GRANULATION TISSUE

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GRANULATION TISSUE

INTRODUCTION

GRANULATION TISSUE …… highly vascularized tissue composed of :

1. Newly vascularized capillaries,
2. Proliferating fibroblasts and
3. Residual inflammatory cells

GRANULATION TISSUE FORMATION…… A YOUNG SCAR

❖ **GRANULATION TISSUE…..is new connective tissue and tiny blood vessels** that forms on the surfaces of wounds during healing process.

PHASES OF GRANULATION TISSUE FORMATION

1. PHASE OF INFLAMMATION. Following trauma, blood clots at the site of injury. There is acute inflammatory response with exudation of plasma, neutrophils and some monocytes within 24 hours.

2. PHASE OF CLEARANCE. Combination of

- Proteolytic enzymes liberated from neutrophils,
- autolytic enzymes from dead tissues cells, and
- phagocytic activity of macrophages **clear off** the necrotic tissue, debris and red blood cells.

- Process of repair begins early – **24 hours**

- It begins as a proliferation of young connective tissue cells (fibroblast) and proliferation of new blood vessels – **3 to 7 days.**

- Two types of granulation tissue present based on duration of repair: **Early (Vascular) and Late**

PHASE OF INGROWTH OF GRANULATION TISSUE

This phase consists of 2 main processes:

i. angiogenesis or neovascularisation, and
ii. fibrogenesis.

i) Angiogenesis (neovascularisation).

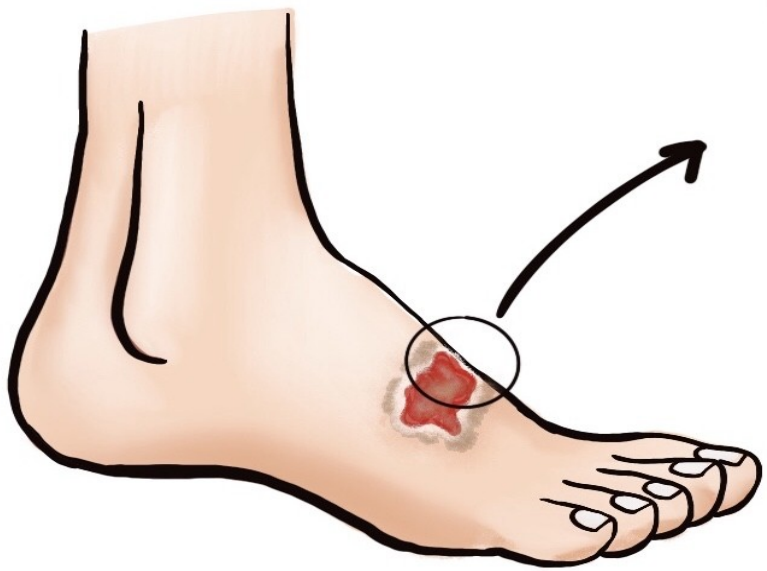
Formation of new blood vessels at the site of injury takes place by proliferation of endothelial cells from the margins of severed blood vessels.

