# Training Module 3

## The Science of Negative Pressure Wound Therapy

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# Upon Completion Of This Module You Will Be Able To:

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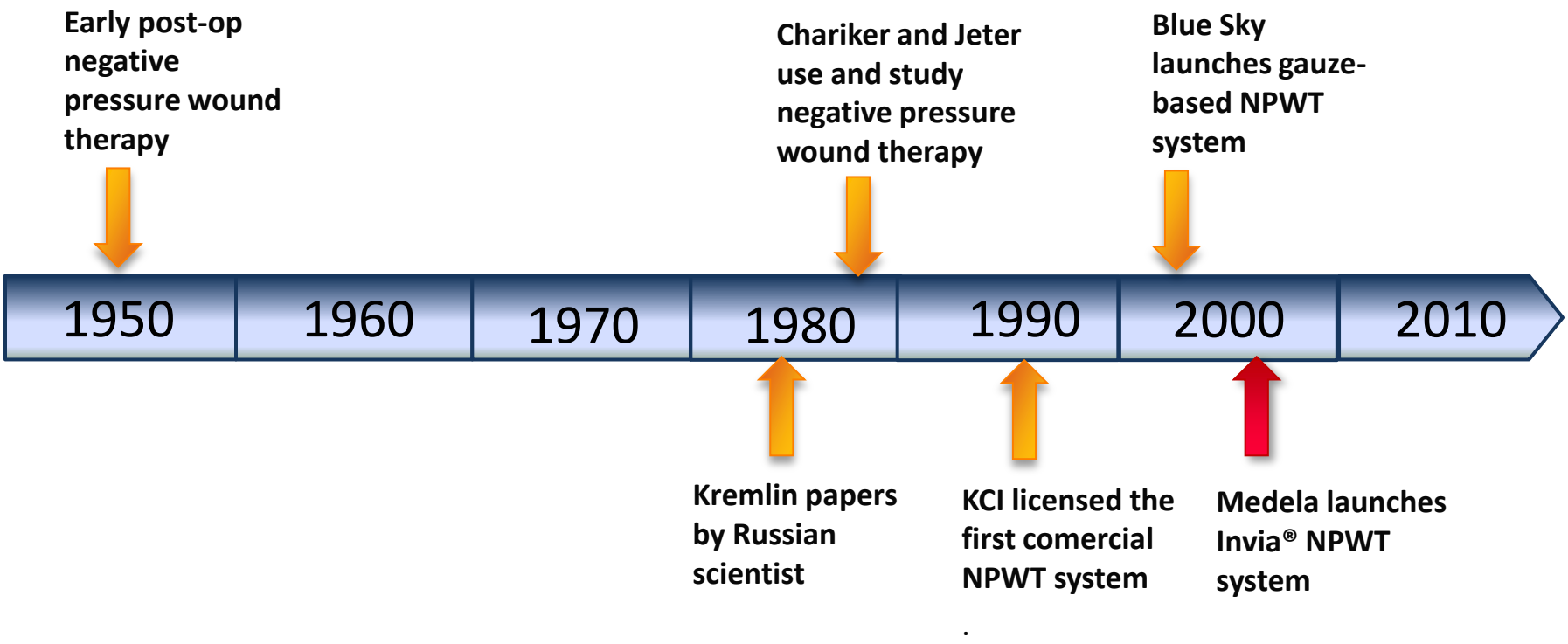
- Define Negative Pressure Wound Therapy(NPWT)
- Describe the components of a NPWT system
- Describe five effects NPWT has on the wound bed
- Identify ten reported clinical benefits of NPWT

Negative Pressure Wound Therapy(NPWT) is the application of sub-atmospheric pressure to a wound to remove exudate and debris from the wound.[1]

# NPWT Developmental History



# Components of the NPWT System

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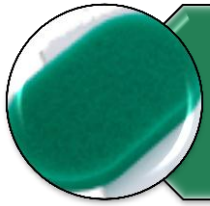
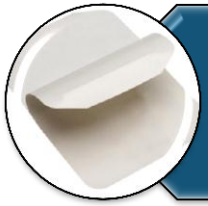
NPWT pump with canister/tubing



