



**WOUND CARE IN THE RURAL SETTING**

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**CHAIR, DEPARTMENT OF SURGERY**

**DIRECTOR, TRAUMA DEPARTMENT**

**MEDICAL DIRECTOR, LITTLE COLORADO MEDICAL CENTER WOUND CARE CENTER**

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**DISCLOSURES: NONE**

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**No Vascular Surgery  
No Orthopedic Surgery  
No Podiatry  
No Cardiology  
No Interventional Radiology  
No Wound Care Nurse  
No Physical Therapist  
Performing Wound Care  
No Plastic Surgery  
No Dermatology**

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Overwhelmed with vendors and their products...

# WHERE TO START?



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# OFFICE PROCEDURE ROOM

Advise from colleagues performing wound care...

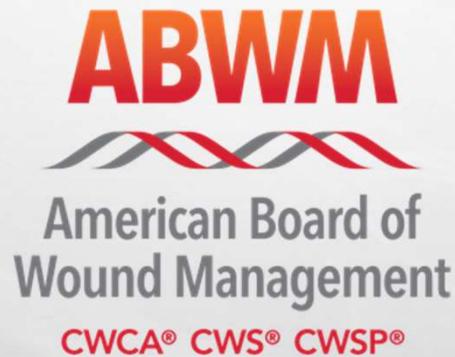
Wound Care Certification  
Attend Wound Care Conferences  
Join Wound Care Organizations



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# CERTIFICATION ELIGIBILITY

Separate Certifications for  
Different Levels of Providers &  
Others  
Examination for Certification  
CME Requirement  
Nationally Recognized



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## CERTIFIED WOUND CARE ASSOCIATE® (CWCA®)

- **HEALTHCARE PROFESSIONAL WITH AT LEAST 3 YEARS OF WOUND CARE EXPERIENCE**
- **SALES AND MARKETING PROFESSIONAL IN THE WOUND CARE INDUSTRY WITH AT LEAST 3 YEARS OF WOUND CARE EXPERIENCE**
- **CANDIDATES WITH A PROFESSIONAL LICENSE APPLYING FOR THE CWCA® MUST POSSESS A FULL AND UNRESTRICTED PROFESSIONAL LICENSE IN AT LEAST ONE STATE AND IN ALL STATES IN WHICH THE CANDIDATE CURRENTLY PRACTICES**
  - **EXAMPLES: LPNS, LVNS, PTAS, ALL CERTIFIED HEALTHCARE ASSISTANTS (CNAS, CMAS), HEALTHCARE ADMINISTRATORS, DIETITIANS, SALES AND MARKETING PROFESSIONALS, AND ACADEMIC RESEARCHERS**

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## **CERTIFIED WOUND SPECIALIST® (CWS®)**

- **A LICENSED HEALTHCARE PROFESSIONAL WITH A BACHELOR'S, MASTER'S, OR DOCTORAL DEGREE AND **3 OR MORE YEARS OF CLINICAL WOUND CARE EXPERIENCE****
- **A LICENSED RN WITH AN ASSOCIATE'S DEGREE AND **3 MORE YEARS OF CLINICAL WOUND CARE EXPERIENCE****
- **CANDIDATES MUST POSSESS A **FULL AND UNRESTRICTED PROFESSIONAL LICENSE** IN AT LEAST ONE STATE AND IN ALL STATES IN WHICH THE CANDIDATE CURRENTLY PRACTICES**
  - **EXAMPLES: REGISTERED NURSES, NURSE PRACTITIONERS, VETERINARY PHYSICIANS, PHYSICIAN ASSOCIATE, PHYSICAL THERAPISTS, OCCUPATIONAL THERAPISTS, PHARMACISTS, AND REGISTERED DIETITIANS**

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## **CERTIFIED WOUND SPECIALIST PHYSICIAN® (CWSP®)**

- **MDS, DOS, AND DPMS WITH **THREE OR MORE YEARS OF CLINICAL WOUND CARE EXPERIENCE****
- **CANDIDATES MUST POSSESS A **FULL AND UNRESTRICTED PROFESSIONAL LICENSE** IN AT LEAST ONE STATE AND IN ALL STATES IN WHICH THE CANDIDATE CURRENTLY PRACTICES**
  - **EXAMPLE: PHYSICIANS AND PODIATRIST**

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**Accredited...  
Nationally Recognized...**



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## **CWSP NATIONAL BOARD CERTIFICATION EXAMINATION**

- **EXAMINATIONS ARE DELIVERED BY COMPUTER AT 300+ PEARSON VUE TEST CENTERS THROUGHOUT AMERICA (APPOINTMENT ONLY)**
- **\$995**
- **180 COMPUTER-BASED, MULTIPLE-CHOICE QUESTIONS, GIVEN OVER A PERIOD OF THREE AND A HALF HOURS**
- **84.4% PASS RATE**
- **SPECIFIC METHODOLOGIES FOR ESTABLISHING THE PASSING SCORE FOR EXAMS, AND ENSURING TEST FORMS ARE EQUIVALENT, WILL BE SELECTED BY A QUALIFIED PSYCHOMETRICIAN BASED ON COMPLIANCE WITH NATIONAL ACCREDITATION STANDARDS**
- **\$150 ANNUAL RENEWAL FEE**
- **10 YEAR RECERTIFICATION**

