Healthy Healing

Biologist Luisa Ann DiPietro:
Reducing Scarring and Speeding Healing

Findings

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Luisa DiPietro Optimizes Healing

Dentist and biologist DiPietro works to change the way we view healing.

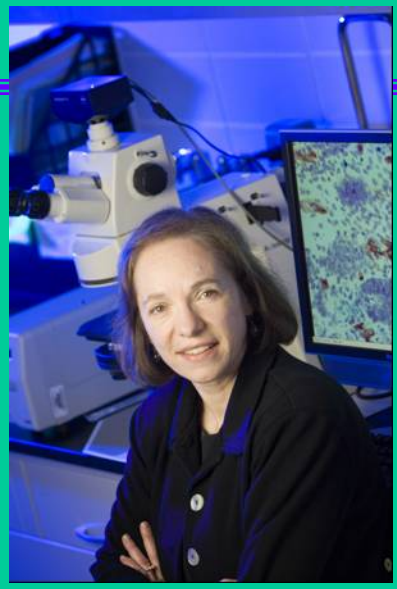

Photo: Bill Wiegand

Healing

- Is a regenerative series of events
- Involves >12 cell types and >100 molecules
- Can go awry

Question:

Do all types of tissue heal equally well?

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Answer: No

Different types of tissue heal better than others.

- Skin tissue is more likely to scar than are mucous membranes
- Slippery tissues inside the nose, ears, mouth, and other body cavities heal faster than skin tissue
- Diseased tissue in arteries may not completely heal
- Wounds in people with some diseases may heal more slowly than those of healthy people

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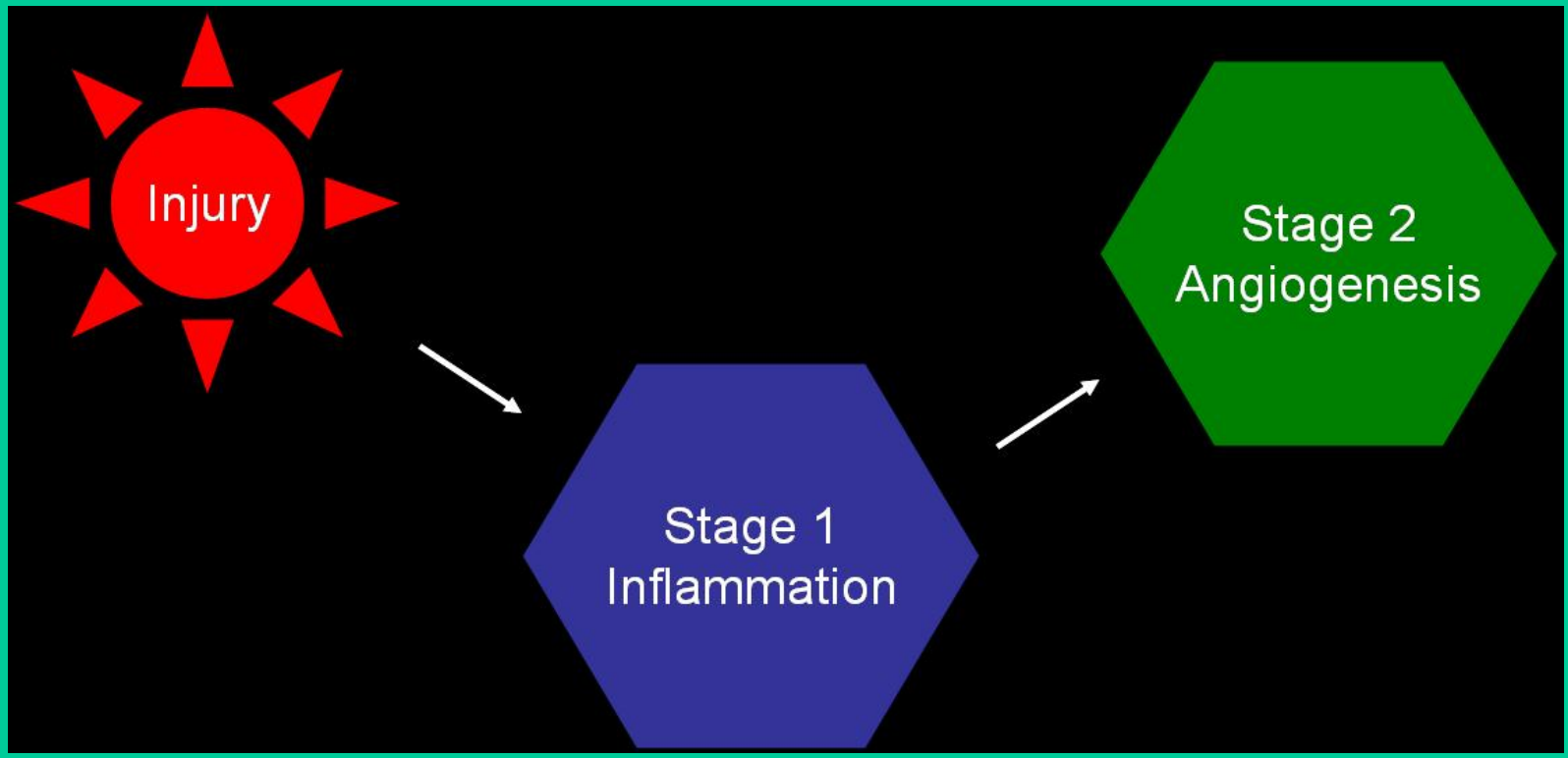
Stages of Healing