Wound filler dressing



Transparent film dressing

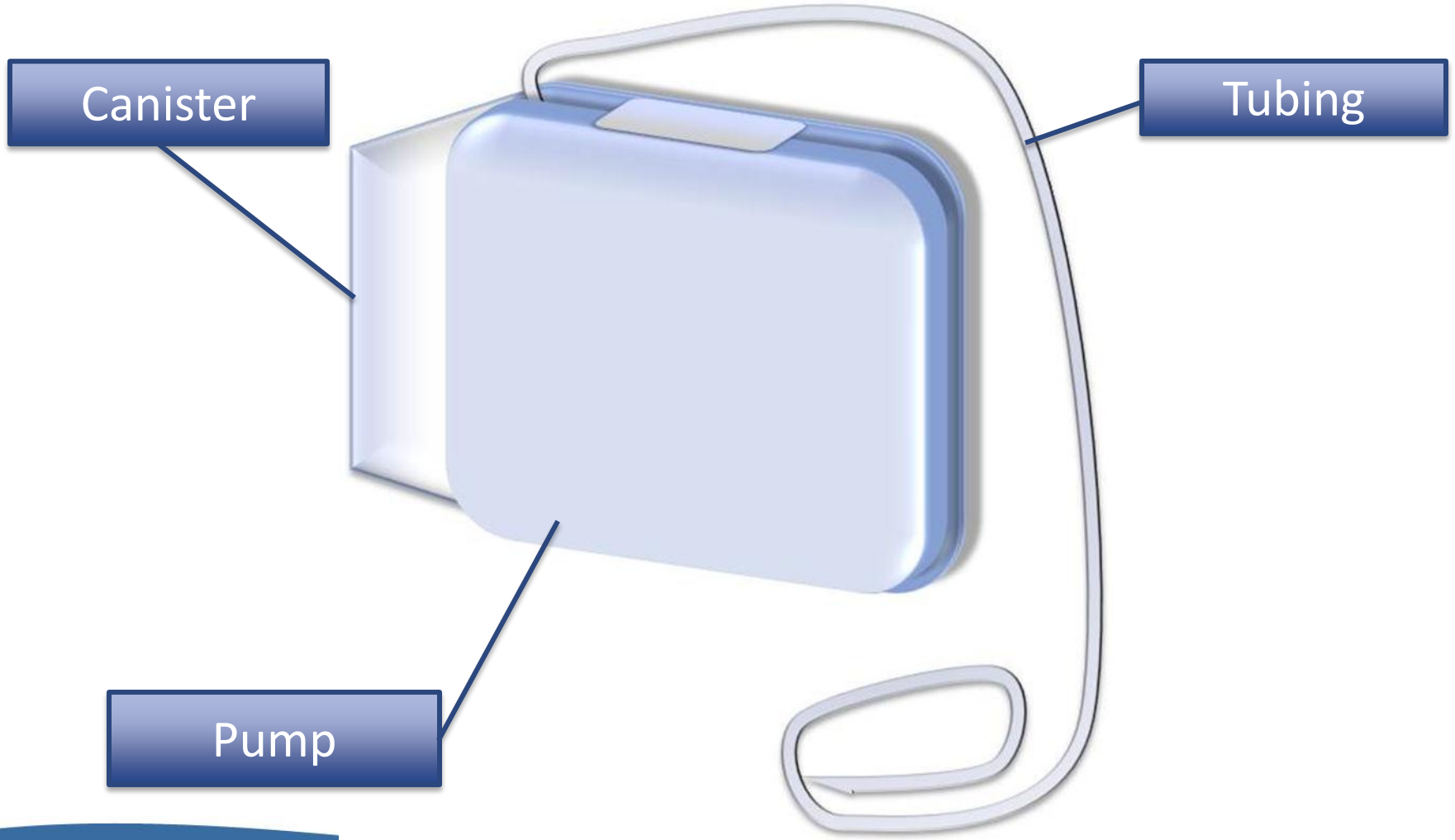
Internal/External drain connecting dressing to pump

# Multiple Types of Wound Fillers

Foam

Gauze

# NPWT Pump



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# NPWT Promotes Wound Healing By:

| | | | |
|---|---|---|---|
| Removing wound exudate [3] | Promoting granulation tissue formation[3] | Removing infectious material from the wound[6] | Maintaining a moist wound environment[2] |

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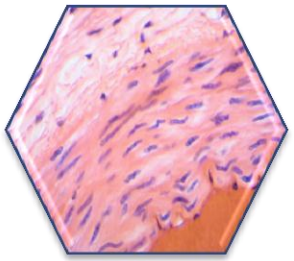
Creates a moist wound environment[2]



Promotes perfusion[3]

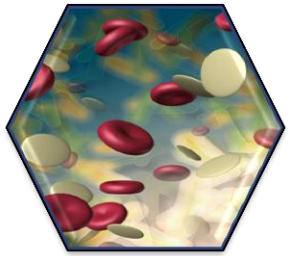
Draws wound edges together[2]

