



Technique Refinements for Reducing S-Stamp Associated Cell Loss on DMEK Grafts

Joshua Galloway, CEBT

Philip Dye, CEBT, Kelly Odell, Mark A. Terry, MD, and Khoa D. Tran, PhD

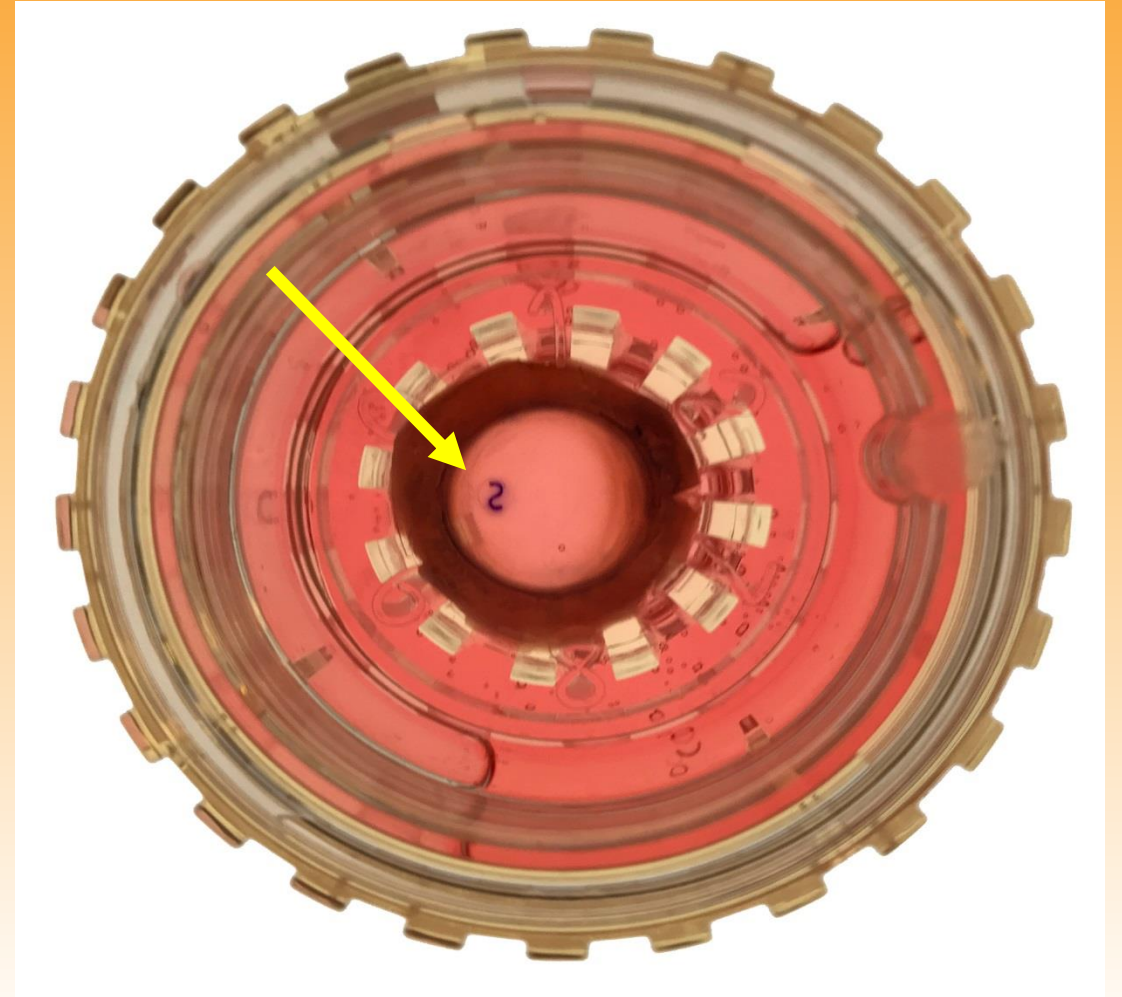
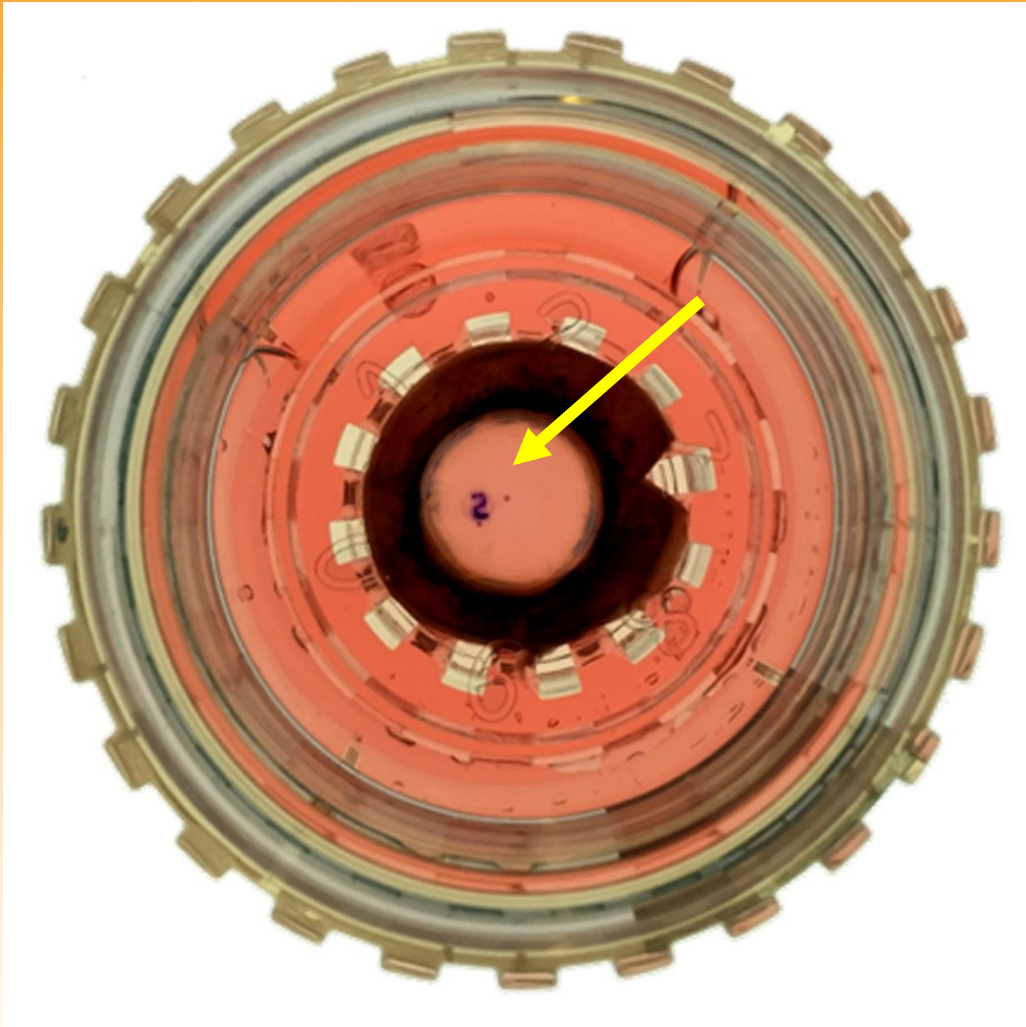
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Are all S stamps created equal?

