Aging Skin: More than just Gray Hair and Wrinkles

Integumentary Issues in the Geriatric Population

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Objectives

– Describe morphologic skin changes in the geriatric population
– Explain age-related issues that affect wound healing and exercise prescription in the elderly
– Distinguish wound dressings/therapy interventions to be used with caution in the geriatric population
– Describe specific clinical assessments of circulatory and sensory systems
– Recall prevention strategies related to wound development

Skin Facts

• Largest organ of the body: Average person has 2 square meters of skin. 15% of the total body weight. 19 million cells per square inch of skin. 7% of the skin cells are melanocytes. 300 sweat glands per square inch of skin.
• Entire skin is replaced every 28 days. 9 pounds of dead skin cells are shed in one year. 50% of the dust in your home are dead skin cells.

Skin Facts

• Body hairs grow for 2-6 years. 20-100 hairs are shed each day. Pigmented and unpigmented hairs exist.
• Human skin is home to more than a 1000 species of bacteria.
• Lipids keep skin moist and healthy.
• Skin color is determined by the activity of melanin cells. 6 months for babies to develop permanent skin tone. Pheomelanin colors skin yellow to red. Eumelanin colors skin dark brown to black. 1:110,000 people have no pigmentation (Albinism).
• Sweat does not smell, bacteria that feeds off sweat does.
• There are around 14 different fungi species between the toes.
Skin Function

- Protection
- Temperature control
- Vitamin D metabolism
- Excretion
- Reception of external stimuli
- Immune Defense
- Personal identity
- Allows motion

Sussman and Bates-Jensen

Aging: By the Numbers

<table>
<thead>
<tr>
<th>Generation</th>
<th>Born</th>
<th>Age Now</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matures</td>
<td>1920-1940</td>
<td>76-96</td>
</tr>
<tr>
<td>Boomers</td>
<td>1940-1960</td>
<td>56-76</td>
</tr>
<tr>
<td>Generation X</td>
<td>1960-1980</td>
<td>36-56</td>
</tr>
<tr>
<td>Millenials</td>
<td>1980-2000</td>
<td>16-36</td>
</tr>
</tbody>
</table>

Morphology of Aging Skin

- Reductions
  - Cell numbers
  - Fiber numbers
  - Structure numbers
  - Structural thickness

- Result
  - Functional decline of skin
Types of Factors in Skin Aging

- **Intrinsic**
  - Genetically driven
  - Time based
  - Irreversible

- **Extrinsic**
  - Environmental
  - Lifestyle
    - Medications that alter normal cellular response
    - Smoking

Extrinsic Factors of Skin Aging

- UV and Ionizing Radiation (80% of the damage)
  - Damages nucleic acids and proteins
  - Increases reactive oxygen species and free radicals

- Smoking
  - Reduced oxygenation
  - Reduced proliferation of fibroblasts, macrophages
  - Reduced wound edge contraction

- Environmental Pollutants

- Mechanical and Chemical insults

Intrinsic Factors in Aging

<table>
<thead>
<tr>
<th>Factor</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-50% thinning of epidermis</td>
<td>Fragility and susceptibility to injury from blunt force trauma</td>
</tr>
<tr>
<td>10-40% reduction in melanocytes per decade</td>
<td>Uneven pigmentation, susceptibility to UV damage and DNA alteration</td>
</tr>
<tr>
<td></td>
<td>Graying hair</td>
</tr>
<tr>
<td>Decreased Langerhans cells</td>
<td>Decreased immune response, decrease ability to kill cancer cells, increased risk of infections</td>
</tr>
<tr>
<td>Flattening of the dermal papillae and epidermal rete ridges</td>
<td>Increase risk of skin tears and layer separation with minimal trauma</td>
</tr>
</tbody>
</table>
Intrinsic Factors in Aging

<table>
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<tr>
<th>Factor</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased size (and type) of Collagen and Elastin</td>
<td>Reduced strength and resiliency, skin sagging</td>
</tr>
<tr>
<td>Increased number of senescent cells — alive but not responding</td>
<td>Decreased cellular response and delayed wound healing</td>
</tr>
<tr>
<td>Reduction in cytokines and chemokines and their receptors</td>
<td>Reduced cellular response for the inflammatory phase of wound healing</td>
</tr>
<tr>
<td>Decreased Hyaluronic Acid, fibroblasts, GAGs, and mast cell in the ECM</td>
<td>Thinning and disorganization of the dermis, increased dryness and wrinkles in the skin</td>
</tr>
</tbody>
</table>