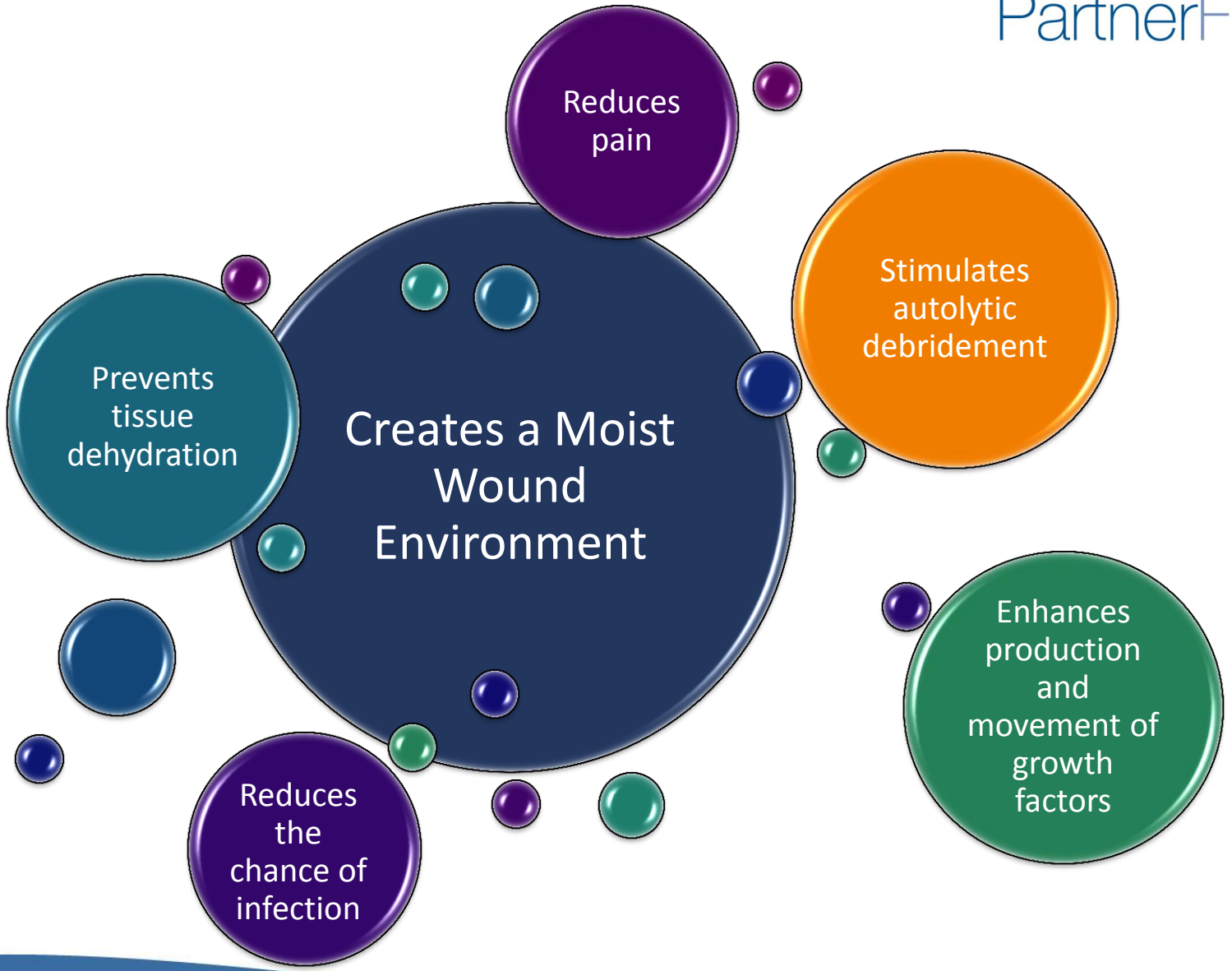
Effects of NPWT

Removes exudate and reduces edema[3]

Removes potentially infectious material from the healing area[3]

Promotes granulation tissue formation[3]




Reduces pain
Stimulates autolytic debridement
Prevents tissue dehydration
Creates a Moist Wound Environment
Enhances production and movement of growth factors
Reduces the chance of infection

# NPWT- Physically Stimulates a Biologic Response

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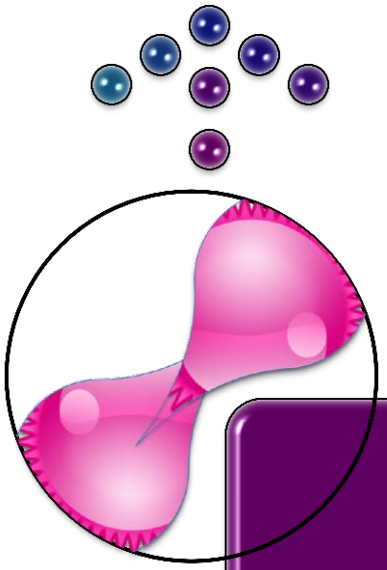
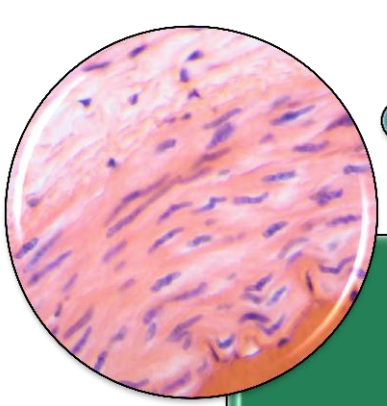
Mechanical stress has direct effects on cellular activity[3]

