Evaluation of Radioprotective Efficacy of ADM and DFO in Tissue Expansion Followed by Radiation

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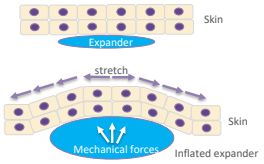
INTRODUCTION

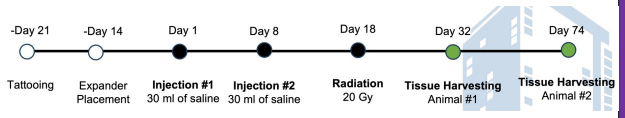
- Tissue expansion (TE) expansion induces cell proliferation and blood vessel formation.
- TE are widely used in the reconstructive surgeries to produce extra skin.
- Complications are not rare especially in patients receiving radiation treatment.

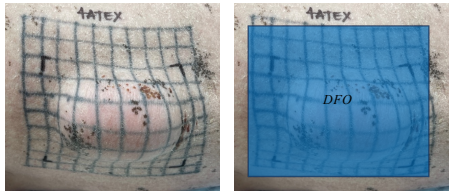
We sought to investigate two modalities to improve TE in irradiated skin:

1. Deferoxamine (DFO)
2. Acellular Dermal Matrix (ADM)



METHODS





- Four 10x10cm grids tattooed on the back of the pig.
- Each pig received one expander without ADM, one expander covered in ADM, and one expander with DFO.
- TE was performed with 2 weekly injections of 30ml of saline.
- Skin samples were harvested at 2 weeks and 8 weeks after radiation.

RESULTS

Effect of ADM + DFO on Skin Vascularity

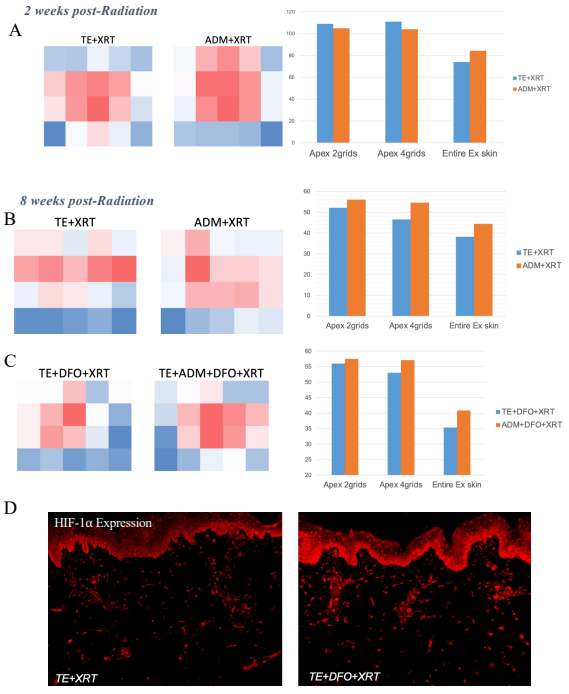


Figure 1: Using the handheld SPY-PHI® and immunofluorescence (IF), skin vascularity was assessed. A) Two weeks after radiation, ADM has improved distribution of and value of vascularity compared to TE. B) 8 weeks after radiation, the positive effect of distribution and value of vascularity among TE with ADM was improved compared to TE alone. C) The positive affect of DFO on vascularity is also seen compared to TE alone. D) HIF-1α expression is increased in TE skin treated with DFO compared to TE alone as evidenced by IF.

Effect of ADM + DFO on Skin Elasticity

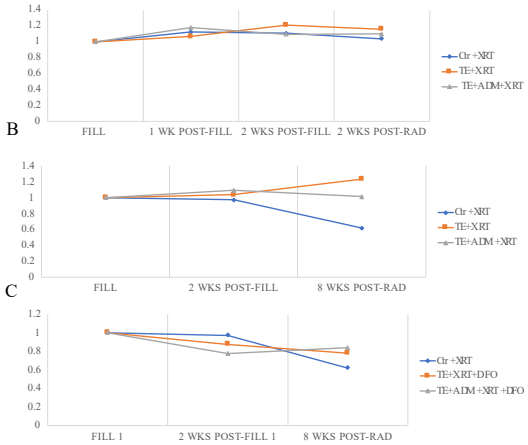


Figure 2: The cutometer was utilized to calculate elasticity of skin. A) After 2 weeks of radiation, there is no change in elasticity among irradiated non-expanded skin compared to expanded skin. B) After 8 weeks of radiation, irradiated expanded skin and irradiated expanded skin with ADM has improved elasticity compared to control. C) There is also improved elasticity when DFO is applied to irradiated expanded skin compared to irradiated non-expanded skin.

CONCLUSIONS

- ADM has positive effect on the distribution of vascularity and elasticity along expanded skin.
- DFO also improves vascularity and elasticity, however this agent does not seem to improve these parameters as much as TE and ADM alone.
- Future directions include evaluating the effect of ADM and DFO on skin growth.