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# CERTIFICATION



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# CONTINUING EDUCATION HOURS

- **A MINIMUM OF SIX (6) HOURS OF CONTINUING EDUCATION IN THE FIELD OF WOUND CARE MANAGEMENT ARE REQUIRED EACH YEAR TO STAY CERTIFIED**
- **[HTTPS://ABWMCERTIFIED.ORG](https://abwmcertified.org)**

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# ORGANIZATIONS



- ASSOCIATION FOR THE ADVANCEMENT OF WOUND CARE® (AAWC®)
- \$139 ANNUAL MEMBERSHIP RENEWAL

# MEMBERSHIP



# CONFERENCES



- SYMPOSIUM ON ADVANCED WOUND CARE (SAWC)

<https://www.sawcspring.com/future-meetings>

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# BOARD PREPARATION



<https://www.woundprepcourse.com>

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## **WOUND ASSESSMENT AND DOCUMENTATION**

- **TYPE OF WOUND:**
  - **ARTERIAL ULCERS & PERIPHERAL ARTERIAL DISEASE (PAD)**
  - **ADVANCED VENOUS INSUFFICIENCY & ULCERS**
  - **LYMPHEDEMA**
  - **DIABETES AND WOUNDS**
  - **BURNS**
  - **PRESSURE ULCERS**
  - **ATYPICAL**
  - **PRE-MALIGNANT AND MALIGNANT SKIN TUMORS**
  - **SURGICAL/ TRAUMATIC**

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## **WOUND SPECIFIC GRADE/ STAGING SYSTEMS**

- **NPUAP/ EPUAP STAGING/ GRADING OF PRESSURE ULCERS**
- **WAGNER SCALE FOR DIABETIC FOOT ULCERS (DFUS)**
- **UT DIABETIC WOUND CLASSIFICATION- DFUS**
- **CEAP FOR VENOUS LEG ULCERS**
- **TISSUE LOSS (PARTIAL/ FULL)- UNIVERSAL**
- **PAYNE-MARTIN & STAR FOR SKIN TEARS**

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## WAGNER ULCER GRADE CLASSIFICATION DIABETIC ULCERS

Grade	Characteristics
0	Pre-ulcerative lesions, healed ulcers, neuropathy, presence of bony deformity
1	Superficial ulcer without subcutaneous tissue involvement, not infected
2	Penetration through the subcutaneous tissue; may expose bone, tendon, ligament, or joint capsule
3	Extensive ulceration with exposed bone and/or deep infection (i.e., osteomyelitis or abscess)
4	Gangrene of toes or forefoot
5	Gangrene of the whole foot requiring disarticulation

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## THERMAL INJURY CLASSIFICATION

Classification According to Depth		
Superficial	1 <sup>st</sup> Degree	Epidermal Damage
Partial-Thickness Superficial Deep	2 <sup>nd</sup> Degree	Epidermis and Superficial (Papillary) Dermis Damage Damage Extends into the Reticular Dermis
Full-Thickness	3 <sup>rd</sup> Degree 4 <sup>th</sup> Degree	Complete Loss of Dermis Damage to Underlying Fascia, Muscle, Bone

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# PRESSURE ULCER CLASSIFICATION

Classification	Description
Stage I	Intact skin with non-blanchable redness of a localized area usually over a bony prominence
Stage II	Partial-thickness loss of dermis presenting as a shallow open ulcer with a red/ pink wound bed, without slough. May also present as an intact or open/ ruptured serum filled blister.
Stage III	Full-thickness tissue loss. Subcutaneous fat may be visible but bone, tendon, or muscle are not exposed.
Stage IV	Full-thickness tissue loss with exposed bone, tendon, or muscle.
Unstageable	Full thickness tissue loss in which actual depth of the ulcer is completely obscured by slough and/or eschar in the wound bed.

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## VENOUS ULCER CLASSIFICATION (CEAP) CLINICAL PRESENTATION, ETIOLOGY, ANATOMIC DISTRIBUTION, PATHOPHYSIOLOGIC BASIS

Class	Description
0	No signs of venous disease
1	Telangiectasias
2	Varicose veins
3	Edema
4	Skin changes - C4a: Pigmentation, Eczema - C4b: Lipodermatosclerosis
5	Healed ulcer
6	Active ulceration

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# LOCATION

- **DOCUMENT IN REFERENCE TO HEAD, FRONT OR BACK**
- **REFERENCE NEAREST BONE STRUCTURE**
- **COMMONLY USED TERMS**
  - **PROXIMAL, DISTAL**
  - **SUPERIOR, INFERIOR**
  - **MEDIAL, LATERAL**
  - **ANTERIOR, POSTERIOR**
  - **DORSAL, PLANTAR**

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# DEGREE OF TISSUE DESTRUCTION

