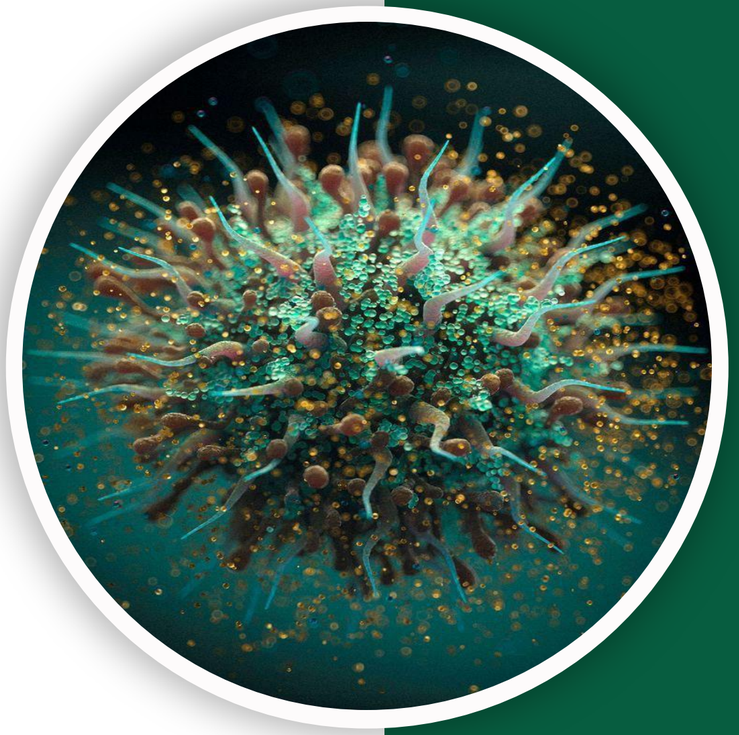
بسم الله الرحمٰن الرحيم

(وَفَوْقَ كُلِّ ذِي عِلْمٍ عَلِيمٌ)

Pathology | Final 3

Repair (Pt.3)



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وَلِلَّهِ الْأَسْمَاءُ الْحُسْنَى فَادْعُوهُ بِهَا

المعنى: الذي قام بنفسه فلم يحتج إلى أحد، وقام كل شيء به، فكل ما سواه محتاج إليه بالذات.

الورود: ورد في القرآن (٣) مرات.

الشاهد: ﴿ ٱللَّهُ لَآ إِلَٰهَ إِلَّا هُوَ ٱلۡحَيُّ ٱلۡقَيُّومُۚ ﴾ [البقرة:٢٥٥].

اضغط هنا لشرحٍ أكثر تفصيلًا

Lecture 9

ABNORMAL HEALING (not all healing processes are perfect)

- **Deficient scar formation** make the wound weak and may open it .
- **Excessive repair** more scar forms .
- **Contractures** impact on the function of the organ .

DEFICIENT HEALING:

- **Venous leg ulcers**

✓ This condition occurs mostly in elderly people as a result of chronic venous hypertension .

- **Arterial ulcers** (cutaneous & skin ulcers)