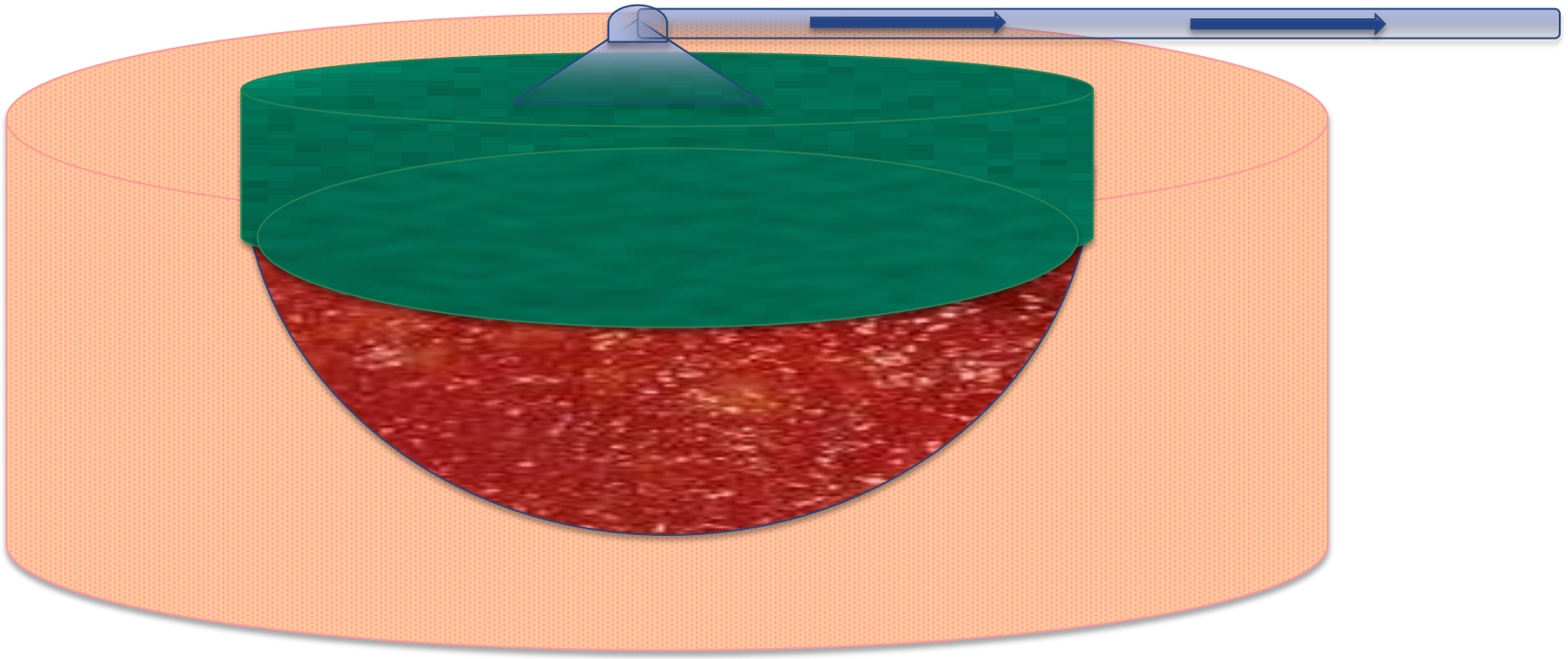


Micro-strain
(3-D stress within cells)[8]