- **PARTIAL-THICKNESS**
  - **LOSS OF EPIDERMIS AND DOWN INTO BUT NOT THROUGH THE DERMIS**
    - **ABRASIONS, SKIN TEARS, BLISTERS, SKIN GRAFT DONOR SITES (SPLIT-THICKNESS)**
- **FULL-THICKNESS**
  - **THROUGH THE DERMIS EXTENDING DOWN TO SUBCUTANEOUS TISSUE, MUSCLE, MAY HAVE EXPOSED STRUCTURE**

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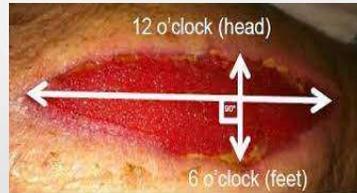
# SIZE



- **(LENGTH) X (WIDTH) X (DEPTH)**

- **CLOCK OR HEAD TO TOE:**

- **LINE CLOSEST TO 12-6 FOR LENGTH**
  - HEAD TO TOE
- **3-9 FOR WIDTH**
  - LEFT TO RIGHT



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# ODOR

- **PRESENT OR ABSENT**

- **ODOR IMPLICATIONS**
  - INCREASING BACTERIA
  - NEED FOR INCREASED FREQUENCY OF DRESSING CHANGES
  - QUALITY OF LIFE IMPACT



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# EXUDATE

- **AMOUNT**
  - NONE
  - SCANT/ SMALL
  - MODERATE
  - LARGE
  - COPIOUS
- **COLOR**
  - GREEN, YELLOW, TAN, ETC.
- **CHARACTER**
  - SEROUS
  - SEROSANGUINOUS
  - PURULENT

## Know Your Exudate



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# WOUND BED

- **DESCRIBE WITH PERCENTAGES**
  - % GRANULATION
  - % NECROSIS
  - % EPITHELIZATION
  - % BIOFILM/ SLOUGH/ FIBRIN



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# WOUND EDGES

- OPEN
- MIGRATING
- CLOSED
- EPIBOLY



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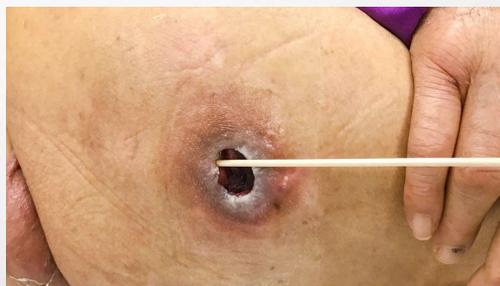
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# UNDERMINING

- **CLOCK REFERENCE AGAIN!**



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# TUNNELING

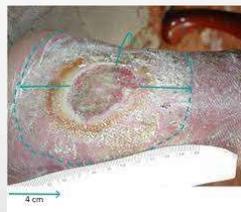
Measuring and Staging Wounds



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# PERIWOUND

- ERYTHEMA
- MACERATION
- DESICCATION



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# DEBRIDEMENT

- **AUTOLYTIC**
  - ENDOGENOUS ENZYMES
- **ENZYMATIC**
  - COLLAGENASE
- **MECHANICAL**
  - WOUND SCRUBBING, WET-TO-DRY DRESSINGS, HYDROTHERAPY, ULTRASONIC
- **SHARP**
- **SURGICAL**
- **STERILE MAGGOTS**
- **LOW FREQUENCY ULTRASOUND**
- **CHEMICAL**

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# MOIST WOUND HEALING & AUTOLYTIC DEBRIDEMENT

- **MOIST WOUND HEALING GOAL:**
  - **PROMOTE PHYSIOLOGICAL HEALING**
- **AUTOLYTIC DEBRIDEMENT GOAL:**
  - **THE PROMOTION OF ENDOGENOUS ENZYMES TO DEBRIDE NECROTIC TISSUE**

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# AUTOLYSIS

- **AUTOLYSIS: THE NATURAL DEGRADATION OF DEVITALIZED TISSUE USING ENDOGENOUS ENZYMES:**
  - **PROTEINASES: PROTEOLYTIC ENZYMES AND WBC IN EXUDATE TO BREAKDOWN AND LIQUEFY NECROTIC TISSUE**
- **MOISTURE RETENTIVE OR MOISTURE DONATING DRESSINGS USED TO PROMOTE MOIST WOUND HEALING AND PREVENT EVAPORATION OF FLUIDS FROM THE WOUND SURFACE**

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# AUTOLYTIC DEBRIDEMENT

- **MOISTURE-RETENTIVE OR MOISTURE DONATING DRESSING IS APPLIED COVERING WOUND, RETAINING ENDOGENOUS ENZYMES**
- **ESCHAR AND SLOUGH ARE LIQUEFIED BY REHYDRATION AND ACTIVITY OF LYSOSOMES NORMALLY PRESENT IN WOUND FLUIDS**

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# AUTOLYTIC DEBRIDEMENT

Indications	Contraindications
All wounds with necrotic tissue	Dry gangrene or dry ischemic wounds
Beneficial with wounds covered by dry eschar	Must have a vascular consultation first to determine circulatory status
Cross-hatching eschar will facilitate autolysis	

