Presentation Number:

Suprachoroidal Injections Across Species via Multimodal Imaging

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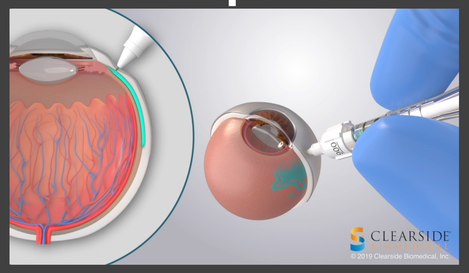
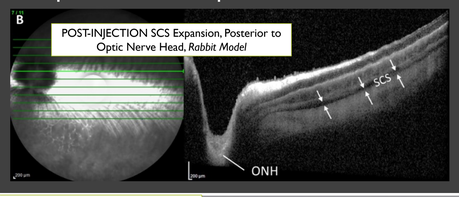
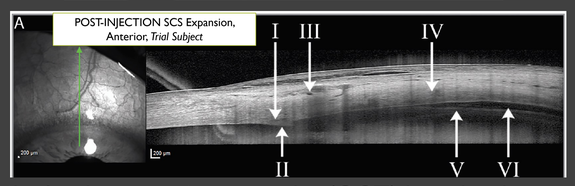
Purpose

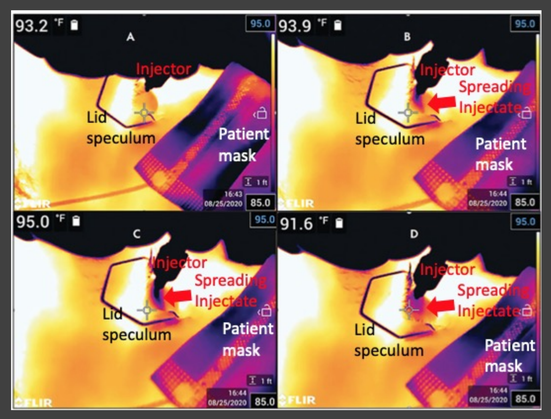


Potential spaces in anatomy refer to the area apposed organs or tissues and can present “druggable target, including the epidural space, used to deliver anesthetics, and the suprachoroidal space (SCS). After SC injection, fluid spreads circumferentially and posteriorly when injected within the suprachoroidal space.





Optical coherence tomography (OCT) imaging has demonstrated acute and transient opening in the SCS in preclinical and clinical studies.



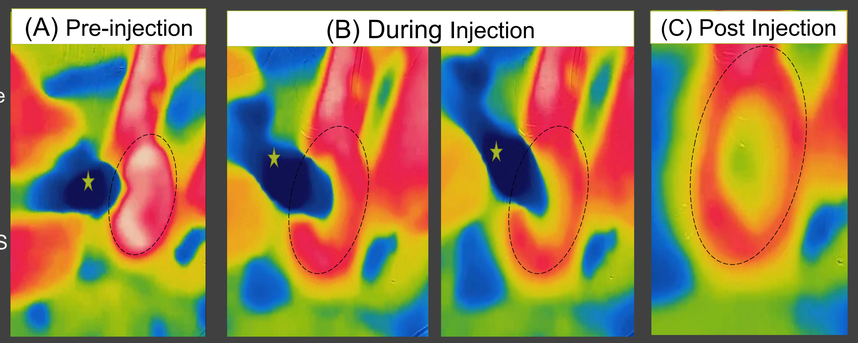
In a clinical trial patient, thermal images show a diffusely spreading temperature gradient within the quadrant of administration after SC injection of RGX-314 (RegenXbio) before dose administration (A), 18 seconds after administration (B), 21 seconds after administration (C), and 32 seconds after administration (D).

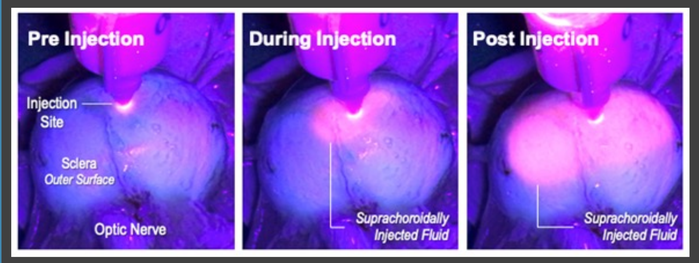
Methods

This imaging study characterized the biomedical response of injection into the SCS with the SCS Microinjector in comparison to intravitreal (IVT) injection in *ex vivo* porcine eyes.

