

The Importance of Flow through an NPWT Dressing for Proper Exudate and Negative Pressure Management¹

Summary

A study was performed to characterize pressure and exudate management efficacy on systems utilizing Prospera Propel™ technology to achieve a known continuous air flow rate on modeled wounds and compare to systems with no air leak or non-continuous air flow.

Background

Negative pressure wound therapy (NPWT) has extensive evidence demonstrating benefits for healing chronic and hard-to-heal wounds²⁻⁷.

- » Pressure helps to contract the wound and stimulate cellular proliferation in generating granulation tissue^{2,8}
- » Exudate management ensures the removal of inhibitors of wound healing, and the inflow of interstitial fluid brings biomolecules that promote wound healing^{2,8}

Some wounds treated with NPWT do not respond to treatment and develop complications such as maceration, infection, or wound degradation². Why?

- » Inadequate airflow through a dressing allows exudate to accumulate
- » Exudate accumulation reduces pressure at the wound bed and causes maceration
- » Failure to deliver prescribed pressure to the wound bed may cause delayed healing
- » Mismanaged NPWT leads to complications

To properly manage wound bed pressure, a NPWT dressing requires airflow to remove exudate from the wound. This study evaluated the differences between active control and passive control enabled by incorporating Prospera Propel™ technology in the NPWT dome interface.



Methods

Prospera Propel™ technology connected to a single-lumen NPWT system was compared to a closed wound system and two market-leading dual lumen systems.

- » Testing utilized an acrylic wound model with 125 cm³ volume
- » All wound models dressed with the identical drape and black foam
- » Pressure applied to wound bed measured under the wound filler
- » Simulated exudate was introduced distal to the dome
- » A 50-cc wound pre-fill was utilized to eliminate dead space in the model wound
- » NPWT devices placed 3 feet above wound model and set to deliver 125mmHg to the wound bed

NPWT Systems Evaluated

- » Closed system (NP with no air-leak)
- » Prospera Propel in Table
- » Dual-Lumen System 1 (NPWT system for home)
- » Dual-Lumen System 2 (NPWT system for hospital)

Conditions Evaluated

- » NPWT managed in a single wound model
- » NPWT management in two wound models connected to one NPWT system

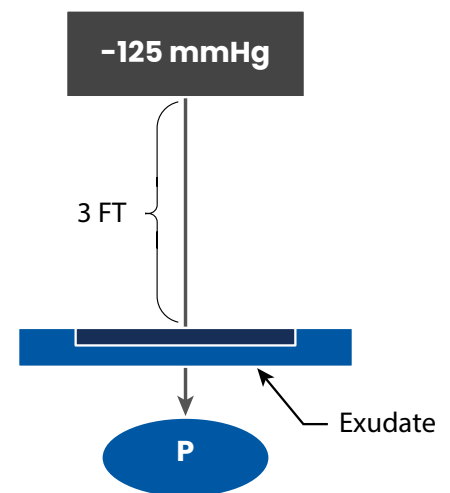


Figure 1 Experimental Design

Results - Exudate and Pressure Management in a Single Wound

Figure 2 Exudate Management in Single Wounds

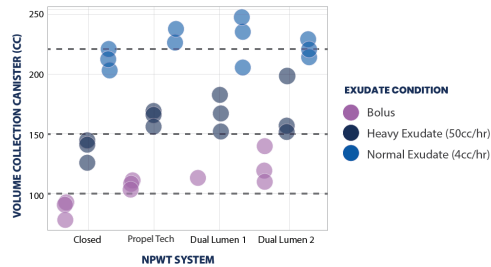
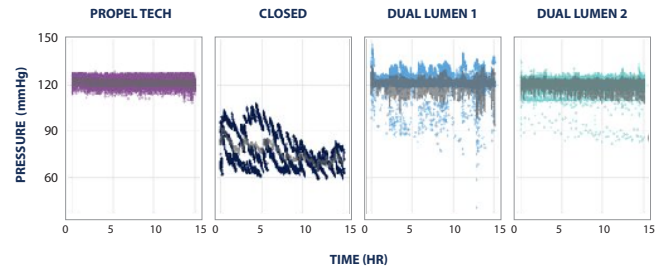


Figure 3 Pressure Data Over Time in a Single Wound

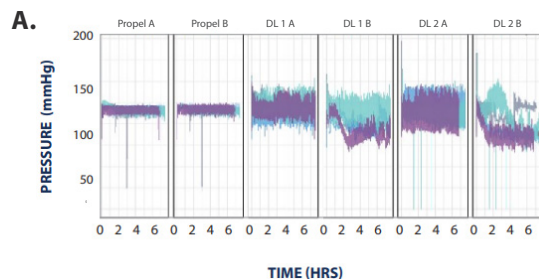


	Propel	Closed	Dual Lumen 1	Dual Lumen 2
Percent Exudate in Canister	83.8%	75.4%	82.4%	78.2%
Retained Exudate	44.2	68.8*	48.8	61.1

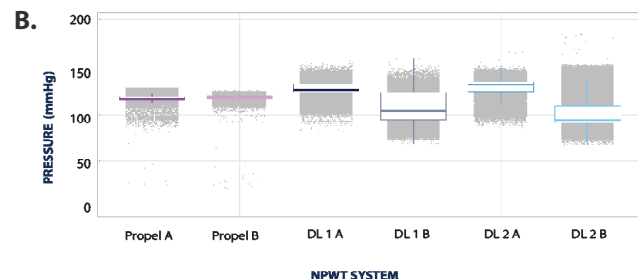
	Propel	Closed	Dual Lumen 1	Dual Lumen 2
Avg. Pressure (± 3σ; mmHg)	121.6 ± 11.3	76.3 ± 49.0	122.8 ± 17.3	121.9 ± 9.7
Percent ± 10 mmHg of 125 mmHg	99.2%	0%	96.9%	97%

Table 1 Summary Data for Single Wound Model Training

Results - Pressure Management in 2 Y-Connected Wounds



Displays pressure data against time.



Box and whisker plot with ± 10 mmHg from target pressure and individual pressure measurements.

Figure 4 Pressure Management in Y-Connected Wounds

Conclusion

Prospera Propel™ technology allows single lumen systems to show performance benefits when compared to dual lumen, no-leak systems in certain conditions. The controlled leak allows a single-lumen system to manage pressure and exudate similarly to dual-lumen systems in one wound.

- Closed system unable to maintain pressure or properly manage exudate
- Dual-lumen system had a larger dynamic range than the continuous controlled leak condition

When using a Y-connector, Prospera Propel™ Technology at both wounds allowed the single-lumen system to properly manage pressure where dual-lumen system could not in the unmonitored wound (DL 1 B and DL 2 B).

References

- Jonathan Cayce, Ph.D. MS, et al., The Importance of Flow through an NPWT Dressing for Proper Exudate and Negative Pressure Management poster presentation SAWC Fall 2023
- Orlov et al. Int. Wound J. 2023,
- Agarwal et al. J Clinical Orthopedics and Trauma 2019,
- Wynn et al. J of Tissue Viability 2019,
- Revesz et al. Jt Dis Relat Surg 2022,
- Rentea et al. J of Surgical Research 2013,
- Pedrazzi et al. Adv in Wound Care. 2021,
- Malmjsjo et al. ePlasty 2011

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