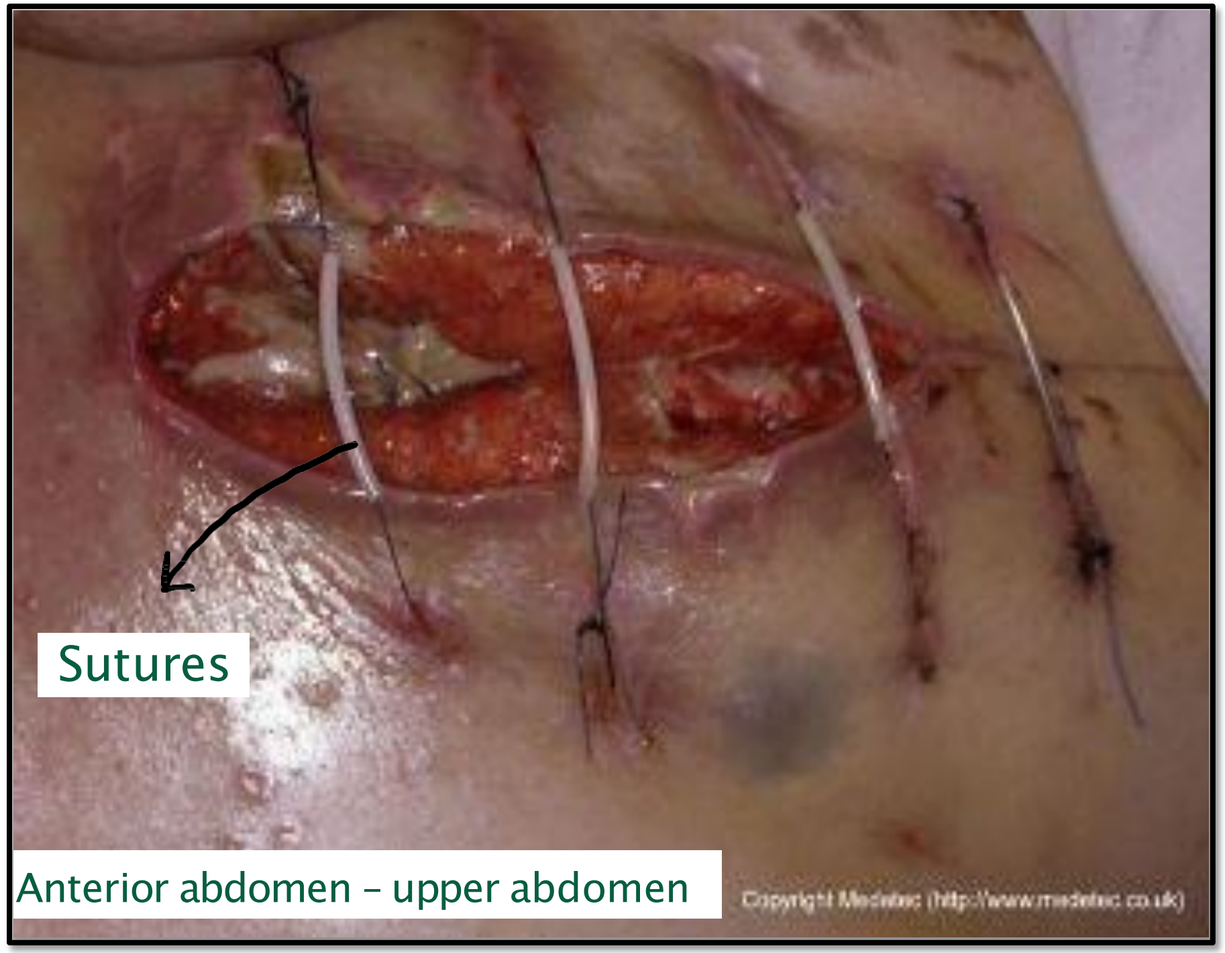
✓ There is a deficiency in arterial perfusion and blood supply, with no angiogenesis occurring, as seen in conditions like chronic atherosclerosis, older age, and hypertension. This leads to more severe deep ulcers compared to venous ulcers.

- **Pressure sores** (Also called Bed Ulcers or bed sores)
- **Diabetic ulcers**

✓ dedicated diabetic foot clinics for this purpose, such as the one at Jordan University Hospital and others within diabetes care centers. These clinics provide specialized treatment for specific types of ulcers that are difficult to treat and need careful management to prevent complications.

- *** **Wound dehiscence** (Rare)

Wound dehiscence:



Causes:

· The main cause of wound dehiscence is increased intra- abdominal pressure.

· It occurs due to weak sutures and poor surgical techniques.

-Surgeons need to be especially careful with wounds in obese patients , COPD , cough as they may require additional support such as plasters, belts, and gauze.