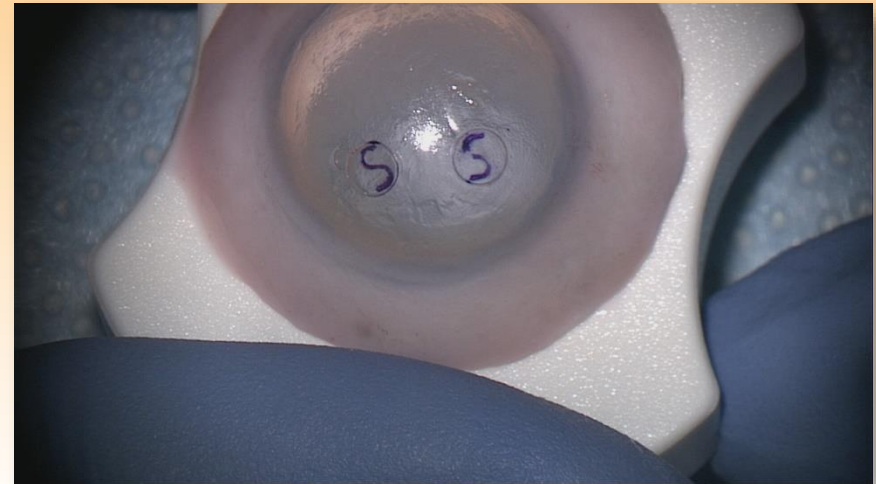
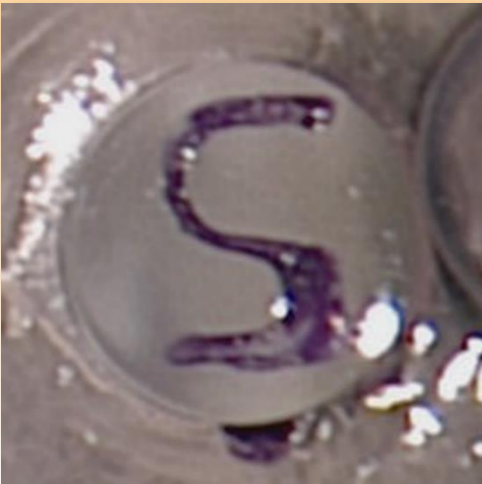
- Two part study was conducted to:
 1. Determine what effect the size of S stamp has on endothelial cell loss (ECL) in tissues prepared for Descemet Membrane Endothelial Keratoplasty (DMEK).
 2. Determine what effect timing of ink application has on ECL in tissues prepared for DMEK.