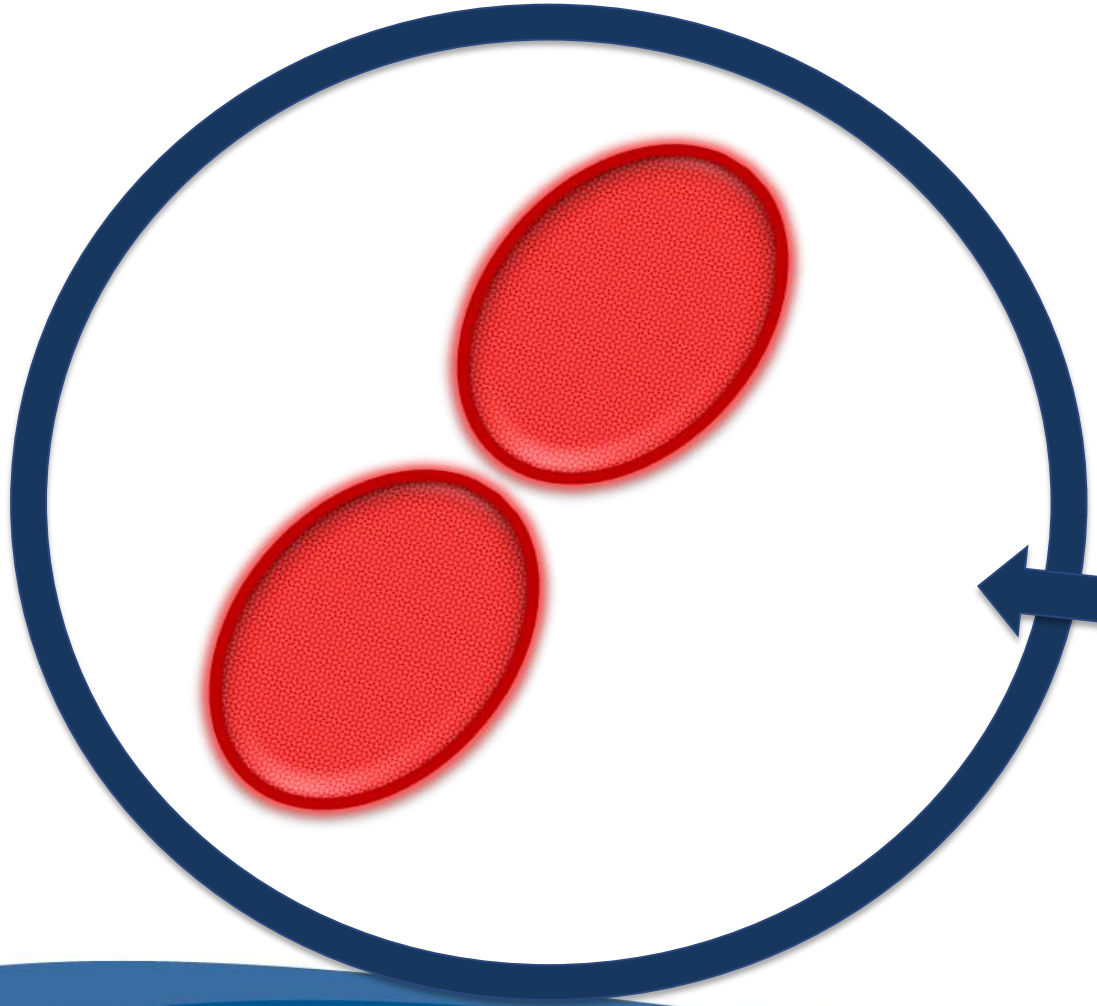
Macro-strain
(stress across the wound)[3]