A) Venous Ulcers:

- **Location: Classic location for venous ulcers, often found in the medial area of lower leg.**
- **Depth: These ulcers are more shallow and less deep compared to arterial ulcers.**
- **Discoloration: The affected area shows dusky gray to blue discoloration (the color in area A), which is due to chronic deposition of iron (hemosiderin) from increased blood pressure and the prolonged presence of blood in the area over months or years.**

B) Arterial Ulcers:

- **Dangerous Nature: Arterial ulcers are more dangerous due to chronic ischemia**
- **Depth: These ulcers are deeper than venous ulcers because the arterial blood supply is deficient, leading to tissue death and more severe wound formation.**

C) Diabetic Ulcers:

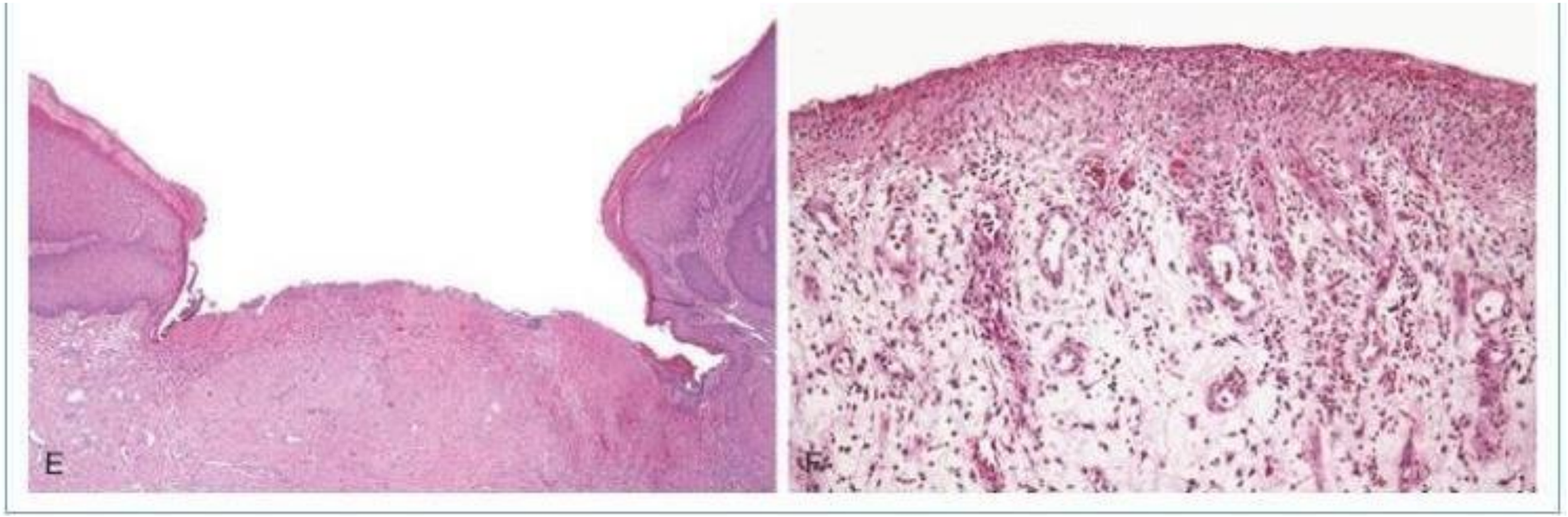
· Patient Condition: These ulcers occur in diabetic foot patients, who often experience difficulty in treating these ulcers.

· Cause: The primary factor is chronic hyperglycemia , which leads to various complications, including peripheral neuropathy. This nerve damage affects sensation in the feet, making patients less aware of injuries that could lead to ulcers.

D) Pressure Sores (Bedsores or Pressure Ulcers):

· Location: Commonly found in areas of the body where bones are close to the skin, such as the lower back and buttocks.
· Cause:
Mechanical pressure: Prolonged compression of tissues against bones causes local ischemia and tissue necrosis, leading to tissue damage and ulcer formation.
· Stroke patients and other bedridden, immobile elderly individuals with multiple morbidities are at higher risk of developing pressure sores.
If patients remain in the same position for extended periods, such as 3 hours, the pressure between the skin and bones obstructs blood vessels, leading to reduced circulation and tissue damage.

· Care Issue: The development of pressure sores often indicates poor nursing care. Regular repositioning of patients is critical to prevent tissue damage and ulcer formation.
· Solution: New electrical beds have been introduced that can automatically reposition patients to reduce the risk of pressure ulcers.