Thick versus Thin



Experimental Design

- Nineteen (19) corneas were prepared by standard DMEK technique, categorized by S stamp size, placed in storage for two days, then analyzed.
- Five additional corneas were given two S Stamps each
 - Group 1: Stromal window closed immediately after stamp application
 - Group 2: 30 seconds “dry time” elapsed before stromal window closure



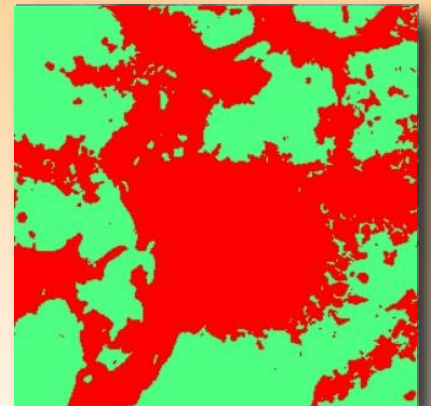
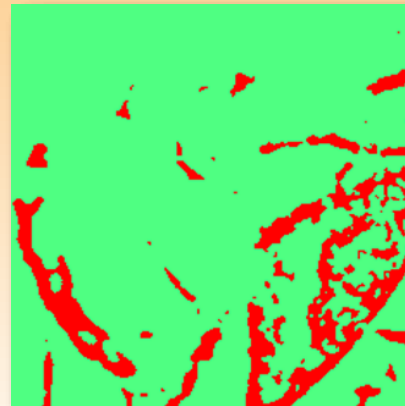
Experimental Design

- 19 S Stamps were categorized into “thin” or “thick” groups
- Two days post processing evaluation protocol:
 - Light microscopy
 - Calcein-AM staining
 - FIJI analysis

Thin S Stamp



Thick S Stamp



Results

- All S Stamps were visible after 2 days storage
- Thin S Stamps:
 - 9 contributed to <1% total ECL

Tissue	S Stamp Damage	Total area (pixels)	S-Stamp Damage (% of area)	2mm area 6.25% of total graft	Total damage
08740D	134414	1034431	0.114997284	0.0625	0.72%
06920D	162758	1004987	0.139378032	0.0625	0.87%
02970S	104129	1071955	0.088538744	0.0625	0.55%
02970D	140834	1029621	0.120324147	0.0625	0.75%
01580S	174983	992919	0.149826783	0.0625	0.94%
09240S	162993	1004799	0.139573657	0.0625	0.87%
08100S	162743	1004577	0.139415927	0.0625	0.87%
08190S	139979	1036420	0.118989391	0.0625	0.74%
09150D	163768	1003876	0.140255078	0.0625	0.88%

- Avg ECL 0.80% (0.55-0.94%)

Results

- The other 5 “thin” s stamps:

Tissue	S Stamp Damage	Total area (pixels)	S-Stamp Damage (% of area)	2mm area 6.25% of total graft	Total damage
0692OS	246436	923639	0.210615559	0.0625	1.32%
0419OS	293051	877035	0.250452531	0.0625	1.57%
0407OD	289932	880219	0.247773151	0.0625	1.55%
0810OD	320416	848171	0.274190967	0.0625	1.71%
0874OS	249808	918423	0.213834421	0.0625	1.34%

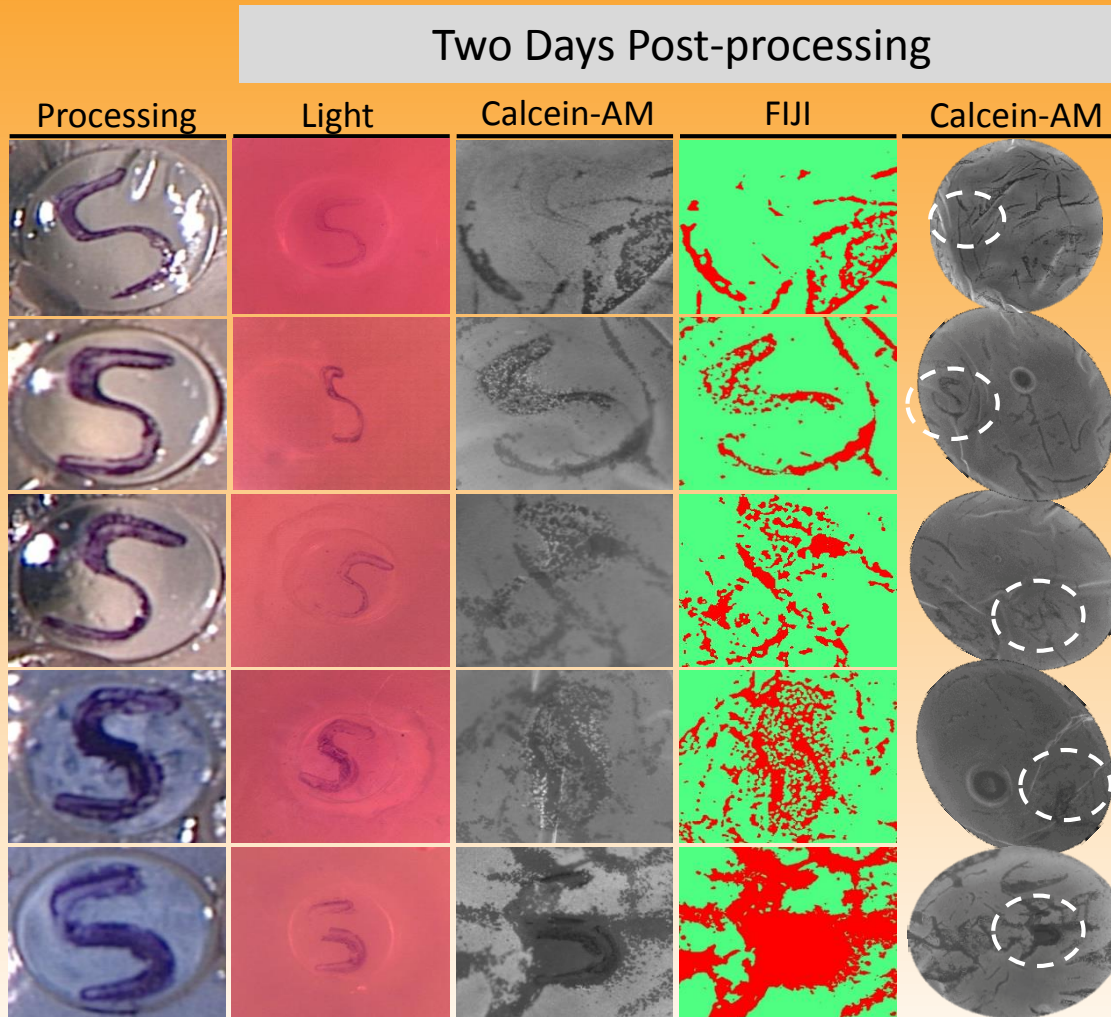
- Average 1.5% ECL (1.32-1.71%)

- 5 “thick” s stamps:

Tissue	S-Stamp Damage	Total Graft Area (pixels)	S-Stamp Damage (% of total graft)	2mm area 6.25% of the total graft	Total Damage
0419OD	402912	764899	0.345014733	0.0625	2.16%
0819OD	405169	763100	0.346811394	0.0625	2.17%
0988OS	402739	764382	0.345070477	0.0625	2.16%
0988OD	744632	422796	0.637839764	0.0625	3.99%
0183OS	457903	709642	0.39219302	0.0625	2.45%

- Average 2.58% (2.16-3.99%)

Results



Grouped S-stamps in to Thin and Thick groups.