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# ADVANTAGES OF AUTOLYTIC DEBRIDEMENT

- **NON INVASIVE- SAFEST**
- **DOES NOT DISRUPT HEALTHY TISSUE**
- **MAY BE USED IN CONJUNCTION WITH OTHER METHOD OF DEBRIDEMENT**
- **PAINLESS**
- **EASY TO PERFORM**
- **SELECTIVE**
- **REQUIRES MINIMAL PROFESSIONAL EXPERTISE/ MONITORING**
- **CAREGIVER FRIENDLY**

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# AUTOLYTIC DEBRIDEMENT DRESSING DECISION TREE

- **ASSESS WOUND DRAINAGE**
  - **MINIMAL**
  - **MODERATE**
  - **COPIOUS**

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# **DRAINAGE DRIVES DRESSING CHOICES**

- **AMOUNT OF DRAINAGE**
- **CONDITION OF PERIWOUND SKIN AT DRESSING CHANGE**
- **FREQUENCY OF DRESSING CHANGES**
- **QUESTION: WHAT CHOICE OF DRESSING/ PRODUCTS ALLOWS THE WOUND TO BE DISTURBED THE LEAST?**
- **DRESSING MAY HAVE TO BE CHANGED MORE OFTEN DURING DEBRIDEMENT**

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# **DRESSING CATEGORIES THAT PROMOTE AUTOLYTIC DEBRIDEMENT**

- **MAINTAIN MOIST ENVIRONMENT**
  - **TRANSPARENT FILMS (THIN FILMS)**
  - **HYDROCOLLOIDS**
  - **HYDROGELS**
  - **ALGINATES**
  - **SEMIPERMEABLE FOAMS**
  - **ABSORBENT FILLER**
  - **ABSORBENT PAD**
  - **IMPREGNATED DRESSING**
  - **GRANULAR EXUDATE ABSORBERS**
  - **GAUZE**

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# ENZYMATIC DEBRIDEMENT

- “ENZYMATIC DEBRIDEMENT IS ACCOMPLISHED BY APPLYING **TOPICAL DEBRIDING AGENTS** TO DEVITALIZED TISSUES ON THE WOUND SURFACE.
- THIS OPTION SHOULD BE CONSIDERED WHEN INDIVIDUALS **CANNOT TOLERATE SURGERY** OR ARE IN LONG-TERM CARE FACILITIES OR RECEIVING CARE AT HOME AND WHEN THE ULCER DOES NOT APPEAR INFECTED
- IF INFECTION SPREADS BEYOND THE ULCER (E.G., ADVANCING CELLULITIS, SEPSIS), THERE IS URGENT NEED FOR SHARP DEBRIDEMENT”

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# ENZYMATIC DEBRIDEMENT

- **DEFINITION- USE OF TOPICALLY APPLIED CHEMICAL AGENT TO STIMULATE THE BREAKDOWN OF NECROTIC TISSUE**
- **ENZYMATIC AGENTS**
  - **COLLAGENASE**
  - **PAPAIN-UREA PRODUCTS NO LONGER AVAILABLE IN U.S.**

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# COLLAGENASE

- **COLLAGENASE** (AN ENZYME) DIGESTS NECROTIC COLLAGEN
- SPECIFIC FOR **DENATURED COLLAGEN**
- MEDICATION HYDROPHILIC
- COLLAGENASE IS MORE LIKELY TO BE USEFUL FOR A VERY PROLONGED PERIOD OF TIME IN THE WOUND IN WHAT IS CALLED **MAINTENANCE DEBRIDEMENT**

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# EXOGENOUS ENZYMES

- ENZYMES DERIVED FROM OTHER SOURCE OUTSIDE THE BODY
- BIOLOGICALLY ENGINEERED

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# COLLAGENASE

- **COLLAGENASE OINTMENT**



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# OTHER CONSIDERATIONS WHEN USING ENZYME MEDICATIONS

- **SALTS OF HEAVY METALS SUCH AS SILVER, LEAD, MERCURY, INACTIVATE THE ENZYMES**
- **HYDROGEN PEROXIDE SOLUTION MAY INACTIVATE PAPAINE**

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# MECHANICAL WOUND DEBRIDEMENT

- **APPLICATION OF SOME OUTSIDE "FORCE" OR ENERGY TO DISLODGE NECROTIC TISSUE**
- **METHODS**
  - **WOUND SCRUBBING**
  - **WET-TO-DRY DRESSINGS**
  - **HYDROTHERAPY**
  - **ULTRASONIC**

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# WOUND SCRUBBING

- **USE FOR SOFT SLOUGH DEBRIS**
- **REMOVES SURFACE DEBRIS**
- **SCRUB FROM CENTER OF WOUND OUTWARD**
- **USE GAUZE OR SPONGE**
- **SCRUB 2-3 MINUTES**
- **AVOID SCRUBBING HEALTHY GRANULATION TISSUE**

