

Lecture 8

Biomaterials

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Eighth lecture

Tissue Response To Implants

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Fourth Stage

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2023 -2022

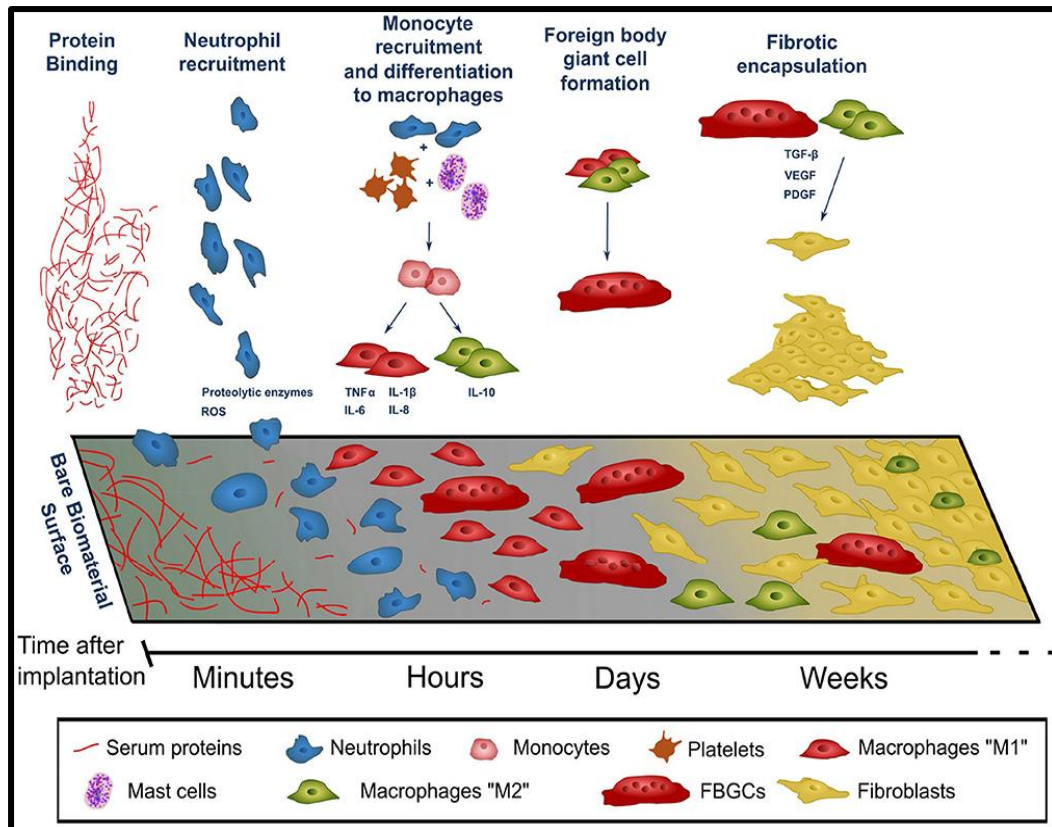
Tissue Response to Implants

Introduction ,,

- ❖ In order to implant a material, tissue will necessarily be injured ,,
- ❖ Injured and/or diseased tissue removed to some extent by procedure
- ❖ Success of procedure depends upon kind and degree of tissue response during healing

How does tissue respond to biomedical implants?

The implantation of any foreign material into the body leads to the development of an inflammatory and fibrotic process—the foreign body reaction (FBR). Upon implantation into a tissue, cells of the immune system become attracted to the foreign material and attempt to degrade it.



How the biomaterials responds when used in human implants and other surgical procedures?

Immediately after implantation, biomaterials and medical devices acquire a layer of host proteins prior to interacting with host cells. Then, a typical tissue response to implantation is that **leukocytes** appear near the implant followed by macrophages, called foreign body giant cells.

What happens to breast tissue with implants?

They can break (rupture) or cause infection or pain. **Scar tissue may form around the implant (called capsular contracture), which can make the breast hard or change shape, so that it no longer looks or feels like it did just after surgery.** Most of these problems can be fixed with surgery, but others might not.

Wound Healing - Inflammation ,,

- ✚ Adjacent cells respond to repair injured or destroyed tissue ,,
- ✚ Inflammation – immediate response ‰
 - Capillaries constrict to stop blood leakage ‰
 - Dilation ,,
 - Increase in capillary endothelial activities – leukocytes, erythrocytes, and platelets
 - Leakage of exudate – leukocytes and dead tissue matter ‰
- ✚ Plugging of lymphatic system

Cellular Response ☐

- Mesenchymal cells evolve into migratory fibroblasts and move into injured site ,,
- Necrotic debris, blood clots, etc. removed by granulocytes ,,
- Inflammatory exudate contains fibrinogen which is converted to fibrin ,,
- Migrating fibroblasts use fibrin scaffolding to deposit collagen

Body Response to Implants ☐

✚ Varies widely ‰

- Host site and species ‰
- Degree of trauma imposed during implantation ‰
- Variables associated with normal wound healing ‰
- Chemical composition of implant ‰
- Micro- and macro-structure

Cellular Response to Implants ,,

✚ Generally – expel ‰

- Exuded or walled-off ‰
- Particle or fluid – ingested by macrophages and removed ,,

✚ If implant is neutral generally a thin layer of collagen will encapsulate ,,

✚ If implant is chemically or physically irritating, inflammation will occur