Direct Comparison of Fractional Carbon Dioxide Lasers Systems: Ablative Well Properties and Healing

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CONCLUSION HEADLINE

Fractional CO_2 laser delivery settings, including laser fluence and density, utilize the same nomenclature across different laser systems. However, these properties are often calculated using different algorithms and can result in substantially different ablative well properties, affecting wound healing.

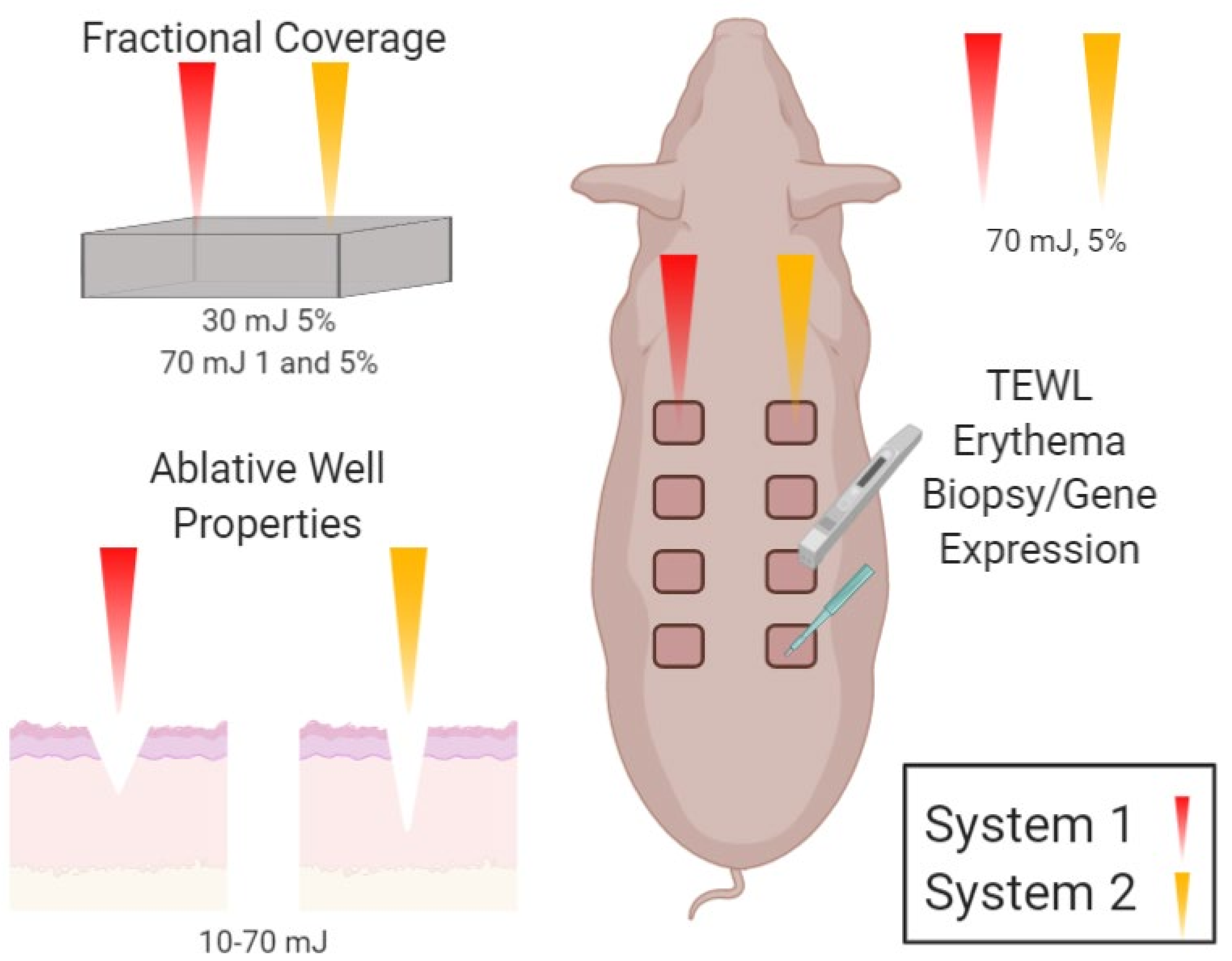
SIGNIFICANCE STATEMENT

Laser setting should not be considered interchangeable in different units. The same fluence and density settings result in different ablative wells which may alter outcomes.

INTRODUCTION

- Ablative lasers are a common tool for burn scar remodeling
- A wide variety of $FXCO_2$ lasers are available
- Many combinations of laser fluence and laser density can be selected
- Clinical outcomes may be dependent on selecting the appropriate fluence and density for scar being treated
- Two different $FXCO_2$ laser units were utilized clinically with the same fluence and density settings
  - Tissue response and outcomes observed to differ between the two systems

OBJECTIVE: Compare ablative well properties, fractional coverage, and healing between two different laser systems using a porcine burn-autograft model.