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# WET TO DRY DRESSINGS

- **ADVANTAGES: EASY TO PERFORM**
- **DISADVANTAGES:**
  - **PAINFUL- MAY NEED TO PROVIDE ANALGESIA**
  - **TRAUMATIC TO GRANULATION AND NEW EPITHELIAL TISSUE**

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# HYDROTHERAPY

- **WHIRLPOOL**
- **WOUND IRRIGATION**
- **PULSE LAVAGE WITH SUCTION (PLWS)**

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# WHIRLPOOL

<b>Advantages</b>	<b>Disadvantages</b>
<b>Softens necrotic tissue</b>	<b>May cause skin maceration</b>
<b>Increases circulation</b>	<b>Increase edema</b>
<b>Cleanse wound of exudate</b>	<b>Disrupt new cells</b>
<b>Loosen debris</b>	<b>Wash away endogenous enzymes</b>
<b>Remove residual topical agents</b>	<b>Whirlpool additives damage cells</b>
	<b>Painful</b>

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# WOUND IRRIGATION

- **USE 35-50 CC SYRINGE**
- **19' GAUGE ANGIOCATHETER**
- **4-8 PSI RECOMMENDED**
- **AVOID > 15 PSI**

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# **PULSED LAVAGE WITH SUCTION (PLWS)**

- **PLWS PROVIDES CLEANSING AND DEBRIDEMENT WITH PULSED IRRIGATION COMBINED WITH SUCTION**
- **PROVIDES NEGATIVE PRESSURE TO REMOVE THE IRRIGANT AND DEBRIS TO HELP REDUCE INFECTION AND TO ENHANCE GRANULATION TISSUE FORMATION**

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# **PLWS**

- **INITIALLY USED BY SURGEONS IN OR**
- **IRRIGATION IN SURGICAL PROCEDURES**
- **CLEANS WOUNDS OF DEBRIS**
- **IRRIGATION AND DEBRIDEMENT TO CLEANS AND ENHANCE HEALING OF SOFT TISSUE WOUNDS**

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# PLWS

- **THEORY AND SCIENCE OF THERAPY**
  - **CLEANSING VIA GENTLE PULSATILE LAVAGE TO STRONGER IRRIGATION AND DEBRIDEMENT**
  - **REDUCES BACTERIA AND INFECTION**
  - **PROMOTES ANGIOGENESIS- GRANULATION AND EPITHELIALIZATION**
  - **THEORY: NEGATIVE PRESSURE OF SUCTION STIMULATES CELLS AND GRANULATION**

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# PLWS

- **ELIMINATED NEED FOR WHIRLPOOLS EXCEPT IN LIMITED CIRCUMSTANCES**
- **NOTE: WP CONTRAINDICATED FOR DFUS**

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# PULSATILE LAVAGE

- **GOOD FOR LARGE OR MULTIPLE WOUND SITES**
- **VARIABLE PRESSURE THAT IS CONTROLLABLE**
- **4-8 PSI RECOMMENDED**
- **> 15 PSI AVOID**
- **RETURN SUCTION ASSISTS WITH DEBRIDEMENT**
- **SELECTIVE APPLICATION TIPS**

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# PULSATILE LAVAGE WITH SUCTION

- **STANDARD PRECAUTIONS**
  - **PRIVATE ROOM ONLY- NO FAMILY/VISITORS**
    - **AEROSOLIZATION STUDY (LOEHNE 1998)**
    - **MICROORGANISMS- INFECTION POTENTIAL**
    - **TESTED 2' & 8' FROM WOUND**
    - **30 MINUTES BEFORE, DURING, AFTER RX**
    - **INCREASED MICROORGANISMS DETECTABLE DURING AND AFTER RX**
    - **HARRIETT LOEHNE, DPT, CWS**

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# **LOW FREQUENCY ULTRASOUND**

- **EMERGING AS AN ALTERNATIVE METHOD FOR WOUND BED PREPARATION AND WOUND HEALING**
- **ULTRASOUND VIBRATION APPLIED TO THE WOUND BED VIA SALINE CREATING DEEP TISSUE PENETRATION**
- **CONTACT ULTRASOUND IS AN EFFICIENT DEBRIDEMENT TOOL FOR WOUNDS WITH DENSE FIBRIN AND SLOUGH**
- **DISRUPTS BIOFILM COLONIES**
- **CAUSES BACTERIAL DESTRUCTION**
- **CONTACT AND NON-CONTACT LFU**

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# **INDICATIONS FOR LOW FREQUENCY ULTRASOUND**

- **LOCALLY INFECTED WOUNDS**
- **WOUNDS WITH IMPAIRED CIRCULATION**
- **WOUNDS WITH THE NEED FOR DEBRIDEMENT, IRRIGATION, AND TOPICAL TREATMENT**
- **PRESSURE, DIABETIC, ARTERIAL AND VENOUS ULCERS, POSTTRAUMATIC, AND SURGICAL**