Intrinsic Factors in Aging

<table>
<thead>
<tr>
<th>Factor</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decrease sweating</td>
<td>Decreased body temperature control, changes skin pH</td>
</tr>
<tr>
<td>Decrease sebum production ~60%</td>
<td>Decreased barrier function, change in pH to alkaline, increased pruritus and eczema, xerosis</td>
</tr>
</tbody>
</table>

Intrinsic Factors in Aging

<table>
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<th>Factor</th>
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<tr>
<td>30% reduction of nerve receptors and decreased neurotransmitters</td>
<td>Altered pain, heat, cold, pressure awareness</td>
</tr>
<tr>
<td>Decreased vascularity — smaller vessels, decreased angiogenesis</td>
<td>Decreased oxygen and nutrient delivery, delayed or impaired wound healing capacity</td>
</tr>
<tr>
<td>Thinning subcutaneous fat layer</td>
<td>Loss of protection to underlying structures</td>
</tr>
<tr>
<td>Decreased estrogen levels</td>
<td>Decreased skin health and repair ability, prolonged inflammatory phase</td>
</tr>
</tbody>
</table>
Skin Failure

- Multifactorial process that is related to the other organ systems function or dysfunction
- Skin deterioration is frequently the outward manifestation of faltering physiology
- Just like the other organ systems, skin failure can be acute, chronic, or end-stage.

Normal Wound Healing

- Requires
  - Vascularization
  - Granulation
  - Collagen Deposition
  - Reepithelialization

Risk Factors: Wound Healing & Aging

- Smoking
- Sun Exposure
- Medication Considerations
  - Polypharmacy
- Concomitant Conditions
  - Incontinence
  - Poor Eyesight/poor lighting
  - Malnutrition
  - Balance impairments
  - Depression
  - Impaired cognition

They have a wound...Now what??

1. Determine the cause
   - Pressure
   - Vascular compromise
   - Neuropathy
   - Trauma
   - Disease

2. What should the plan of care include:
   - Dressings
   - Off-loading
   - Exercise
   - Protection
   - Edema control
Skin Assessment

- Color
- Temperature
- Texture
- Hydration
  - Pinch test
- Presence of Hair
- Nails

Pressure Point Assessment

- Bony prominences must be assessed for discoloration, boggy or firm tissue, increased temperature, skin disruption, maroon or deep purple discoloration.
- Assess all furniture and off-loading devices — including bathroom equipment.

Circulatory Assessment

- Pulses
- Ankle Brachial Index (ABI)
- Skin Discoloration
  - Hemosiderin staining
- Skin Temperature
- Rubor of Dependency
- Venous Hypertension
  - Varicosity
  - Telangiectasias
- Venous Filling Time test

Rubor of Dependency
Ankle Brachial Index

<table>
<thead>
<tr>
<th>VALUE</th>
<th>CLINICAL COORELATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 1.3</td>
<td>Non-compressible vessel disease</td>
</tr>
<tr>
<td>0.7-0.9</td>
<td>Moderate symptoms with exercise</td>
</tr>
<tr>
<td>0.5</td>
<td>Symptoms at rest</td>
</tr>
<tr>
<td>0.3</td>
<td>Associated with gangrene/necrosis</td>
</tr>
</tbody>
</table>

Venous Filling Time Test

1. Position patient supine
2. Observe superficial veins on the dorsal surface of the foot
3. Elevate the limb 60°
4. Hold for 1 minute or until veins empty
5. Place the extremity in dependent position
6. Record time for veins to refill

Venous Filling Time Results

<table>
<thead>
<tr>
<th>Condition</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>5-15 seconds to refill</td>
</tr>
<tr>
<td>Venous Insufficiency</td>
<td>&lt;5 seconds</td>
</tr>
<tr>
<td>Arterial Insufficiency</td>
<td>&gt;20 seconds</td>
</tr>
</tbody>
</table>

Venous Hypertension

- Varicosity
- Telangiectasias

Sensory Assessment

- Monofilament Testing

Trauma or Disease

- Fall history
- Signs of abuse or neglect
- Health history for systemic disease
- Always check for melanoma with ABCDs
Wound Dressings: Oxygen and Water Vapor Transmission