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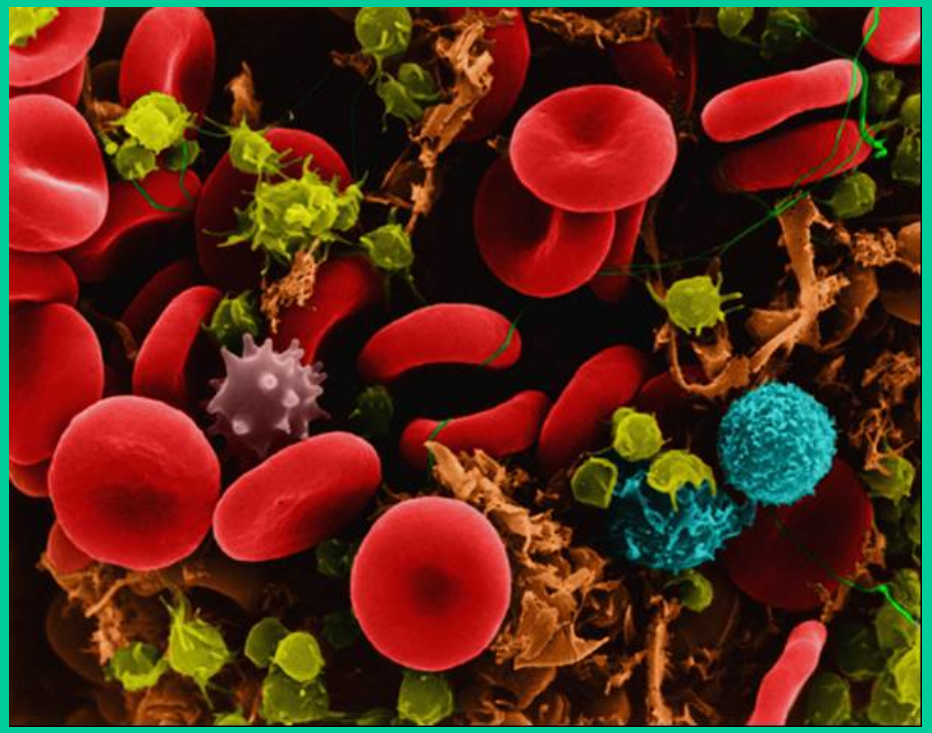
Inflammation in Cells

1. Neutrophils are the first cells to respond to injury
2. Macrophages clean up debris
3. Mast cells induce swelling, warmth, and redness
4. All 3 types of cells summon more immune system cells

Findings

Wound cells



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Angiogenesis

1. New vessels grow and cover wound
2. New vessels bring oxygen and nutrients to wound
3. Proteins grab the edges of wound and close it, forming a protective mesh
4. Excess new vessels die off

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Scar

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Too Much of a Good Thing?

- Excess inflammation can damage healthy, neighboring tissues
- Excess inflammation can be life-threatening
- Excess angiogenesis can worsen scarring

How does this happen?

When is inflammation potentially dangerous?

In what types of human cells does this NOT occur?

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DiPietro's Gnawing Problem

- As a dentist, DiPietro knew that severe scarring is rare in tissue with mucous membranes, such as mouth tissue
- As a biological researcher, DiPietro wants to know why the same is not true of other types of tissue, like skin

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Knowledge By Comparison

DiPietro's Approaches to Better Understand Healing

- **Approach #1:** Compare how lab-grown, human skin and mouth cells respond to injury → *In vitro* experiment
- **Approach #2:** Compare healing process of injured skin and tongues in mice → *In vivo* animal experiment

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Many Unanswered Questions

- What causes scarring?
- Why does your mouth scar so much less severely than your skin?
- Can we learn from these differences?

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Research Applications

Can you think of a new way to prevent scarring?

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