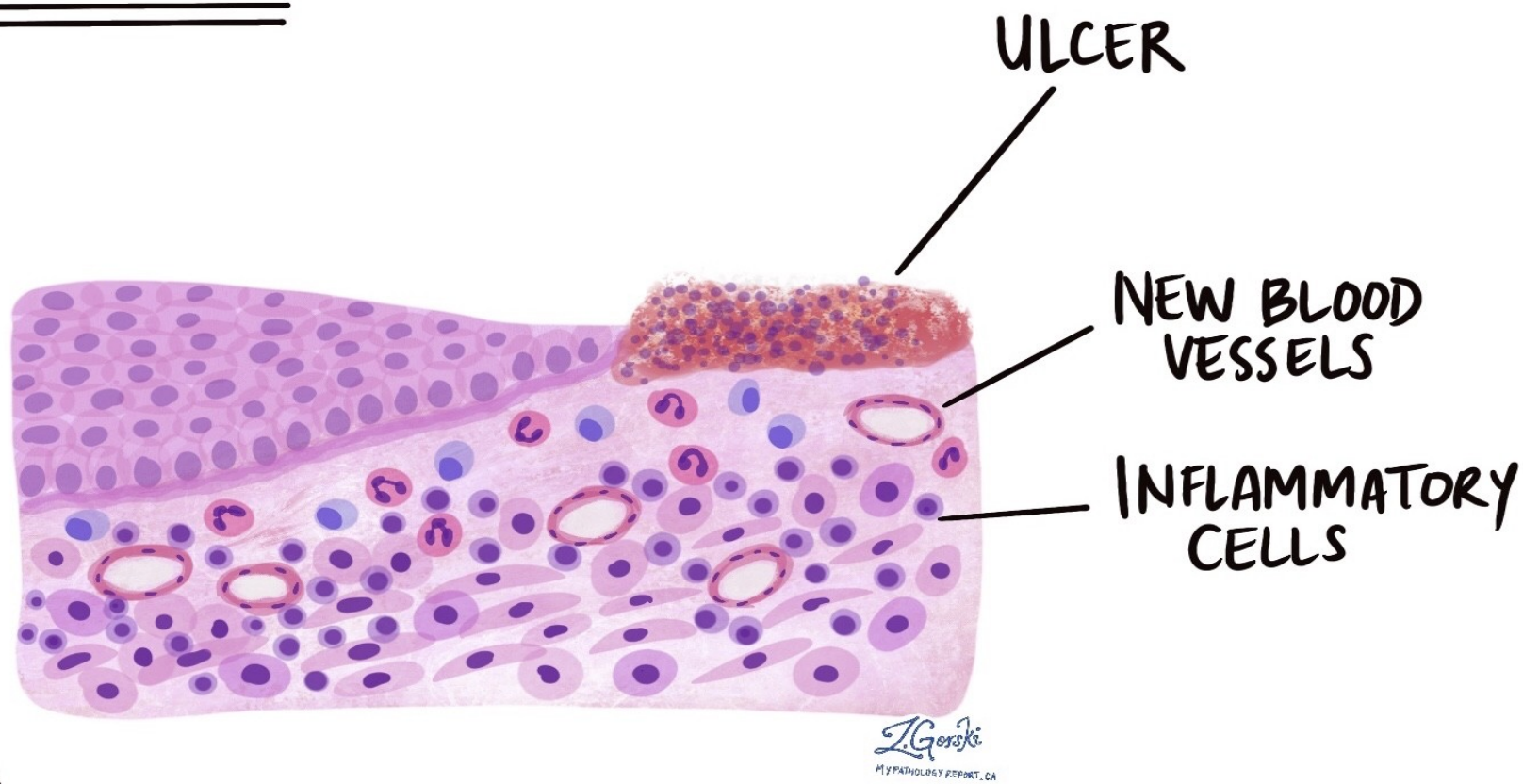
Initially, the proliferated endothelial cells are solid buds but within a few hours develop a lumen and start carrying blood.

The newly formed blood vessels are more leaky, accounting for the oedematous appearance of new granulation tissue.

Soon, these blood vessels differentiate into muscular arterioles, thin-walled venules and true capillaries.

GRANULATION TISSUE





GROSS MORPHOLOGY

During the migratory phase of wound healing, granulation tissue is:

- light red or dark pink in color, being perfused with new capillary loops or "buds";
- soft to the touch;
- moist; and
- bumpy (granular)/pebbly in appearance, due to punctate hemorrhages,
- pulseful on palpation,
- painless when healthy.