- Thin S-stamps:

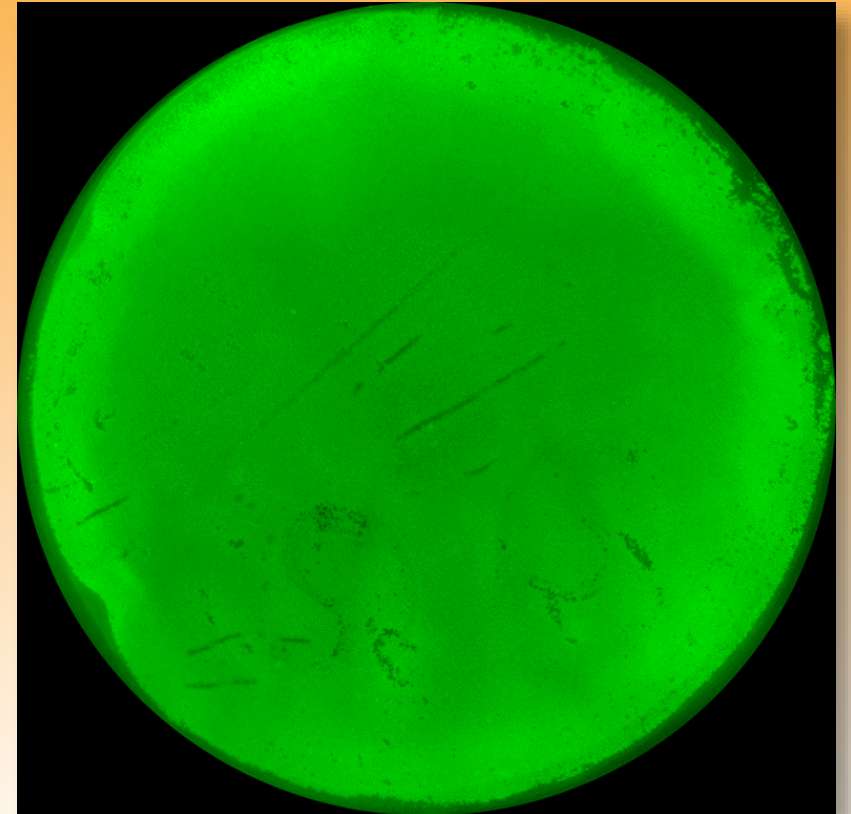
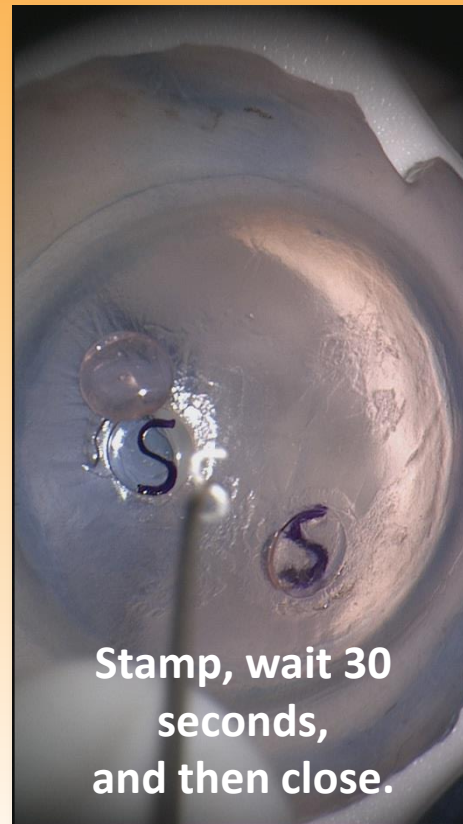
- 9 contributed to < 1% total ECL.
- 5 contributed between 1 and 2% of total ECL.
- Average total ECL 1.10%

- Thick S-stamps:

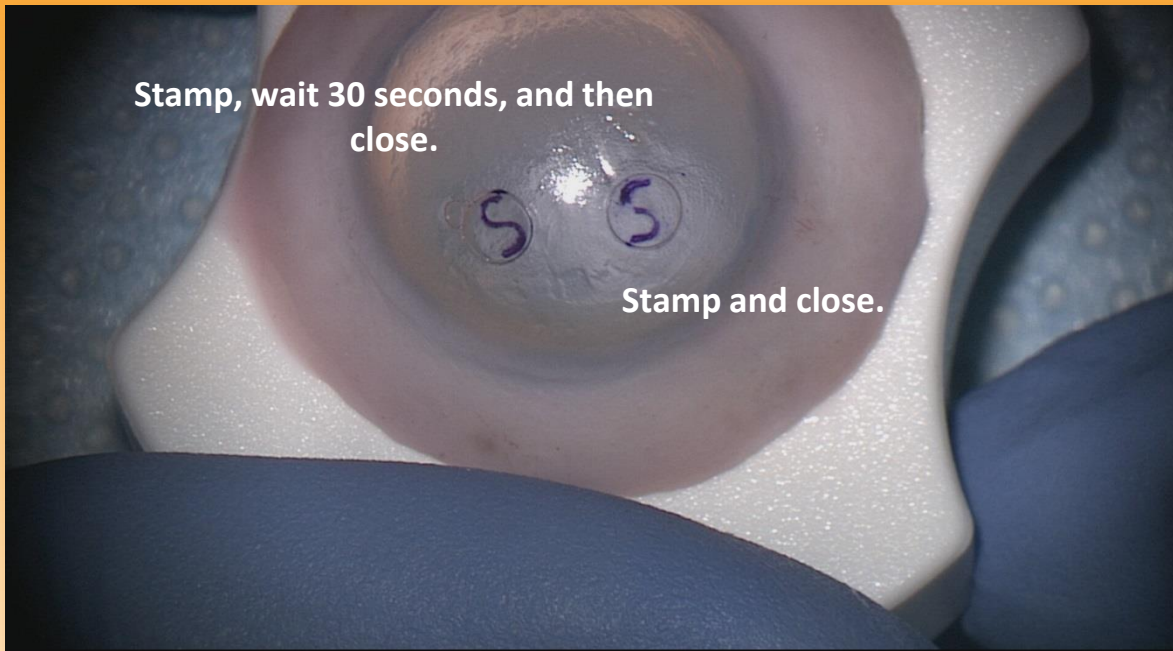
- 5 contributed between 2-4% of total ECL
- $P = .005$

Experimental Design

- A larger but thinner S stamp was applied to 5 more grafts

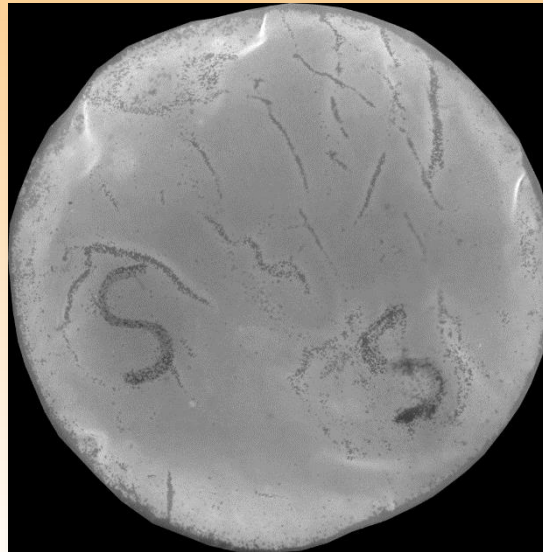
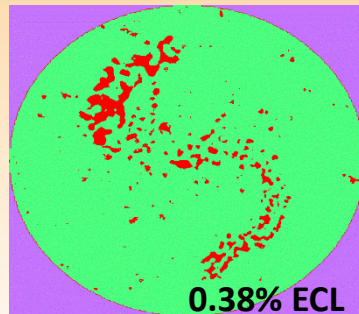
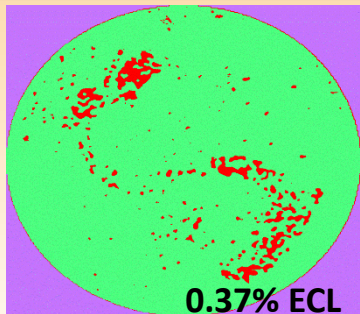


