

Fresh frozen plasma may decrease levels of endothelial dysfunction in burn injury patients

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Introduction

- After burn injury, patients are typically given a combination of crystalloids and colloids for fluid resuscitation.
- Fresh frozen plasma (FFP) is an adjunctive colloid solution used during burn resuscitation for patients with high total body surface area (TBSA) burns.
- FFP may reduce endothelial dysfunction associated with larger TBSA burns.
- Vascular endothelial growth factor (VEGF-A) is a cytokine that regulates angiogenesis, which is the proliferation of new vasculature.
- Angiogenesis after injury can increase inflammatory cell infiltration and lead to endothelial dysfunction.
- FFP may accomplish a reduction in endothelial dysfunction by modulating cytokine levels of adipose-derived stem cells, specifically that of VEGF-A.
- This research study aims to investigate the effects FFP may have on VEGF-A levels in burn patients.

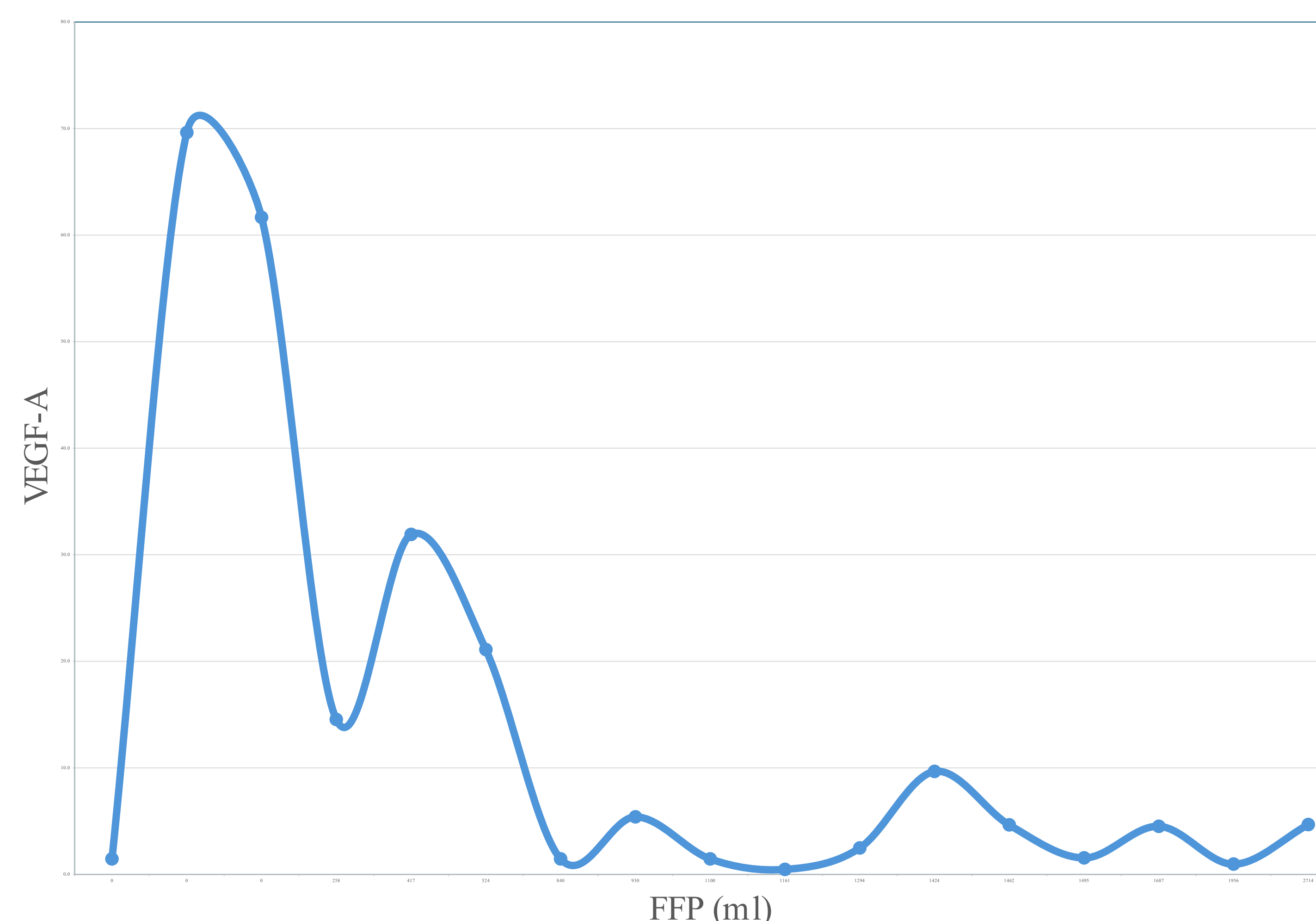
Demographics

Variable	Median	Min.	Max.
Age	61	23	78
TBSA	31	6	93
Weight (kg)	73	43.1	117.9
Adipose tissue collection day	4	2	13

Conclusion

- Spearman correlation showed a moderately-strong negative association between VEGF-A levels and FFP.
- This means that patients receiving FFP had lower levels of VEGF-A, and may have had decreased endothelial cell dysfunction.
- Decreased endothelial cell dysfunction can decrease the inflammatory state of burn injury patients and may contribute to improved healing.
- Though this correlation did approach the statistically significant p-value (<0.05), the correlation was not found to be statistically significant.
- Future studies are needed to expand the sample size to demonstrate statistical significance of the negative correlation.
- Future studies can also adjust for TBSA, as a smaller range of values may indicate stronger correlations with cytokine values.

Fresh Frozen Plasma Received vs. VEGF-A Levels



Results

- Spearman correlation coefficient: -0.458
- P-value: 0.064

Methods

- Seventeen patients with full-thickness burn injury were enrolled in this study.
- Adipose tissue was collected at median 4 days following injury.
- ADSCs were isolated from the tissue by trypsin enzyme digestion.
- Fluorescence-activated single-cell sorting of ADSCs was performed with CD105, CD90, and CD73 antibodies to determine purity.
- ADSCs were grown in standard tissue culture conditions and supernatant was collected for cytokine analysis.

References

- Desborough, M., Stanworth, S., & Curry, N. (2013). Uses and abuses of fresh frozen plasma for the treatment of bleeding. *Clinical Medicine*, 13(2), 200–202.
- Greenhalgh, D. G., Cartotto, R., Taylor, S. L., Fine, J. R., Lewis, G. M., Smith, D. J., Marano, M. A., Gibson, A., Wibbenmeyer, L. A., Holmes, J. H., Rizzo, J. A., Foster, K. N., Khandelwal, A., Fischer, S., Hemmila, M. R., Hill, D., Aballay, A. M., Tredget, E. E., Goverman, J., Phelan, H., Jimenez, C., Baldea, A., Sood, R. (2021). Burn resuscitation practices in North America. *Annals of Surgery*, 277(3), 512–519.
- Rehn, M., Olsson, A., Reckzeh, K., Diffner, E., Carmeliet, P., Landberg, G., & Cammenga, J. (2011). Hypoxic induction of vascular endothelial growth factor regulates murine hematopoietic stem cell function in the low-oxygenic niche. *Blood*, 118(6), 1534–1543.