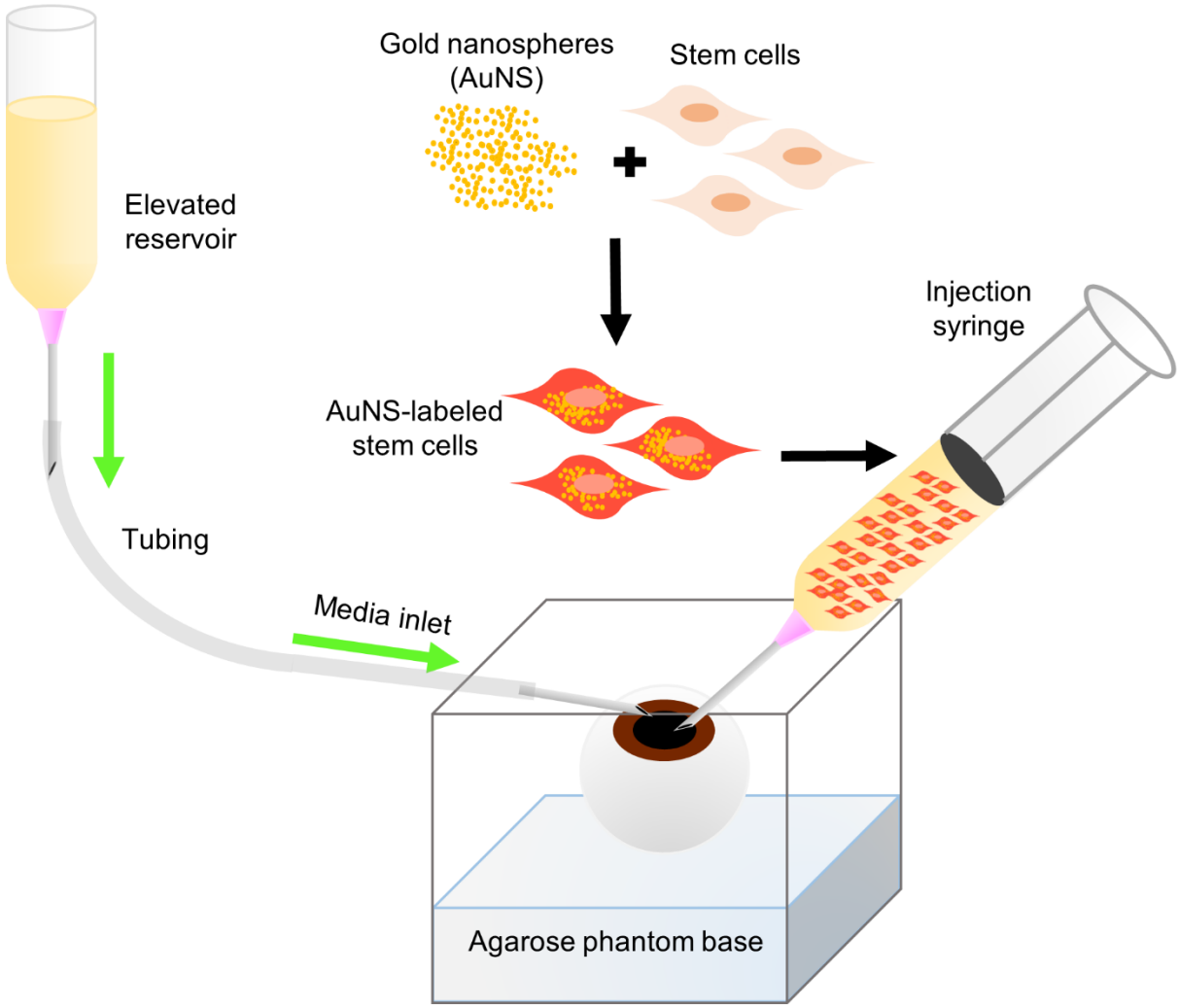
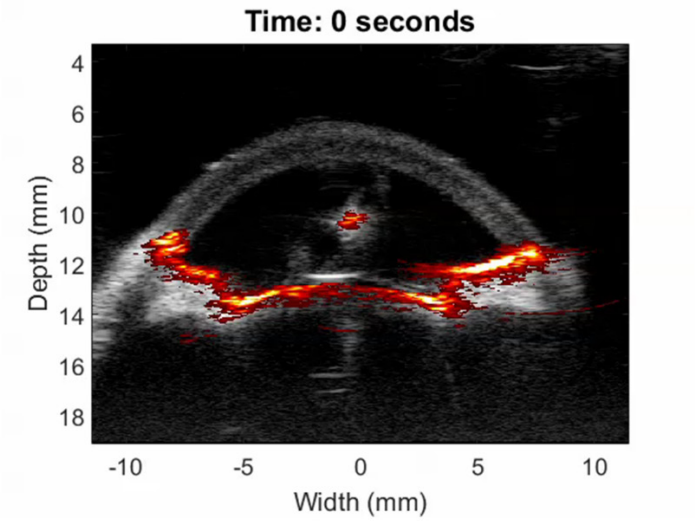


Figure S1. Ex vivo porcine eyes were hydrostatically clamped using an elevated reservoir to mimic the in vivo situation, specifically by maintaining physiological intraocular pressure and fluid flow rates within the anterior segment and through the aqueous outflow pathway. Stem cells were labeled with AuNSs and injected using a separate syringe. The elevated reservoir remained in place throughout the AuNS-labeled MSC injection and 5 hour period in the incubator. Stem cells circulated in the anterior chamber because inflowing media from the elevated reservoir drained through the trabecular meshwork, which is part of the eye's natural fluid outflow pathway.

Figure S2. Spectra of gold nanospheres (AuNSs) in solution (blue line) and of AuNS-labeled MSCs (red line). Spectra were acquired using a UV-Vis spectrophotometer. AuNS-labeled MSCs were suspended at 1k cells/μl. The peak absorption showed a red-shift, from ~ 520 nm (AuNSs in solution) to ~670 nm (AuNS-labeled MSCs), indicating AuNS endocyotosis and aggregation in intracellular vesicles [48].



Video S1 (still image). Video of AuNS-labeled MSC injection. Overlay of ultrasound (gray) and photoacoustic (red) images at λ = 680 nm. AuNS-labeled MSCs were injected into the anterior chamber through the cornea. The video depicts the injection over fifteen seconds. Prior to injection photoacoustic signals were present at melanin-rich tissues, such as the iris and trabecular meshwork. The photoacoustic signal at the center of the image was from a syringe needle. The anterior chamber appeared optically and ultrasonically clear until the AuNS-labeled MSCs were injected (t = 5 seconds). Flow was implemented in our experimental set up to circulate AuNS-labeled MSCs in the anterior chamber.