Results part two



No dry time	
Tissue	Total Damage
160OD	0.67%
160OS	0.38%
222OD	0.93%
233OD	0.72%
233OS	1.11%
Avg = 0.76%	

30 Seconds dry time	
Tissue	Total Damage
160OD	0.37%
160OS	0.37%
222OD	0.63%
233OD	1.01%
233OD	0.60%
Avg = 0.60% P = .30	

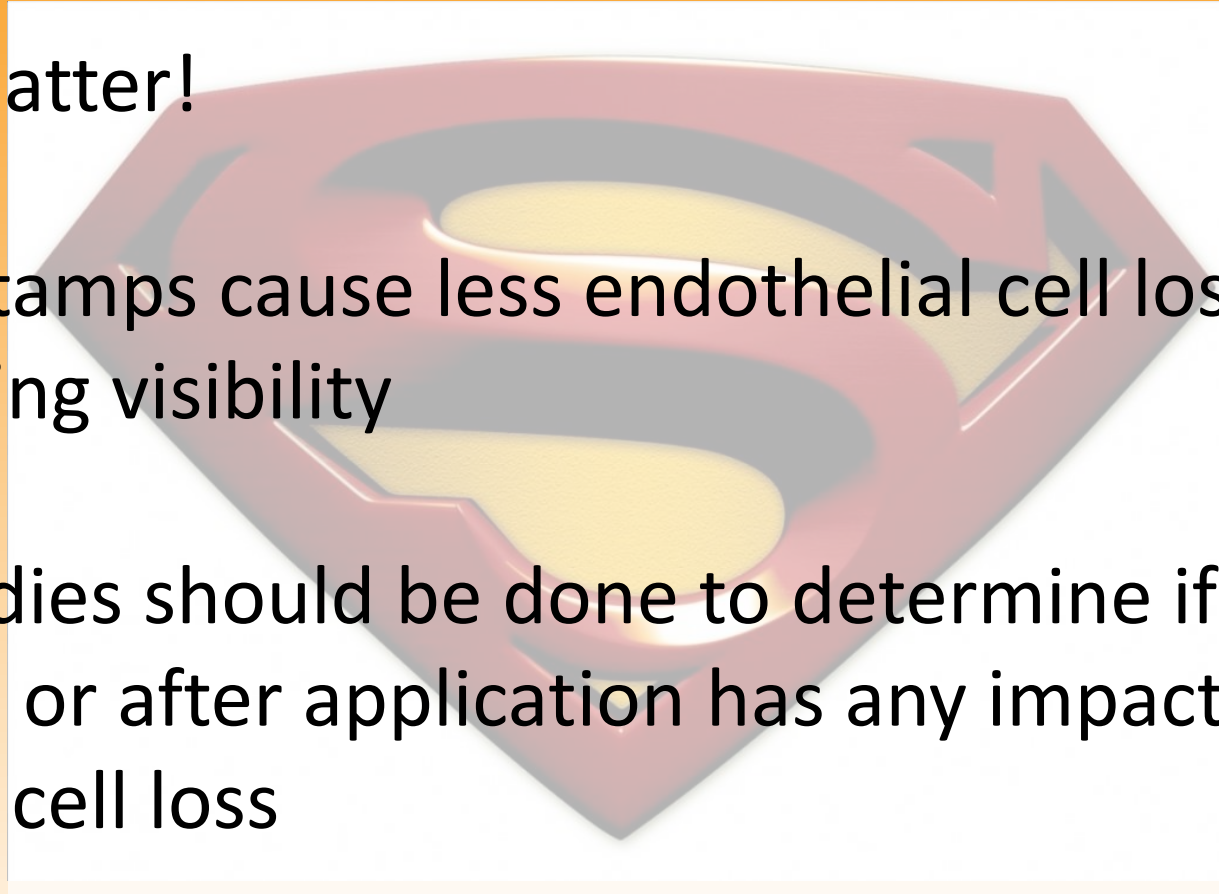


New S-stamps (bigger, but thinner):

All appeared as "thin" s-stamps.
All 10 had <1.2% tissue damage (Avg: 0.7% ECL).

It's all about the “S”

- Size does matter!
- Thinner S Stamps cause less endothelial cell loss without compromising visibility
- Further studies should be done to determine if S Stamp dry time before or after application has any impact on endothelial cell loss



Thank You