GROSS MORPHOLOGY

5 P's of granulation tissue:

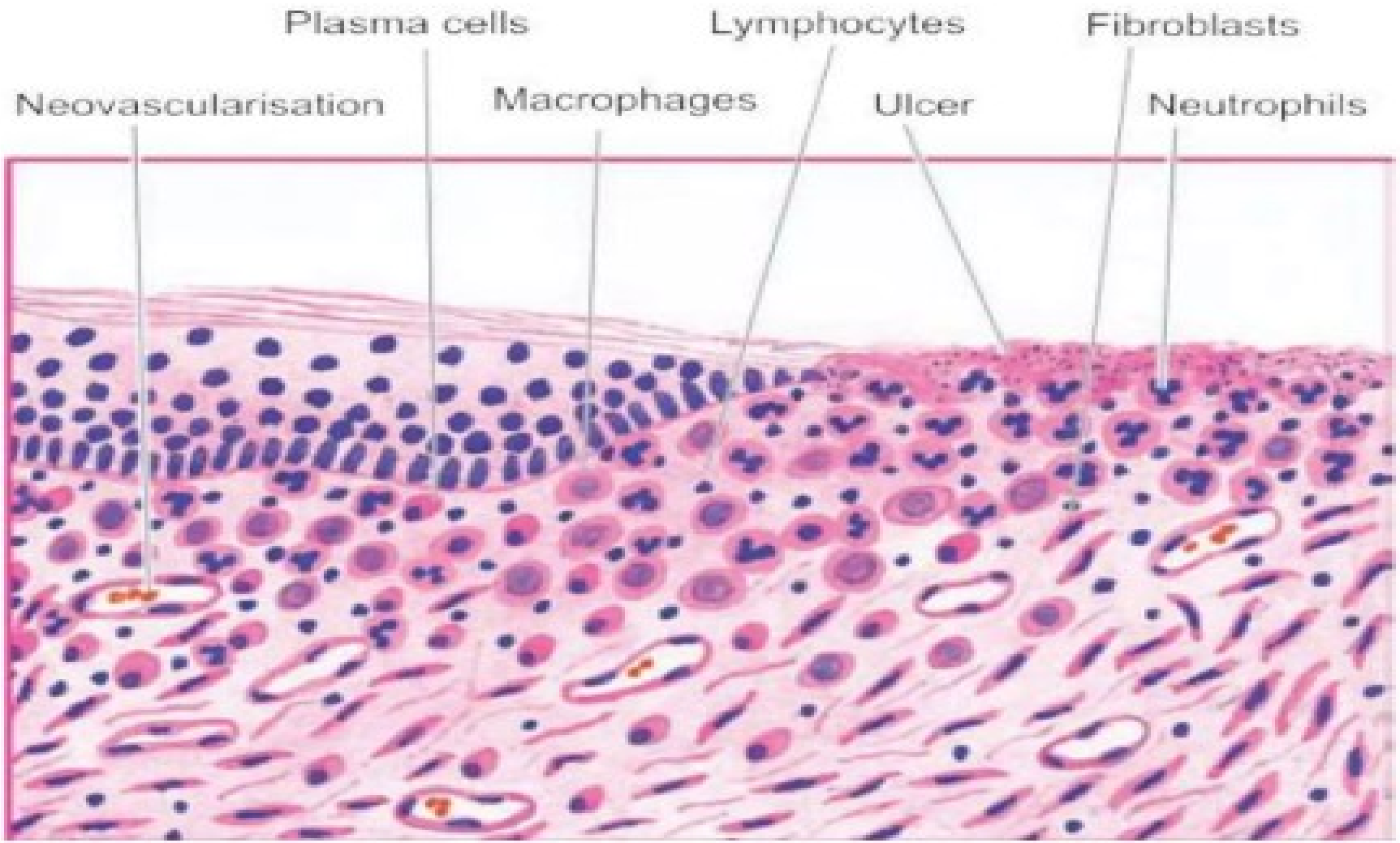
- Pink,
- Punctate hemorrhages,
- Pulseful,
- Painless,
- Pin head granulation.