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## PROPOSED MECHANISMS OF ACTION AT CELLULAR LEVEL

<b>Cavitation</b>	<b>Acoustic Microstreaming</b>
<b>Ultrasound induced pressure changes in the tissue fluids, which create gas-filled bubbles that expand and compress</b>	<b>Unidirectional movement of fluids along cell membranes</b>
<b>Stable macro cavitation may change cell membrane permeability</b>	<b>Results from mechanical pressure changes within the ultrasound field</b>
	<b>Acoustic microstreaming may change cell membrane permeability</b>

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## CONTACT LOW FREQUENCY US

- **WOUND IRRIGATION FLUID DIRECTED THROUGH AN OPENING IN A PROBE'S TIP**
- **ADMINISTERS FLUID DIRECTLY TO WOUND SURFACE**
- **FLUID SERVES AS COUPLING MEDIUM, COOLANT, WOUND LAVAGE, OR FLUSH**
- **TOPICALLY TREAT THE WOUND BASE**

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# OUTCOMES OF LOW FREQUENCY ULTRASOUND

- **DEBRIDEMENT:**
  - **LOOSENS THE NECROTIC TISSUES FROM THE WOUND AREA SO IT CAN BE WASHED AWAY**
- **BIOBURDEN CONTROL**
  - **SIGNIFICANTLY DECREASES THE BACTERIA CONTENT OF THE WOUND AREA**
- **INCREASES THE MOVEMENT OF FIBROBLAST CELLS INTO THE WOUND AREA**
- **STIMULATES THE GROWTH OF FIBROBLAST CELLS**
- **IMPROVES THE GROWTH OF CAPILLARY BLOOD VESSELS**
  - **IMPROVE CIRCULATION IN THE AREA SURROUNDING THE WOUND**
- **REPORTS OF DECREASED WOUND SITE PAIN**

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# BIOSURGERY



- **MAGGOTS HAVE BEEN USED SUCCESSFULLY TO DEBRIDE:**
  - **PRESSURE ULCERS**
  - **VENOUS INSUFFICIENCY ULCERS**
  - **DIABETIC FOOT ULCERS**
  - **SOFT TISSUE WOUNDS RESULTING FROM NECROTIZING SOFT TISSUE INFECTIONS**

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# MAGGOT THERAPY

- **STUDIES IN SUPPORT OF DEBRIDEMENT**
  - **BAER- 1929**
  - **HOBSON- 1931**
  - **MASERITZ- 1934**
  - **ZIFFREN ET AL- 1953**
  - **WATERHOUSE & IRZYKIEWICZ- 1957**
  - **FRASER ET AL; BROOKES- 1961**
  - **PENDOLA & GREENBERG- 1975**
  - **VISTNES ET AL- 1981**
  - **CASU ET AL- 1994**

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# MAGGOTS

- **PHAENICIA (LUCILIA) SERICATA LARVA**
- **COLORIZED SCANNING ELECTRON MICROGRAPH**

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# MAGGOTS

- **SECRETE ENZYME COCKTAIL**
- **COLLAGENASE**

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# MAGGOT THERAPY

- **3 REPORTED ACTIONS OF MAGGOT THERAPY**
  - **DEBRIDEMENT (DISSOLVES NECROTIC TISSUE)**
  - **DISINFECTION (KILLS BACTERIA)**
  - **PROMOTES WOUND HEALING (STIMULATES GRANULATION TISSUE FORMATION; EPITHELIAL CELL PROLIFERATION; TISSUE OXYGENATION)**

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# **MAGGOT THERAPY**

- **JANUARY 12, 2004- FDA APPROVES THE PRODUCTION AND MARKETING OF THE BRAND: MEDICAL MAGGOTS AS A MEDICAL DEVICE (510K#K033391) FOR THE FOLLOWING INDICATIONS**
  - **“... DEBRIDING NON-HEALING NECROTIC SKIN AND SOFT TISSUE WOUNDS, INCLUDING PRESSURE ULCERS, VENOUS STASIS ULCERS, NEUROPATHIC FOOT ULCERS, AND NON-HEALING TRAUMATIC OR POST SURGICAL WOUNDS.”**

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# **CHEMICAL DEBRIDEMENT**

- **CHEMICAL DEBRIDEMENT**
- **AKA CHEMICAL CAUTERIZATION**
- **SILVER NITRATE STICKS**

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# INDICATIONS AND CHEMICAL MAKEUP

- **SKIN OR MUCOUS MEMBRANE CAUTERIZATION**
- **REMOVING WARTS**
- **HYPER-GRANULATED TISSUE**
- **75% SILVER NITRATE AND 25% POTASSIUM NITRATE**

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# APPLICATION CONSIDERATIONS

- **RIGID WOODEN APPLICATOR FOR PRECISION PLACEMENT**
- **SILVER NITRATE TIPS ARE SOLUBLE IN ALL SECRETIONS**
- **CONTROL STRENGTH BY DIPPING IN STERILE WATER**
- **INCREASE IN WOUND DRAINAGE- INFLAMMATORY RESPONSE**
- **EDUCATE PATIENT/ FAMILY REGARDING BLACK/ GRAY STAINING**
- **PROTECT PERIWOUND AREA WITH PETROLATUM- WILL INJURE HEALTHY TISSUE**
- **PHYSICIAN ORDER NEEDED**