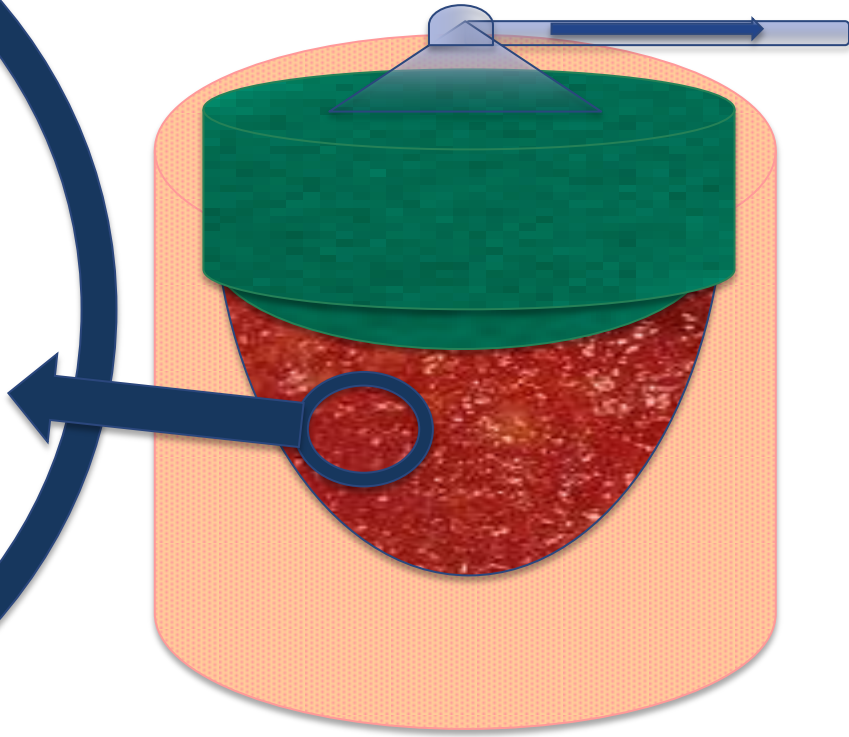
# NPWT- Draws The Wound Edges Together

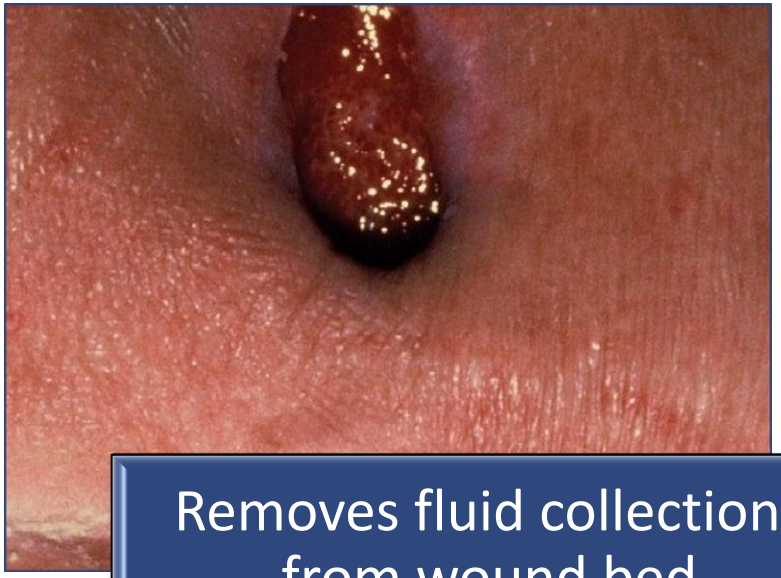


# Micro-strain

Mechanical stress within the cell.
Stimulates cell proliferation[4]





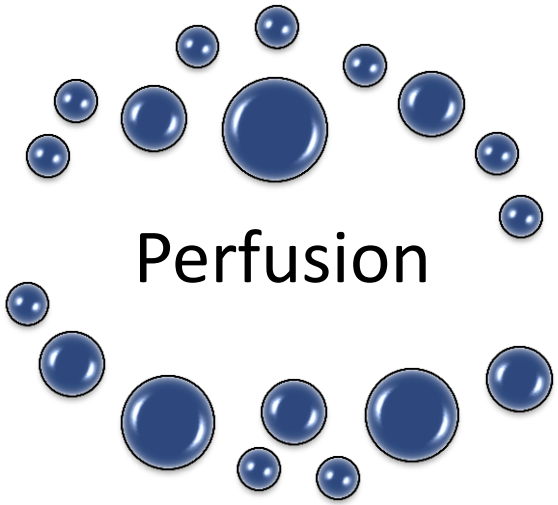


Removes fluid collections from wound bed

May reduce interstitial edema

Reduction of inflammatory agents contained in exudate[8]

# NPWT May Increase Perfusion





Multiple studies show increased blood flow to tissue[3]

***Perfusion***: the delivery of arterial blood, containing nutrients, O2, cells and growth factors, to tissue.

# NPWT May Help Control Bacterial Burden

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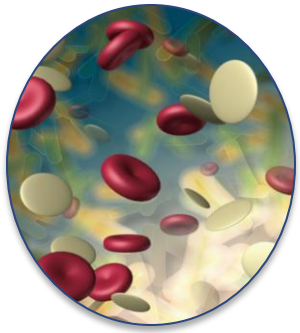
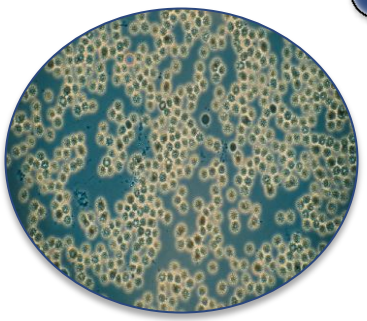