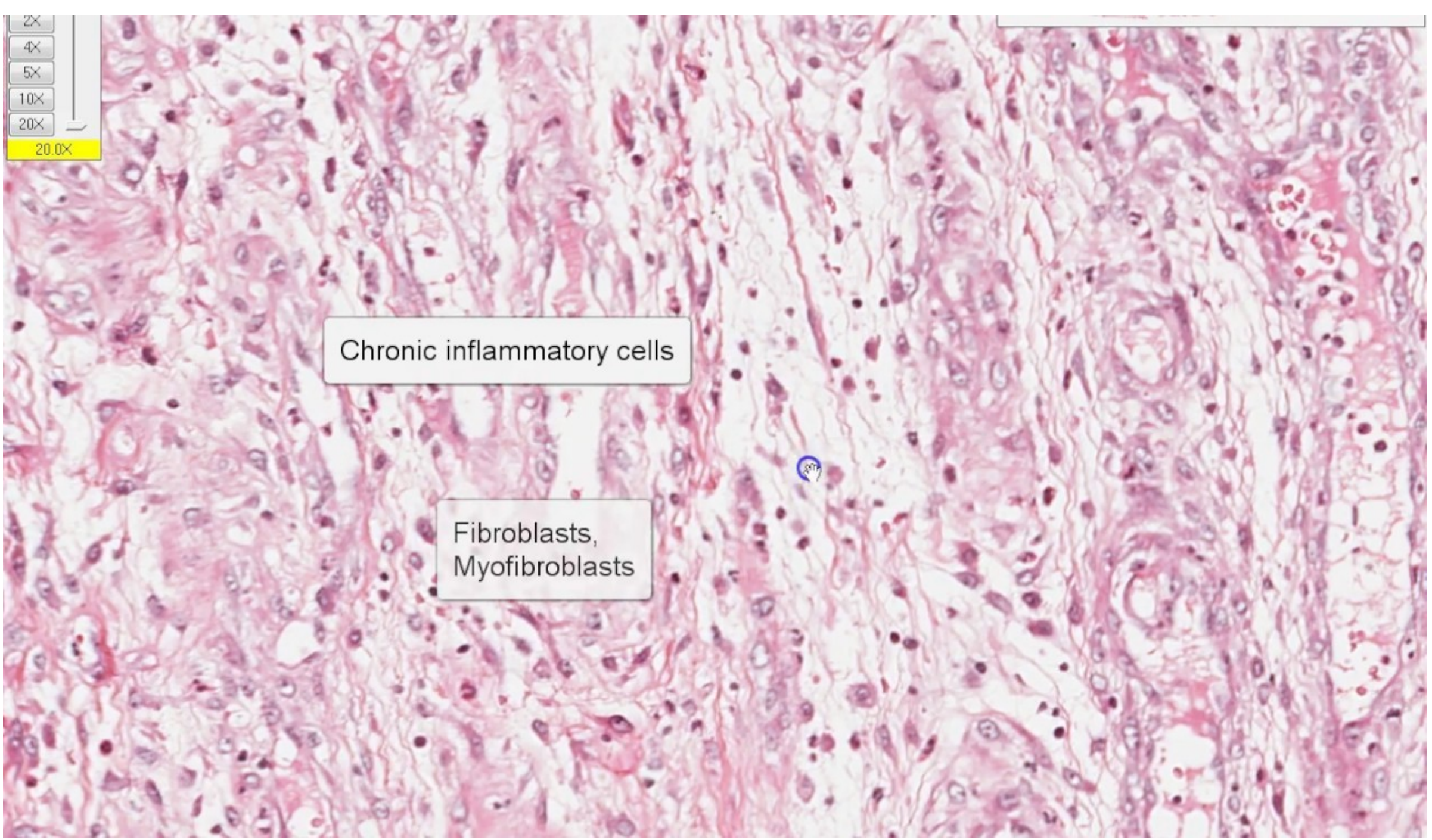
MICROSCOPY

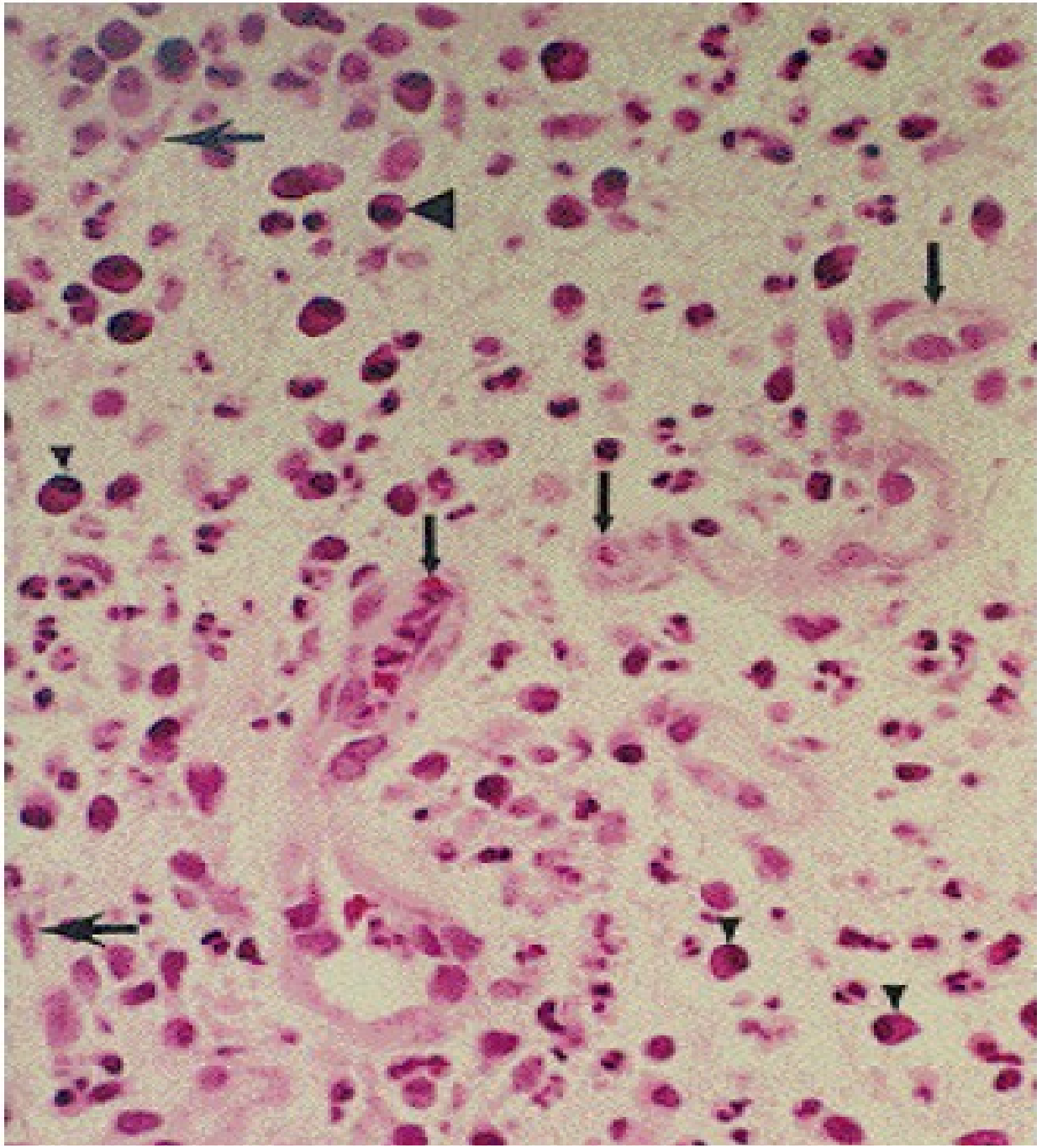
- Microscopic examination shows thin-walled capillaries lined by endothelium and surrounded by fibroblasts.

Residual inflammatory cells: Neutrophils, lymphocytes, plasma cells & macrophages

Active granulation tissue has **inflammatory cell infiltrate, newly formed blood vessels** and **young fibrous tissue** in loose matrix.




2X
4X
5X
10X
20X
20.0X
Chronic inflammatory cells
Fibroblasts,
Myofibroblasts



- Granulation tissue, pyogenic; small capillaries are forming (small arrows), some as yet without lumens.
- Plasma cells (triangle) and lymphocytes predominate. Large arrows indicate fibroblasts.