- **Permeable**
  - Loose-weave Gauze
  - Fine-weave Gauze
  - Calcium Alginate

- **Semipermeable**
  - Impregnated Gauze
  - Semi-permeable Film
  - Semi-permeable Foam
  - Hydrogel

- **Occlusive**
  - Hydrocolloid

Wound Dressings: Ability to Absorb

- **Most Absorbent**
  - Calcium Alginate
  - Semi-permeable Foam
  - Loose-weave Gauze
  - Fine-weave Gauze
  - Hydrocolloid
  - Hydrogel
  - Impregnated Gauze

- **Least/Non-Absorbent**
  - Semi-permeable Film

Problematic Wound Dressings

- **Heavy Adhesives**
  - Semi-permeable films
  - Hydrocolloids
  - Tapes

Problematic Wound Dressings/Edema Control

- **Tight securing dressings**
  - Roll gauze and ace wraps
  - Vascular compression or pressure/shear problems
Off-loading

- Temporary footwear
- Off-loading orthotics
- Sacral cut-out and other types of seating cushion
- Body positioners for supine and semi-side lying
- Specialty beds, wheelchair cushions, custom shoes
- Gait training, transfer training, safety assessment !!!

Exercise

- Wide variability in physical fitness at the same chronological age.
- Extra care with therapy band to avoid skin tears.
- Check blood pressure and, if needed, glucose prior to exercise.
- Ovoid over-heating due to decrease in sweat glands.

Prevention & Wellness Strategies

- Assessment overall health including nutrition
- Foot screening !
- Skin Protection
- Edema Control
- Clothing and Shoe Assessment
- Mobility Assessment
- Environment Assessment
Skin Protection

- Sunscreen and protective clothing
- Protective sleeves for arms and legs
- Avoiding architectural barriers/trauma
- Correct skin products
- Incontinence

A sunscreen with SPF 40 is twice as effective as a sunscreen with SPF 20.

1. True
2. False

Sun Screens & Protective Clothing

Avoiding Trauma

- Skin Tears
  - Typical Sites
    - Arms
      - Non-ambulatory seniors
      - Due to additional handling by assistants
    - Legs
      - Ambulatory population
      - Blunt trauma by equipment
  - Transfer Education
Skin Tears

Associated with
• Senile Purpura—40%
• Advanced Age
• Sensory Loss
• Compromised Nutrition
• Previous Skin Tears
• Cognitive Impairment
• Dependency

65%

Protective Sleeves

• Non-compressive sleeves
• Protection from trauma

Xerosis in Aged Skin

• Humidification
• Room temperature as low as comfortable
• Warm not hot bath/shower
• Use of correct skin products
• Reduce bathing frequency to 1-2 times per week
• Check hydration status

Correct Skin Products

<table>
<thead>
<tr>
<th>Soaps</th>
<th>Lotions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove the sebum and lipids</td>
<td>Emollients</td>
</tr>
<tr>
<td>Daily bathing with non-emollient soap</td>
<td>Moisturizers</td>
</tr>
<tr>
<td>discouraged</td>
<td>• Trap water</td>
</tr>
<tr>
<td>Non-rinse body washes less drying</td>
<td>Humectants</td>
</tr>
<tr>
<td></td>
<td>• Draw moisture</td>
</tr>
<tr>
<td></td>
<td>Lotions and Creams</td>
</tr>
<tr>
<td></td>
<td>• Classified by amount of solids to</td>
</tr>
<tr>
<td></td>
<td>liquids they contain</td>
</tr>
</tbody>
</table>
Incontinence

• Urine and feces are acidic
  – Incontinence Associated Dermatitis

• Mobility and balance issues
• Diuretics and urgency
• Dependence in ADLs

Edema Control

• Elevation
• Compression
  – Wraps
    • Ace wraps
    • Low compression wraps
    • Multi-layered wraps
  – Stockings

Clothing and Shoe Assessment

• Foot Assessment
  – Calluses, corns
  – Abnormal wear patterns
  – Extra width &/or depth shoes

• Clothing Assessment
  – Tight, poor-fitting, or clothing

Mobility and Environmental Assessment

• Mobility
  – Balance, Gait, Transfers, Gait Aids, ADLs

• Lighting
  – ≥ 65 years
  – 70% more lighting for visual acuity

• Home Barriers
  – Clutter
  – Floor coverings
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Questions?

References


Poljsak B, Dahmane R: Free Radicals and Extrinsic Skin Aging. Dermatology Research and Practice 2012 article 135206