RESULTS

Figure 1: Fractional coverage differs between laser systems, even when identical density settings are utilized.

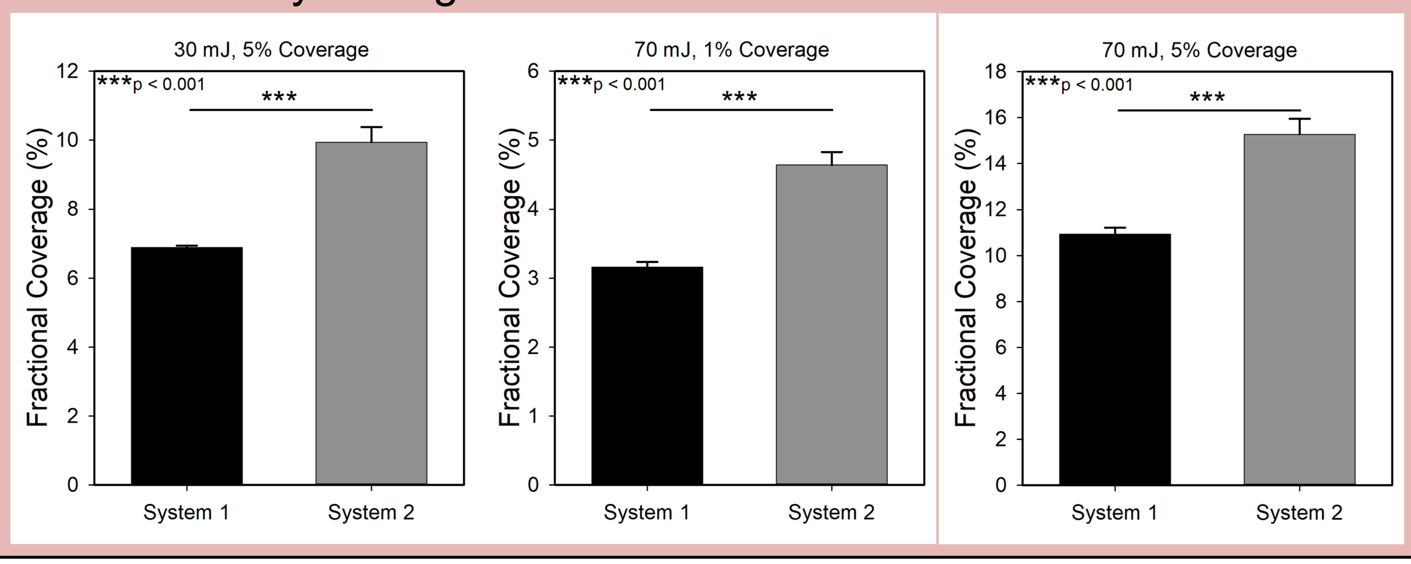


Figure 2: Burn scars treated with different laser systems have no difference in re-establishment of barrier function or change erythema post laser.