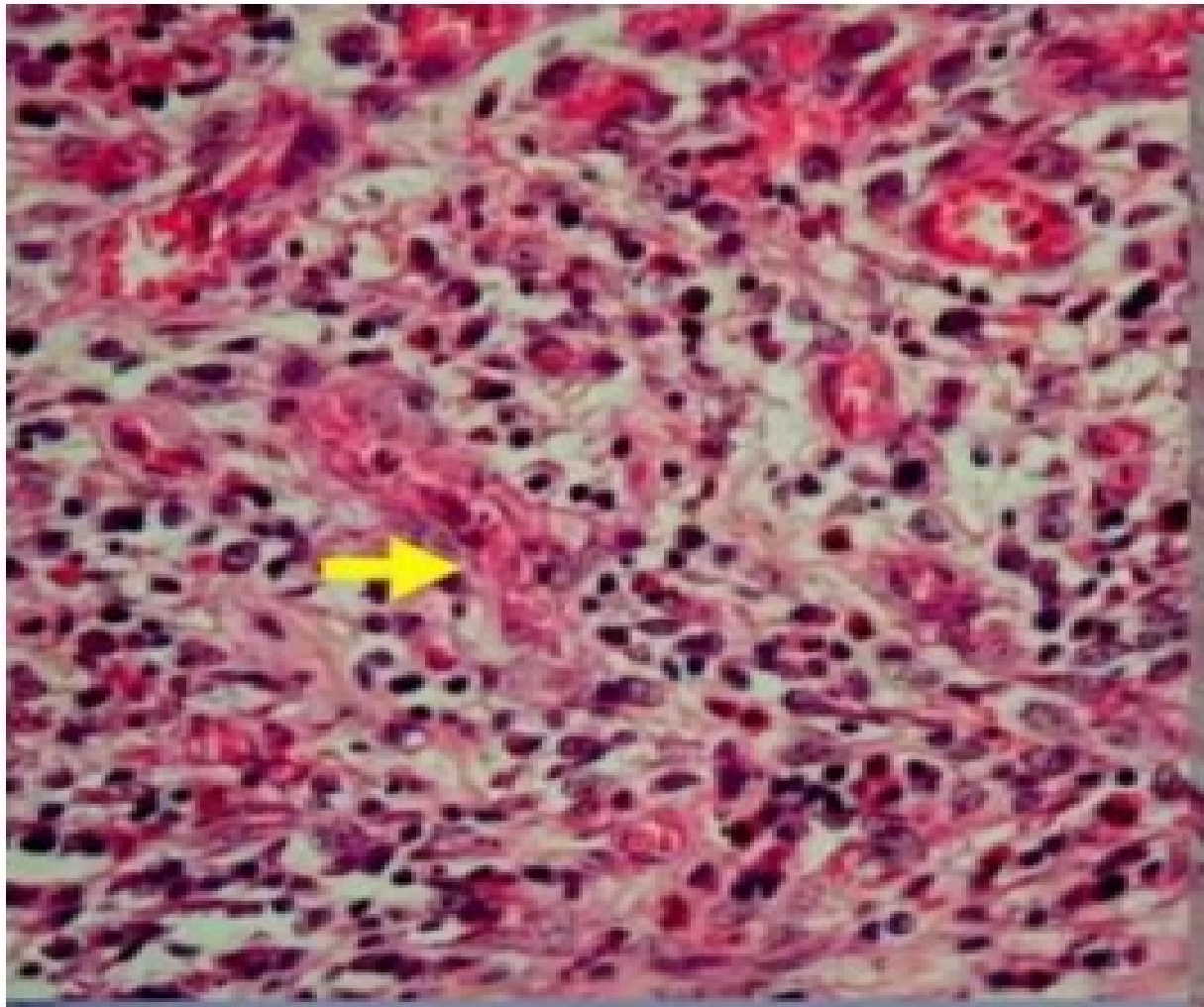
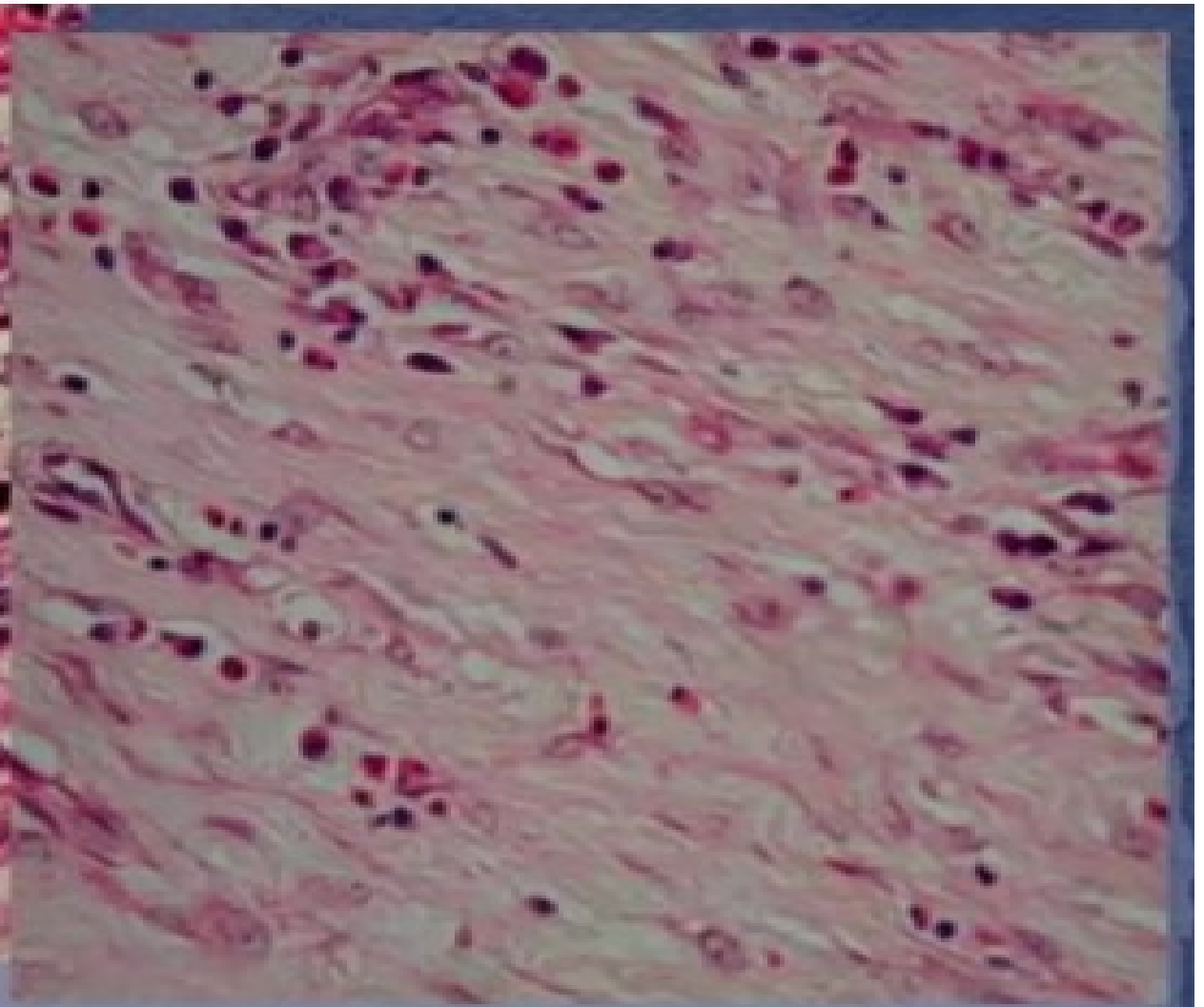


Figure 4). Granulation tissue in the ulcer base.
New blood vessels lined by plump endothelial cells (arrow). Edema and inflammatory infiltrate are also seen.



(Figure 5). Fibrotic tissue beneath the ulcer base

ROLE OF GRANULATION TISSUE

- **Anti infection** and **protecting the wound** from further injury .
- **Filling** incision, wound and any defect of tissue.
- **Replacing necrotic tissue** , effusion and other foreign body.