Removes stagnant wound fluid

Improved blood perfusion may increase resistance to infection



Protection from external contamination

# NPWT Enhances Granulation Tissue Formation

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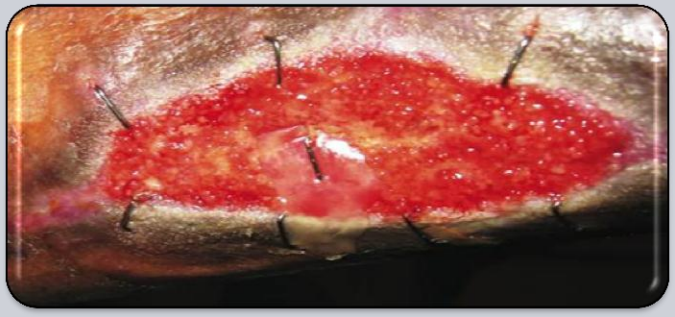
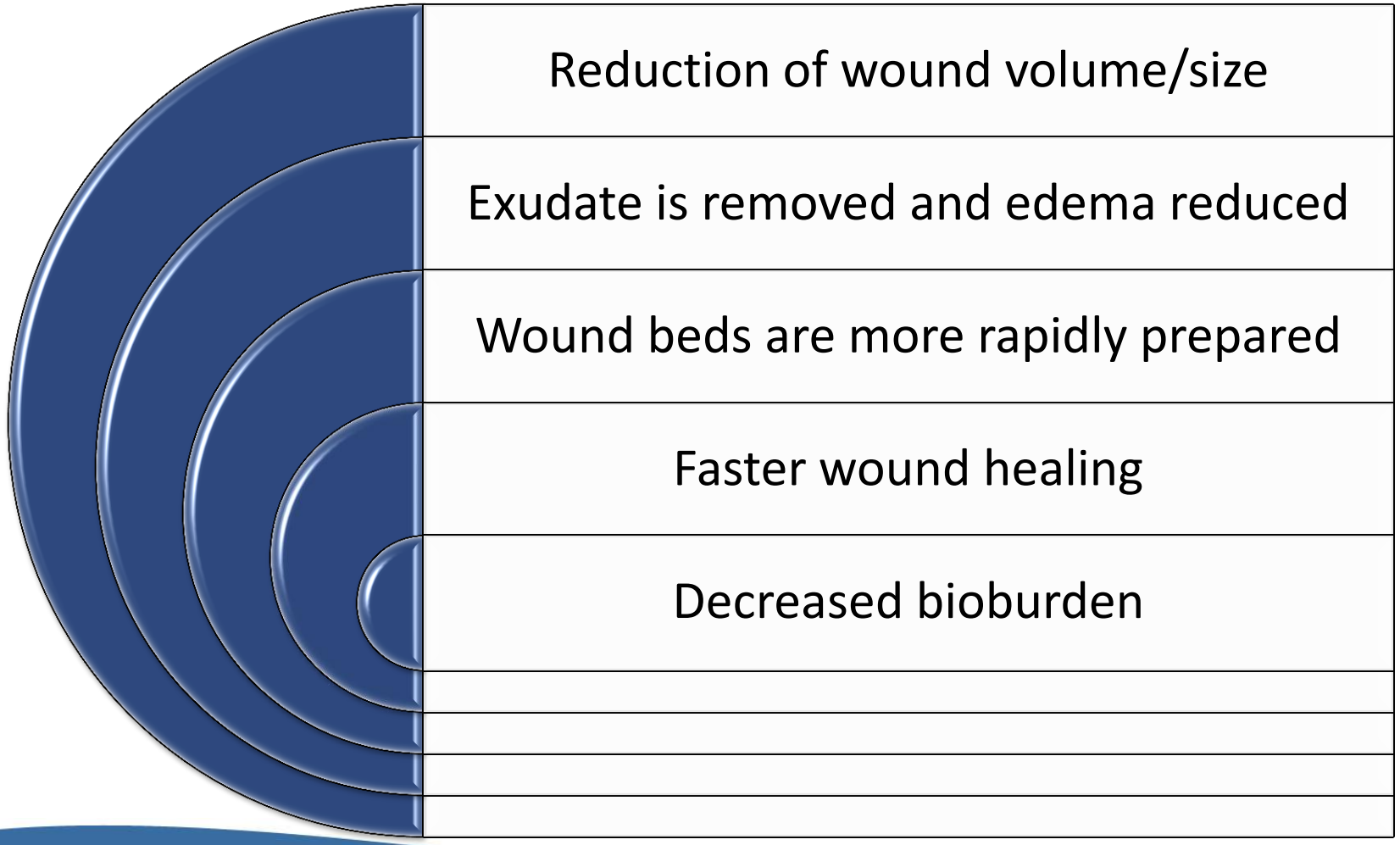


Higher rates of granulation tissue reported with NPWT in porcine models[3]

