Aging is a systemic phenomena...does it *cause* chronic wounds?

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Aging is the process of becoming older…

- Older usually are defined as ≥ 65 years
- Currently 13% of US population (35 Million)
- Will increase to 20% by 2030 (70 Million)
**Cause** is defined as
- events that provide the generative force that is the origin of something;
- a justification for something existing or happening;
- causal agent: any entity that produces an effect or is responsible for events or results give rise to.

[wordnet.princeton.edu/perl/webwn](http://wordnet.princeton.edu/perl/webwn)
Chronic wound is one that does not heal in a timely manner or follow an orderly sequence of events.

Common chronic wounds are:
- Pressure ulcers
- Venous ulcers
- Diabetic ulcers
Are these chronic wounds caused by aging?

- Pressure ulcer: ischemia due to external pressure
- Venous ulcer: venous hypertension – with theories as to role of environment in healing
- Diabetic ulcer: trauma to neuropathic tissue, high glucose altering nutrient availability, tissue with alterations in blood flow

ALL OCCUR FREQUENTLY IN OLDER ADULTS
Older adults have many co-morbidities

• Average 75 year old has
  – at least 3 chronic illnesses
  – 5 different prescription drugs
• Top 3 causes of death are
  – Heart disease
  – Cancer
  – Stroke
• Top 3 behaviors linked to almost 35% of deaths
  – Smoking
  – Poor diet
  – Physical activity

Elderly hospitalized more

- Elderly hospitalized nearly three times as frequently as younger persons*
- Elderly account for about 39% of all hospital admissions (but only 13% of the population)
- Elderly hospital LOS is longer; they consume about 48% of all hospital days**

**Kozak, Owings, Hall, 2005.
Wounds are present in elderly, often with co-morbidities

- 14.8 million surgical procedures annually
- 8.6 million diabetics 60+ and 15-20% hospitalized in lifetime with wound causes
- 2% of population has venous disease, prevalence peaks in 60-80 year olds
- 5 - 15% of hospitalized patients have pressure ulcers, more in older persons than younger

Stotts & Hopf, 2005
Data show that aging DOES affect all phases of healing

- Inflammatory
- Proliferative
- Remodeling
- Slowed healing
- Infection
- Dehiscence
Aging and the inflammatory phase

- Increased
  - platelet adherence
  - release of alpha granules (TGF-beta, TGF-alpha, PDGF)

- Decreased
  - nitric oxide
  - capillary permeability
  - decreased neutrophil diapedesis
  - Decreased growth factor production

- Delayed leukocyte arrival at injury

- Macrophages less phagocytic
Aging and the proliferative phase

• Decreased
  – re-epithelialization
  – collagen synthesis
  – angiogenesis (FGF, VEG-F, TGF-beta)

• ECM not broken down
  – increase MMPs (metalloproteinases)
  – decreased TIMPs (tissue inhibitors of metalloproteinases)
Aging and the remodeling phase

- Less collagenase activity & decreased TGF-beta (rarely see hyper-proliferative i.e., hypertrophic scars, keloids)
- Strength gain is slower
- Less tensile strength than in younger
Yet there are limits to the studies where findings on effects of aging on healing were generated...

- Concomitant conditions were not recorded or controlled for.
- Medications were not addressed.
- Sites from which tissue samples were taken were not reported.
- Designs often were cross-sectional rather than longitudinal.
- Measures of healing often examined intermediate outcomes.
When co-morbidities are controlled for, healing is not different in older and younger subjects.
Chronic wounds are caused by underlying pathology:
- pressure...pressure ulcers,
- venous disease... venous ulcers,
- neuropathy, high glucose levels & vascular changes... diabetic ulcers.
If aging caused chronic wounds, **ALL** older persons would have a chronic wound...
Aging is a systemic phenomena. It may contribute to but does NOT cause chronic wounds...