Results

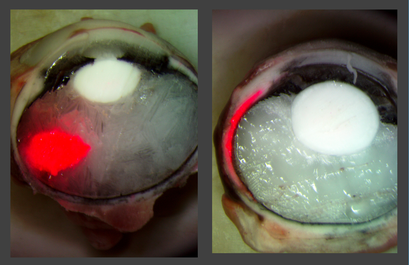
Suprachoroidally injected cold injectate into warmed ex vivo porcine eyes before (A), during (B), and immediately post (C) injection shows posterior and circumferential spread of the injectate within the SCS. Star denotes the SCS Microinjector and the dashed oval approximates the location of the eye

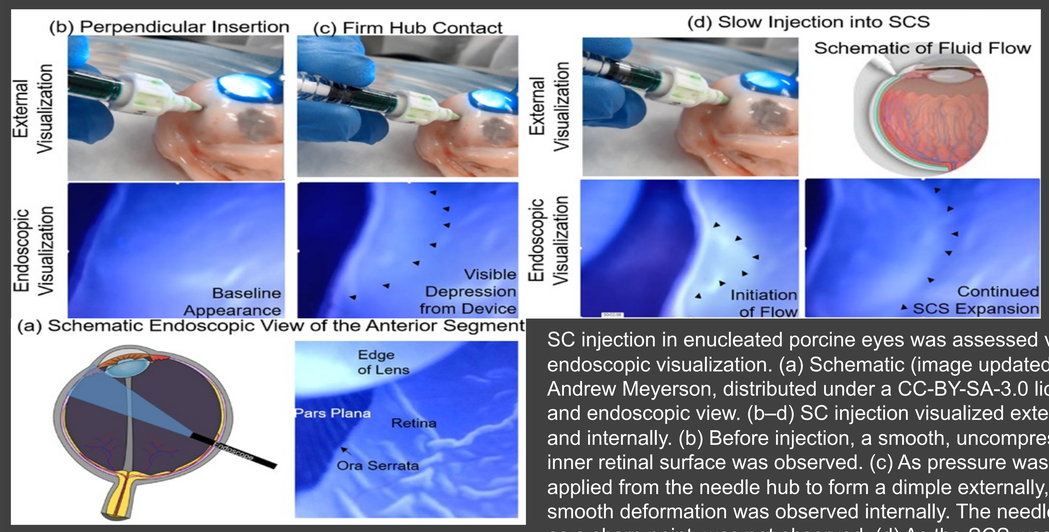




Suprachoroidally injected fluorescing dye under UV light in an ex vivo porcine eye before, during, and immediately after injection shows posterior and circumferential spread of the injectate within the SCS.

Intravitreal (left) and suprachoroidal (right) injection of 0.1 mL dye, following by freezing and sectioning show fluid distribution.





SC injection in enucleated porcine eyes was assessed via endoscopic visualization. (a) Schematic (image updated from Andrew Meyerson, distributed under a CC-BY-SA-3.0 license) and endoscopic view. (b–d) SC injection visualized externally and internally. (b) Before injection, a smooth, uncompressed inner retinal surface was observed. (c) As pressure was applied from the needle hub to form a dimple externally, a smooth deformation was observed internally. The needle tip, as a sharp point, was not observed. (d) As the SCS was accessed, injectate was immediately observed to flow posteriorly and circumferentially. The black arrowheads highlight the fluid boundary as it expands the SCS

Results

Imaging modalities demonstrated differences between suprachoroidal and IVT injection in distribution of injectate, tissue change, and globe behavior. When evaluated under UV light, suprachoroidal injection of fluorescing particles showed spread circumferentially and posteriorly. No injectate spread was visible with the IVT injection, as fluorescence is muted by the pigmented choroid and RPE. Cryofreezing and section showed suprachoroidally injected injectate spread posteriorly toward the macula, between the sclera and choroidal tissues. Intravitreal injection showed a bolus of injectate located in the vitreous. Endoscopic footage of *ex vivo* porcine suprachoroidal injection showed a localized depression of the choroidal tissues when the procedure is begun, followed by SCS expansion as fluid is injected. Corresponding imaging during IVT delivery demonstrated differences in spread of injectate within the globe.

Conclusions

In contrast to intravitreal delivery, suprachoroidal drug delivery results in acute opening of the SCS, supporting the potential to target affected tissue layers in chorioretinal disorders.

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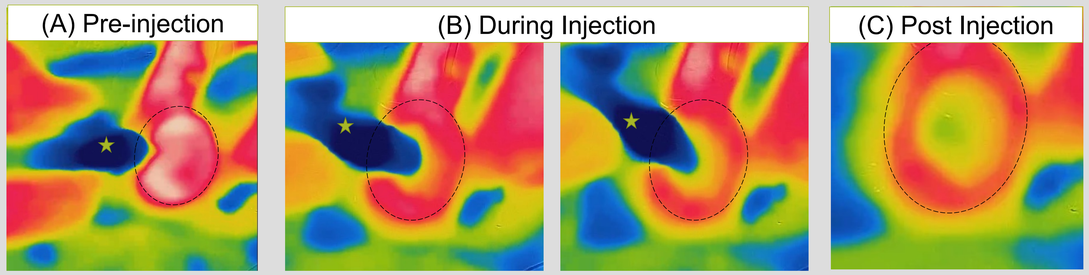
(A) Pre-injection
(B) During Injection
(C) Post Injection