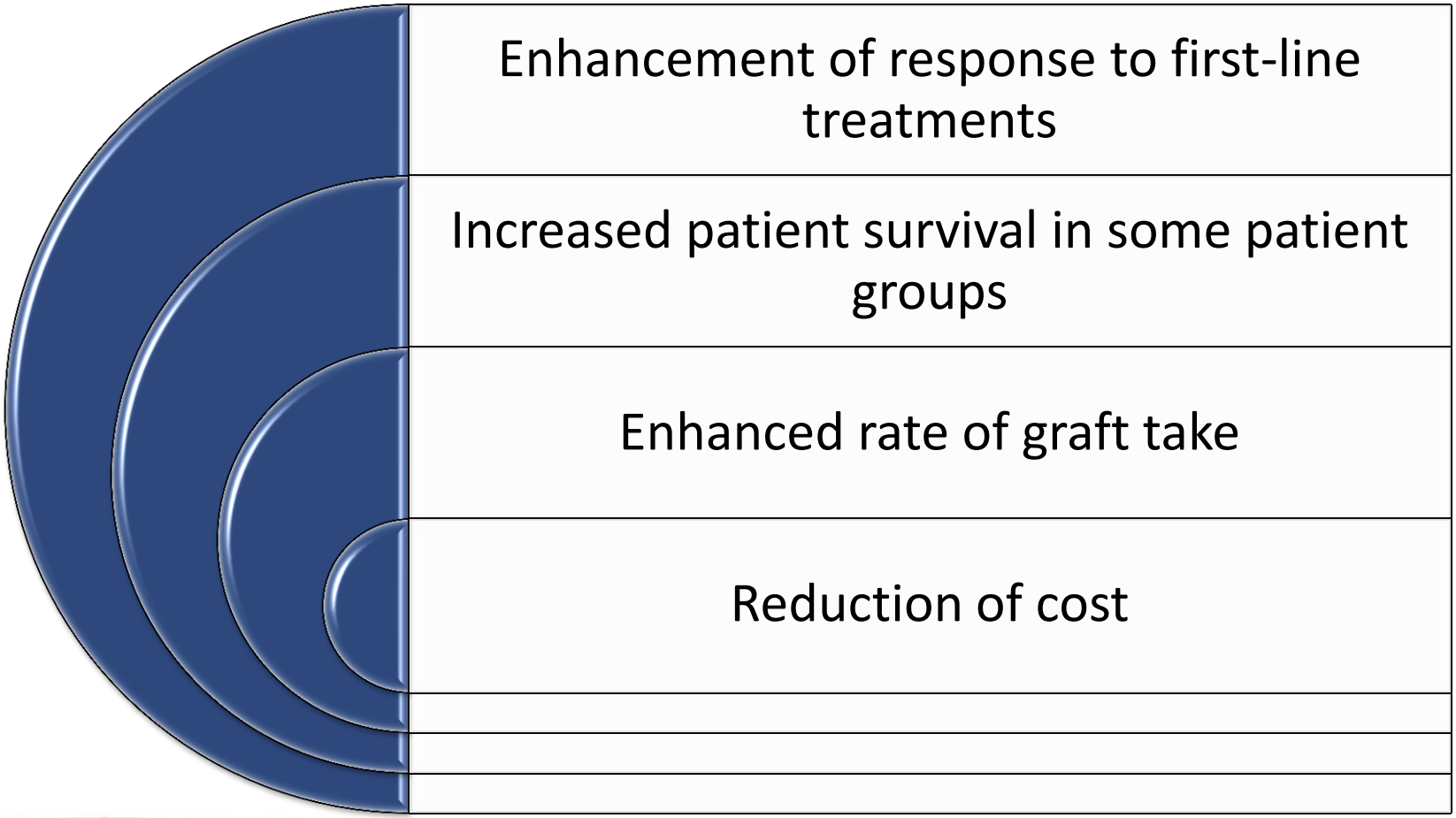
The presence of granulation tissue signals healing[3]

# Reported Clinical Evidence Supporting NPWT




(Hunter, 2007)

# Reported Clinical Evidence Supporting NPWT




(Hunter, 2007)

The science of NPWT must be understood to support the rationale for use in clinical practice

# References


1. Centers for Medicare and Medicaid Services. Local Coverage Determination for Negative Pressure Wound Therapy. Effective October 2011. http://www.cms.gov/medicare-coverage-database/details/lcd-details.aspx?LCDId=5008&ContrId=140&ver=46&ContrVer=2&CntrctrSelected=140*2&Cntrctr=140&name=CGS+Administrators%2c+LLC+(18003%2c+DME+MAC)&LCntrctr=140*2&bc=AgACAAIAAAAA&. Accessed October 11, 2012.
2. Agency for Healthcare Research and Quality. Negative pressure wound therapy devices: technology assessment report. Available at:www.ahrq.gov/Clinic/ta/negpresswtd. Accessed May 2012.
3. Banwell P, Musgrave M. Topical negative pressure therapy: mechanisms and indications. Int Wound J 2004;1:95-106.
4. Chariker ME, Jeter KF, Tintle TE, Bottsford JE. Effective management of incisional and cutaneous fistulae with closed suction wound drainage. Contemp Surg 1989:34:59-63.
5. Winter JD. Formation of the scab and the role of epithelialization of superficial wounds in the skin of domestic pig. Nature 1962; 193:293-4.
6. Andros G, Armstrong DG, Attinger C, Bolston AJM, et al. Consensus statement on negative pressure wound therapy (V.A.C. therapy) for the management of diabetic foot wounds. Wounds. 2006;6:1-32 Supplement.
7. Saxena V, Hwang CW, Huang S, Eichbaum Q, Ingber D, Orgill DP Vacuum-assisted closure: microdeformations of wounds and cell proliferation. Plast Reconstr Surg 2004;114:1086-96; Discussion 1097-8
8. Chen CS, Mrksich M, Huang S, Whitesides GM, Ingber DE. Geometric control of cell life and death. Science 1997;276:1425-8

# References


9. Moryckwas MJ, Argenta LC, Shelton-Brown EI, McGuirt W. Vacuum-assisted closure: a new method for wound control and treatment: animal studies and basic foundation. *Ann Plast Surg* 1997;38:553-562
10. Gustafsson R, Sjogren J, Ingemansson R. Understanding topical negative pressure therapy. European Wound Management Association (EWMA). Position Document: *Topical negative pressure in wound management.* London: MEP Ltd. 2007.
11. Hunter JE, Teot L, Horch R, Banwell PE. Evidence-based medicine: vacuum-assisted closure in wound care management. Int Wound J 2007;4:256-269