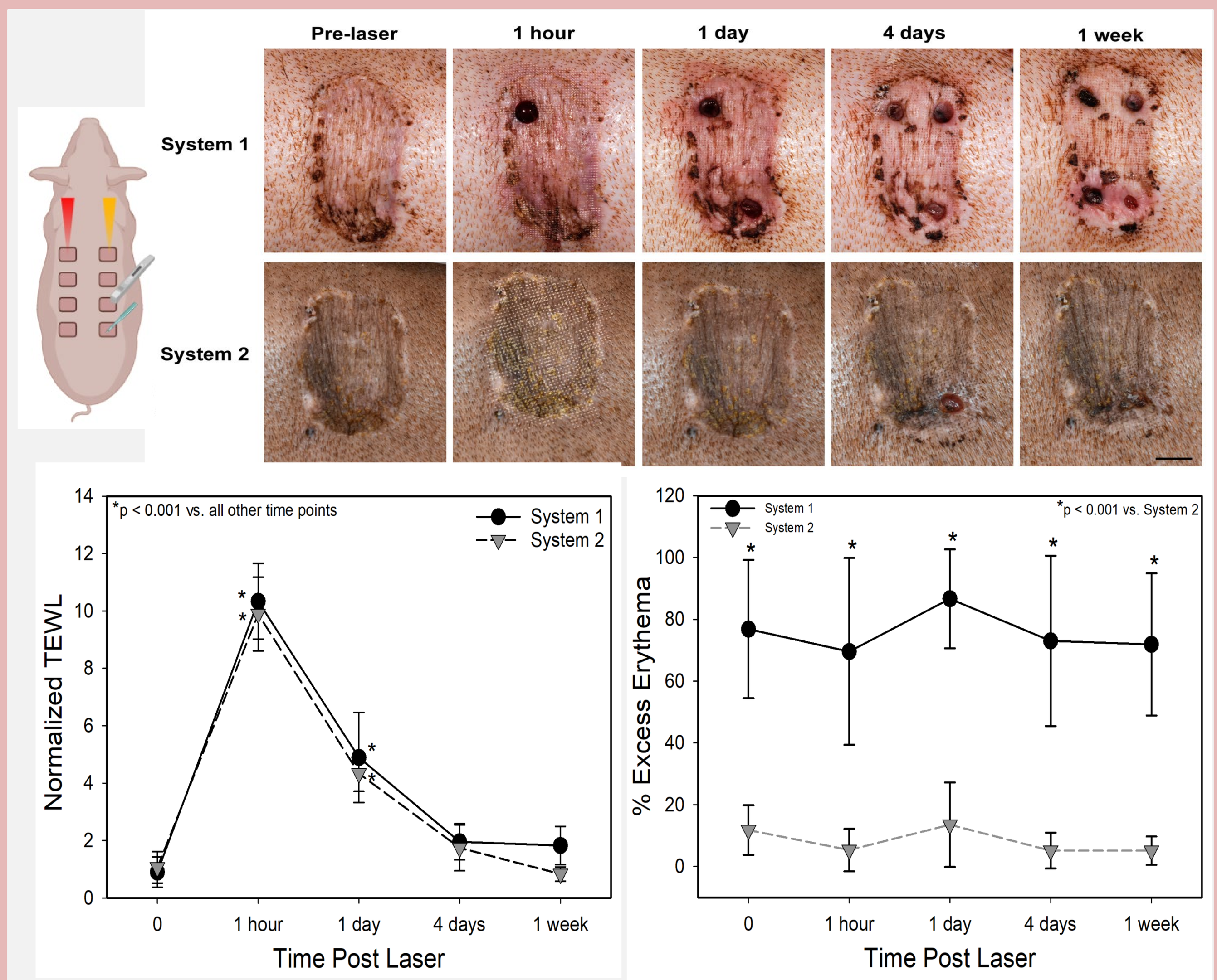


Figure 3: Histological analysis of ablative wells demonstrate differences between laser systems utilized at identical power settings.