- It is a discontinuation of squamous epithelium, so it is ulcer .
- Ulceration is discontinuity of mucosal epithelial surface .

- Granulation tissue which occurs as a response to this ulcerative morphology of an inflammatory response .

EXCESSIVE SCARRING:

(abnormal healing)

- **Hypertrophic scar**
- **Keloid**

✓ Excessive scar tissue that grows beyond the boundaries of the original wound. It often involves more collagen type 1and does not look cosmetically appealing.

- **Exuberant granulation tissue (proud flesh)**

✓ The tissue can appear beefy red and huge at the site. Doctors rarely see this in practice but it's mentioned in medical books.

- **Aggressive fibromatosis (desmoid tumor)**
- **Contractures** (mainly affects the hands , foot and penis)

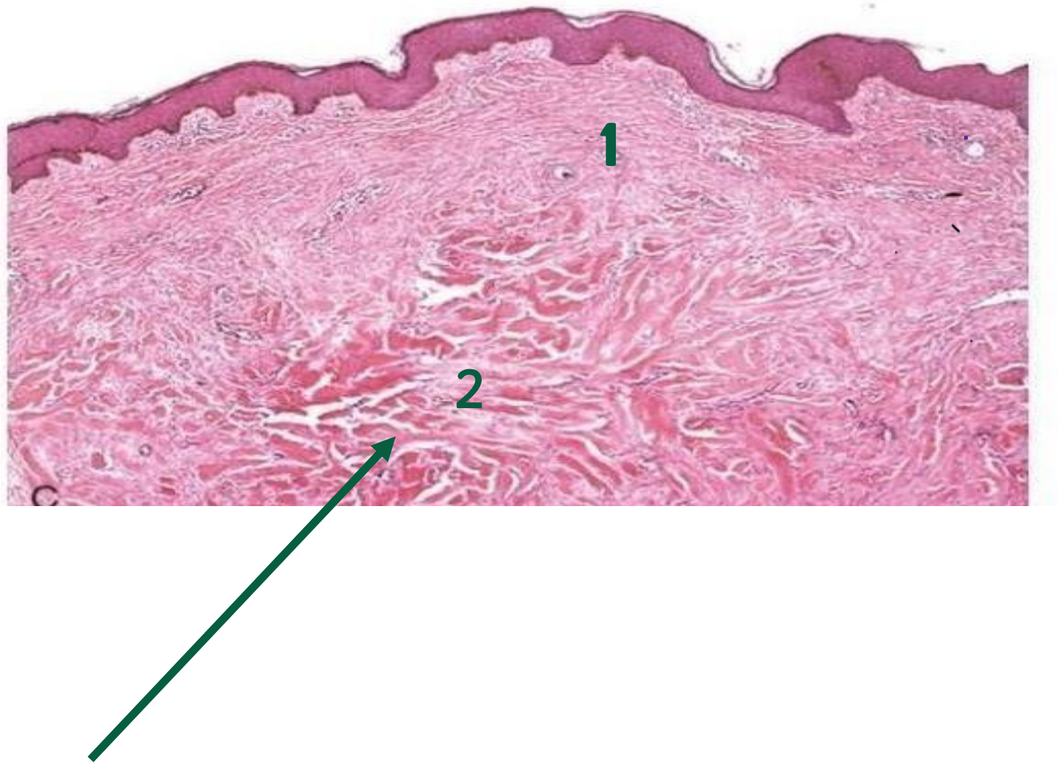
The doctor will explain the last two point in more detail in next semester.

This is an example of a hypertrophic scar, it has to be clean and nice but this is really cosmetically not nice looking and sometimes they have to be treated by :

- Excision again and certain types of surgical techniques to clean it up. (removing the scar tissue and cleaning the wound) allowing for the scar tissue to be formed again while introducing techniques to ensure minimal scar formation to ensure better cosmetic appearance.
- utilizing some local anti – inflammatory medications like steroid creams .