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# SELECTIVE SHARP DEBRIDEMENT



- **SHARP DEBRIDEMENT IS THE MOST RAPID METHOD**
- **SELECTIVE FOR NON-VIABLE TISSUE ONLY**
- **SIGNS OF ADVANCING CELLULITIS OR SEPSIS REQUIRES RAPID EMERGENT DEBRIDEMENT**

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# INDICATIONS FOR SHARP DEBRIDEMENT

- **EXTENSIVE DEVITALIZED TISSUE**
- **SIGNS OF ADVANCING CELLULITIS OR SEPSIS**
- **PRESENCE OF THICK ADHERENT ESCHAR- INDICATES FULL-THICKNESS WOUND**
- **AS AN ADJUNCT IN COMBINATION WITH OTHER METHODS**
- **CALLOUS FORMATION- INSENSATE FOOT**

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# PRECAUTIONS AND CONTRAINDICATIONS FOR SHARP DEBRIDEMENT

- **ARTERIAL INSUFFICIENCY**
  - **GANGRENE**
  - **LOW ABI, LOW TCPO2**
- **PAIN CONTROL CANNOT BE ASSURED**
- **EXCESSIVE BLEEDING MIGHT RESULT**
- **DIAGNOSIS OF THE LESION MAY BE UNCERTAIN**
- **PATIENT IMMUNOCOMPROMISED**
- **STABLE VERSUS UNSTABLE HEEL ULCERS**
- **UNIDENTIFIABLE STRUCTURES**
- **TERMINALLY ILL- DEPENDS ON GOALS FOR CARE**
- **NOTE: SHARP/ SURGICAL DEBRIDEMENT MAY CAUSE ORGANISMS TO BE SHOWERED INTO BLOODSTREAM RESULTING IN BACTEREMIA**

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# REASONS TO STOP SHARP DEBRIDEMENT

- **CLINICIAN FATIGUE/ PATIENT FATIGUE**
- **BLEEDING**
- **PAIN**
- **TO VIABLE TISSUE**
- **LOCATION OF A FASCIAL PLANE**
- **LOCATION OF A NAMED STRUCTURE**
- **HIGH ANXIETY LEVEL (CLINICIAN OR PATIENT)**
- **ACHIEVED SET TIME LIMIT (15-30 MINUTES)**

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# HEMOSTASIS

- **PRESSURE WILL STOP MOST BLEEDING**
- **ELEVATION ABOVE HEART IF EXTREMITIES**
- **NITRATE STICKS**
- **CALCIUM ALGINATE**
- **LIDOCAINE JELLY**
- **ARTICAINE AND EPINEPHRINE ANESTHETIC**
- **HEMOSTATIC AGENTS**
  - **TOPICAL THROMBIN**
- **COLLAGEN**
- **QR POWDER**

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# MAINTENANCE DEBRIDEMENT

- **REPEATED ONGOING DEBRIDEMENT OF CHRONIC WOUNDS TO MAINTAIN THE WOUND BED IN A STATE OF READINESS TO HEAL**

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# **SURGICAL DEBRIDEMENT**

- **SHARP SURGICAL DEBRIDEMENT**
- **LASER DEBRIDEMENT**
- **FASTEST METHODS OF DEBRIDEMENT**
- **CAN GET ALL NECROTIC OR UNHEALTHY WOUND TISSUE IN ONE PROCEDURE**
- **SELECTIVE IF NONVIABLE TISSUE ONLY**
- **NON-SELECTIVE IF VIABLE TISSUE INCLUDED**
- **SURGICAL DEBRIDEMENT CAN BE PERFORMED IN THE OPERATING ROOM OR AT BEDSIDE**
- **CLINICIAN MUST BE CREDENTIALLED AS MD/DO, DPM**

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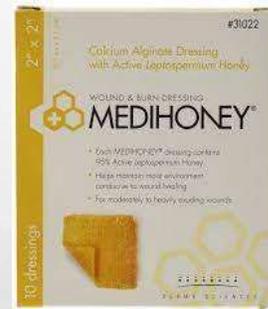
# **SURGICAL DEBRIDEMENT**

- **ADVANTAGES**
  - **GOOD FOR WOUNDS WITH A LARGE AMOUNT OF NECROTIC TISSUE**
  - **APPROPRIATE FOR REMOVAL OF INFECTED TISSUE**
  - **FAST**
- **DISADVANTAGES**
  - **PAINFUL TO PATIENT**
  - **COSTLY, ESPECIALLY IF OPERATING ROOM IS REQUIRED**

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# BACTERIAL BURDEN

- SILVER (ALL DRESSING CATEGORIES COME WITH AG OPTION)
- CADEXOMER IODINE
- PIGMENTED FOAM
- PHMB
- HONEY
- DACC



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# DRESSING FUNCTION

	Films	Hydrogels	Alginates/ Hydrofibers	FOAMS	HYDROCOLLOIDS
<b>COVER/ PROTECT</b>	X	X		X	X
<b>HYDRATE</b>		X			
<b>MAINTAINS MOISTURE/ AUTOLYTIC SUPPORT</b>	X	X	X	X	X
<b>ADDS MOISTURE</b>		X			
<b>ABSORPTION</b>			X	X	
<b>FILL SPACE</b>		X	X		