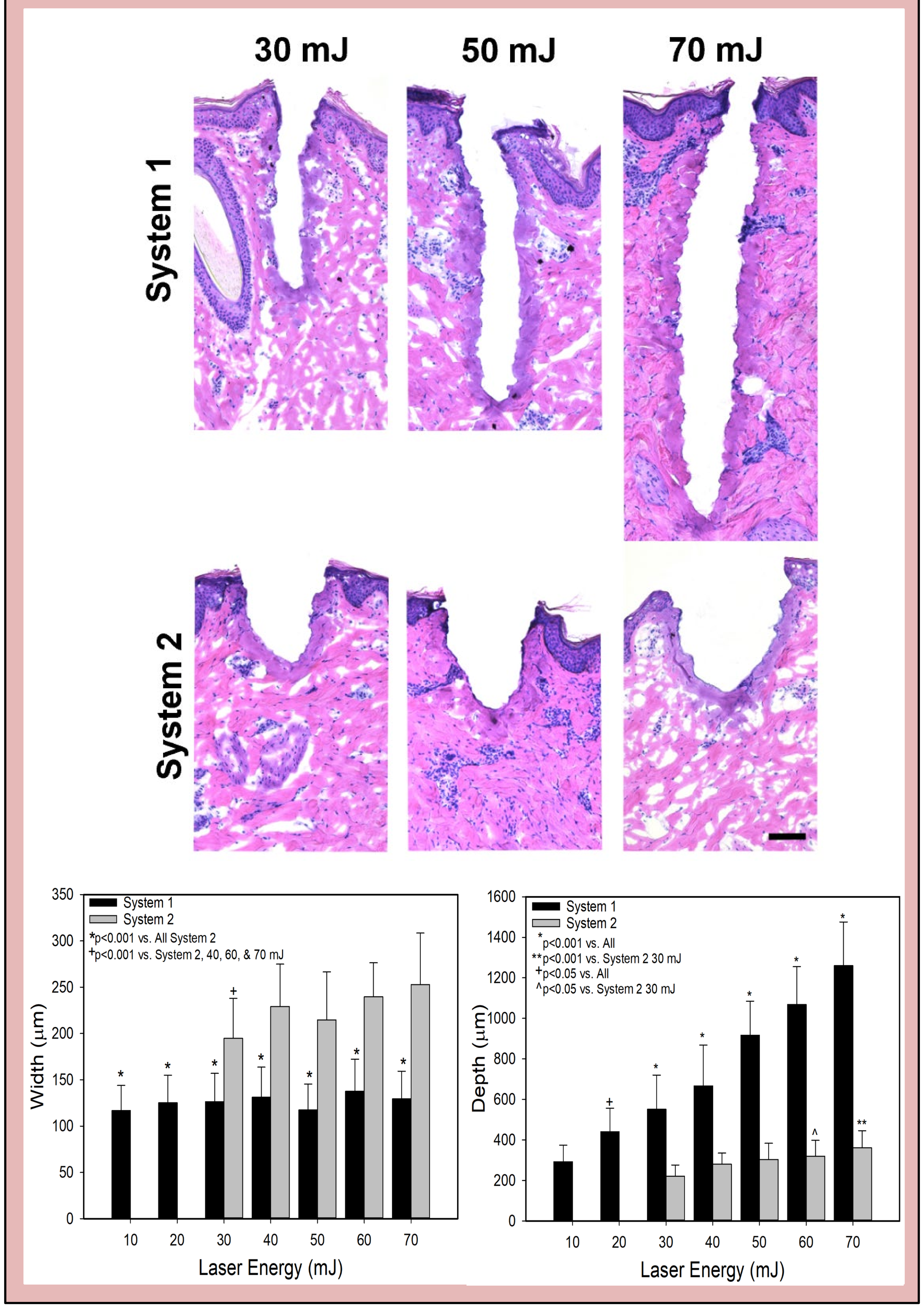
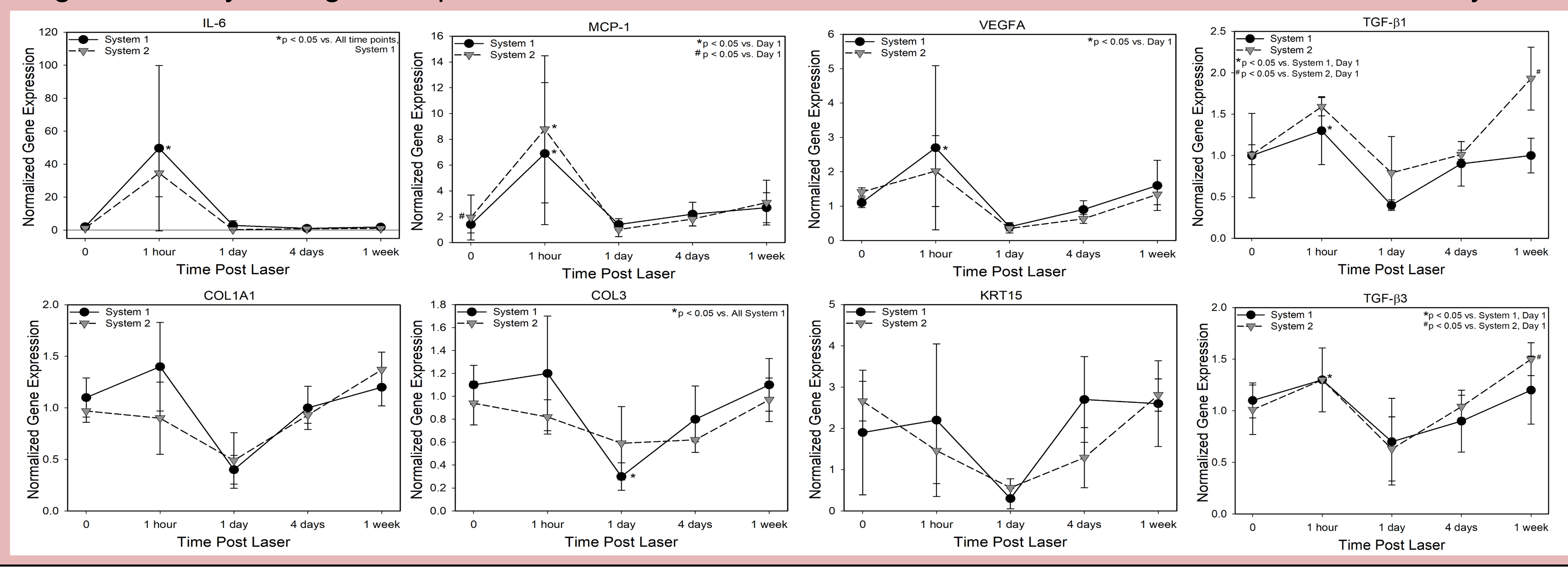


Figure 4. Analysis of gene expression after laser treatment revealed minor differences between laser systems.



SUMMARY of DATA

- System 1 created deep, narrow wells while System 2 created shallow, wide wells
- At the same setting, significantly different wells are produced
- No differences in TEWL but significantly greater erythema in System 1
- No change in gene expression for genes encoding for pro-inflammatory cytokines, ECM proteins or keratinocyte markers

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