This is an example of a keloid scar :

- Fresh a lot large scars for simple cutaneous tumors.
- Really difficult to treat because the more surgical manipulation of them the more scars appear.
- More common in dark skin people (African – American).
- It runs in certain families.



Abnormally located abundant dense bundles of collagen type 1 causing squamous cell elevation

Microscopic View of a Keloid Scar

· After surgically removing the scar or keloid, the tissue is examined under a microscope.

· Microscopic Findings:

1. Squamous epithelium: The outer layer of tissue observed.

2. Collagen Type I: The main structural protein found in the scar tissue, indicative of scar formation.

* Microscopically , it is hard to differentiate hypertrophic and keloid scars

FIBROSIS OF ORGANS:.

Very serious and can lead to morbidity and mortality

Fibrosis and scar formation are common outcomes of the tissue repair process, especially in chronic conditions.

· If a condition involves chronic relapsing episodes or acute exacerbations on top of chronic inflammation, each acute episode contributes a small amount of fibrosis.

· Over time, with repeated cycles of injury and repair (e.g., 100–150 attacks over 15–20 years), this cumulative fibrosis can lead to excessive scarring in the affected organs.

- **Scar and fibrosis: excessive deposition of collagen and ECM.**
- **Continuous infections and immunologic injuries cause organ fibrosis and loss of function**
- **TGF-ß is the most common cytokine of fibrosis**

The most important fibrogenic mediator

- **Examples: liver cirrhosis, Idiopathic lung fibrosis, ESKD**

✓ **Chronic fibrosis can impair organ structure and function, resulting in long-term complications and reduced tissue elasticity.**

1. Liver cirrhosis (severe fibrosis) :

- Almost 95% is replaced by fibrous scar tissue that is not functioning
- Needs liver transplantation to survive
- High mortality rate if not compensated
- In the west the most common cause of liver cirrhosis is alcoholism
- In the middle east the most common cause is the chronic hepatitis due to hepatitis C

2. Idiopathic lung fibrosis (interstitial lung disease) :

- Recurrent lung disease up to the point
- When the whole tissue is replaced by fibrous scar tissue patients cannot breath and will require transplantation also
- Silica and certain occupational hazards can cause it , however most of the time the etiology of lung disease is unknown

3. End stage kidney disease (ESKD) :

Is characterized by extensive fibrosis within the renal tissue. In many cases, the severity of the fibrosis is so pronounced that it masks the primary disease that led to kidney failure, making it difficult for pathologists to determine the initial cause. Chronic damage, often due to conditions like hypertension or diabetes, culminates in significant scarring, further impairing renal function.