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# WOUND FLUID MANAGEMENT

LOW	MODERATE	HIGH
FILMS	CALCIUM ALGINATES HYDROFIBERS	CALCIUM ALGINATES HYDROFIBERS
FOAMS	FOAMS	FOAMS
HYDROCOLLOIDS	HYDROCOLLOIDS	
HYDROGELS		

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# TISSUE ENGINEERED PRODUCTS

- **CAN BE CLASSIFIED AS CELLULAR OR ACELLULAR**
  - **ACELLULAR ARE TISSUE MATRICES THAT CONTAIN NO CELLS**
    - **CONSIST OF A MATRIX THAT FUNCTIONS BY BINDING TO THE HOST, ALLOWING MATRIX-CELL INTERACTIONS**
    - **THE MATRIX ALLOWS HOST CELLS TO INFILTRATE**
  - **CELLULAR DEVICES USUALLY KERATINOCYTES AND FIBROBLASTS**
    - **SINGLE LAYER KERATINOCYTES GROWN ON POLYGLACTIN MESH**
    - **BILAYER KERATINOCYTES AND FIBROBLASTS ON COLLAGEN MATRIX**

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# FUNCTION OF CELLULAR SKIN SUBSTITUTES

- **GOAL OF USE IS TO RESTORE SKIN BARRIER**
- **SECRETE EXTRACELLULAR MATRIX (COLLAGEN)**
- **PRODUCE GROWTH FACTORS NEEDED BY THE WOUND AT THE NEEDED TIME AND NEEDED AMOUNTS**
- **PROVIDE TEMPORARY WOUND COVERAGE**
- **PRODUCTS WITH DIFFERENTIATED KERATINOCYTE LAYER PROVIDE PROTECTION FROM MOISTURE LOSS, BACTERIAL PROTECTION**

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# SKIN GRAFTS



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## **CELLULAR SKIN SUBSTITUTES DO NOT “TAKE”**

- **THEY ARE NOT SKIN GRAFTS**
- **THERE IS NO PERSISTENCE**
- **THERE IS NO VASCULARIZATION**
- **THERE IS NO INTEGRATION**

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## **HUMAN FIBROBLAST-DERIVED DERMAL SUBSTITUTE (DERMOGRAFT)**



- **A CRYOPRESERVED HUMAN FIBROBLAST DERIVED DERMAL SUBSTITUTE; IT IS COMPOSED OF FIBROBLASTS, EXTRACELLULAR MATRIX, AND A BIOABSORBABLE SCAFFOLD**

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# BI-LAYER BIOENGINEERED SKIN SUBSTITUTE (APLIGRAFT)



- **A LIVING, BI-LAYER SKIN SUBSTITUTE:**

- **EPIDERMAL LAYER IS FORMED BY HUMAN KERATINOCYTES AND HAS A WELL-DIFFERENTIATED STRATUM CORNEUM**
  - **CONTAINS KERATINOCYTE STEM CELLS**
- **DERMAL LAYER IS COMPOSED OF HUMAN FIBROBLASTS IN A BOVINE TYPE I COLLAGEN LATTICE**
- **HUMAN MATRIX PROTEINS AND CYTOKINES FOUND IN HUMAN SKIN ARE PRESENT**
  - **DOES NOT CONTAIN LANGERHANS CELLS, MELANOCYTES, MACROPHAGES, LYMPHOCYTES, BLOOD VESSELS OR HAIR FOLLICLES (NO IMMUNE CELLS)**

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# ACELLULAR TISSUE ENGINEERED PRODUCTS



- **MAY FUNCTION AS A BIOLOGIC MODULATOR**
  - **MATERIAL OR SUBSTANCE DERIVED FROM BIOLOGIC OR SYNTHETIC SOURCES**
  - **INFLUENCES BIOLOGICAL PROCESSES SUCH AS WOUND HEALING**
- **PROVIDE A SCAFFOLD FOR TISSUE REPAIR**
  - **NEEDS TO REMAIN IN PLACE FOR A SUFFICIENT LENGTH OF TIME**
  - **PROVIDES A SUPPORTING STRUCTURE INTO WHICH CELLS CAN MIGRATE**

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# DEHYDRATED HUMAN AMNION/CHORION MEMBRANE (DHACM) ALLOGRAFT



- **MULTI-LAYER BIOLOGIC DEHYDRATED HUMAN AMNIOTIC MEMBRANE ALLOGRAFT COMPRISED OF AN EPITHELIAL LAYER AND TWO FIBROUS CONNECTIVE TISSUE LAYERS SPECIFICALLY PROCESSED TO BE USED FOR THE REPAIR OR REPLACEMENT OF LOST OR DAMAGED DERMAL TISSUE**

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# PDGF



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