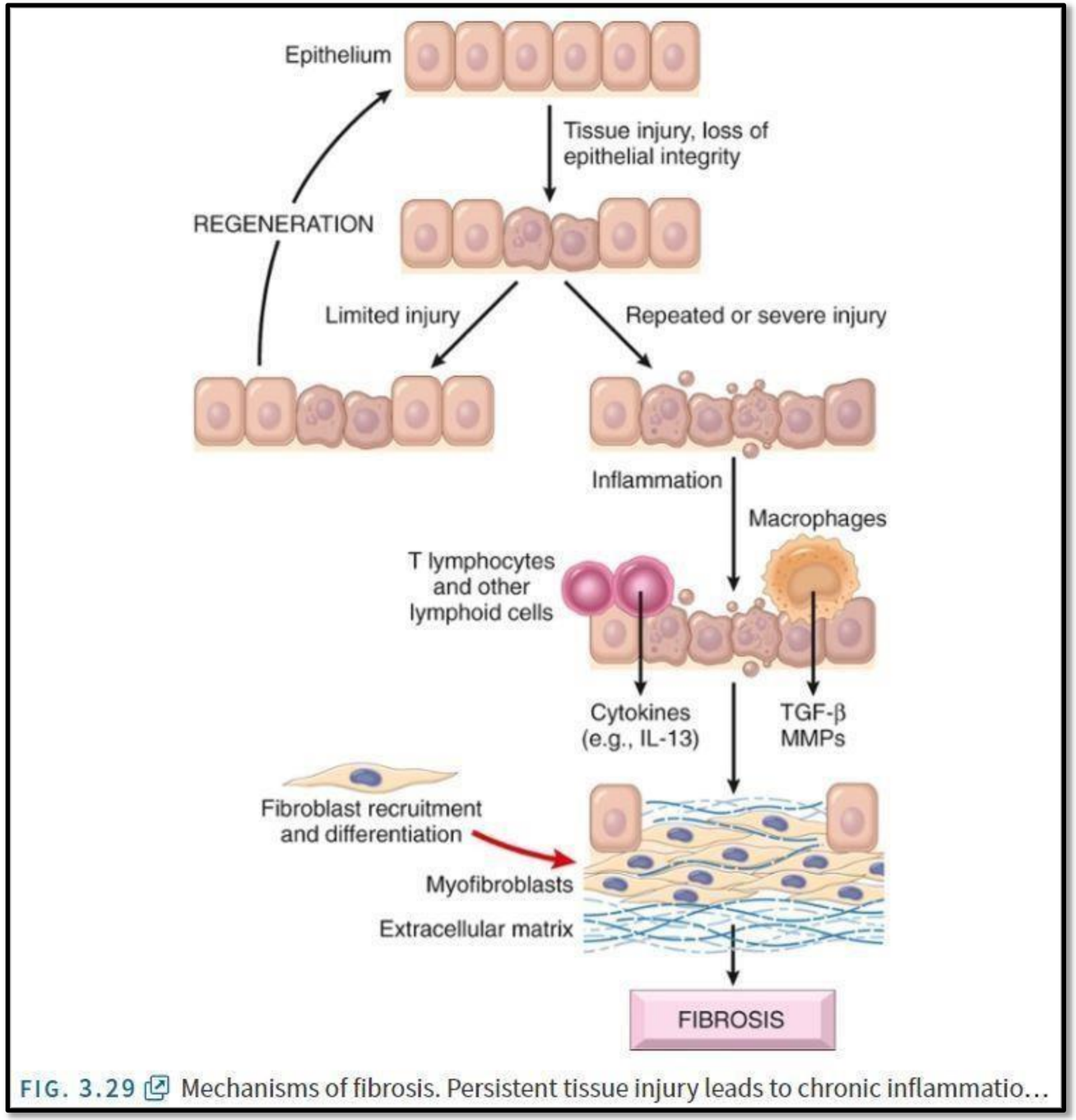


FIG. 3.29 Mechanisms of fibrosis. Persistent tissue injury leads to chronic inflammatio…

- **The following picture represents 2 cases of response to tissue injury. On the right there is a continuous (inflammatory response then fibrosis). Happens more often in chronic active diseases.**

Summary

Cutaneous Wound Healing and Pathologic Aspects of Repair

- The main phases of cutaneous wound healing are inflammation, formation of granulation tissue, and ECM remodeling.
- Cutaneous wounds can heal by primary union (first intention) or secondary union (secondary intention); secondary healing involves more extensive scarring and wound contraction.
- Wound healing can be altered by many conditions, particularly infection and diabetes; the type, volume, and location of the injury are important factors that influence the healing process.
- Excessive production of ECM can cause keloids in the skin.
- Persistent stimulation of collagen synthesis in chronic inflammatory diseases leads to tissue fibrosis, often with extensive loss of the tissue and functional impairment.

Additional Resources:

رسالة من الفريق العلمي:

﴿ وَاذْكُر رَّبَّكَ إِذَا نَسِيتَ ﴾

- لآ آلهَ الا الله.

- سبحَان الله وَبحمده.

- سبحَآن الله العظيم.

- استغفرالله واتوب إليه

For any feedback, scan the code or click on it.

Corrections from previous versions:

Versions	Slide # and Place of Error	Before Correction	After Correction
V0 → V1	Slide 10; 1st rectangle	**Extension** again and certain types of surgical techniques to clean it up.	**Excision** again and certain types of surgical techniques to clean it up. **(removing the scar tissue and cleaning the wound) allowing for the scar tissue to be formed again while introducing techniques to ensure minimal scar formation to ensure better cosmetic appearance.**
V1 → V2			