Surgical Infectious Disease

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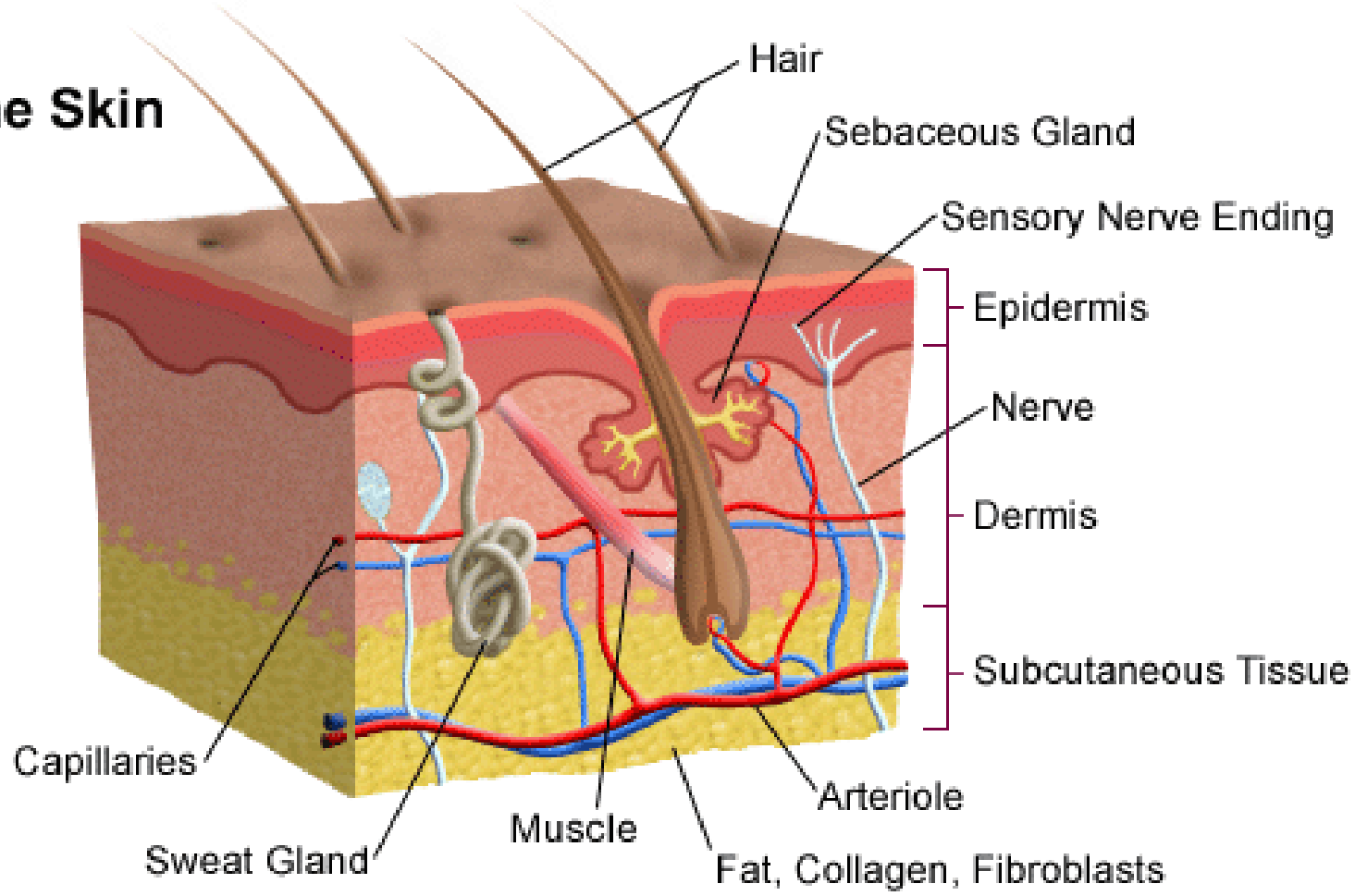
F.I.C.M.S

The Skin


Hair
Sebaceous Gland
Sensory Nerve Ending
Epidermis
Nerve
Dermis
Subcutaneous Tissue
Capillaries
Sweat Gland
Muscle
Arteriole
Fat, Collagen, Fibroblasts

- The pathogenesis of infection involves a complex interaction between the host and infectious agent.

COMPONENTS OF INFECTION

1-Virulence of the organism,

2-Size of inoculum,

3-Presence of nutrient source for the organism,

4-A breakdown in the host’s defense.

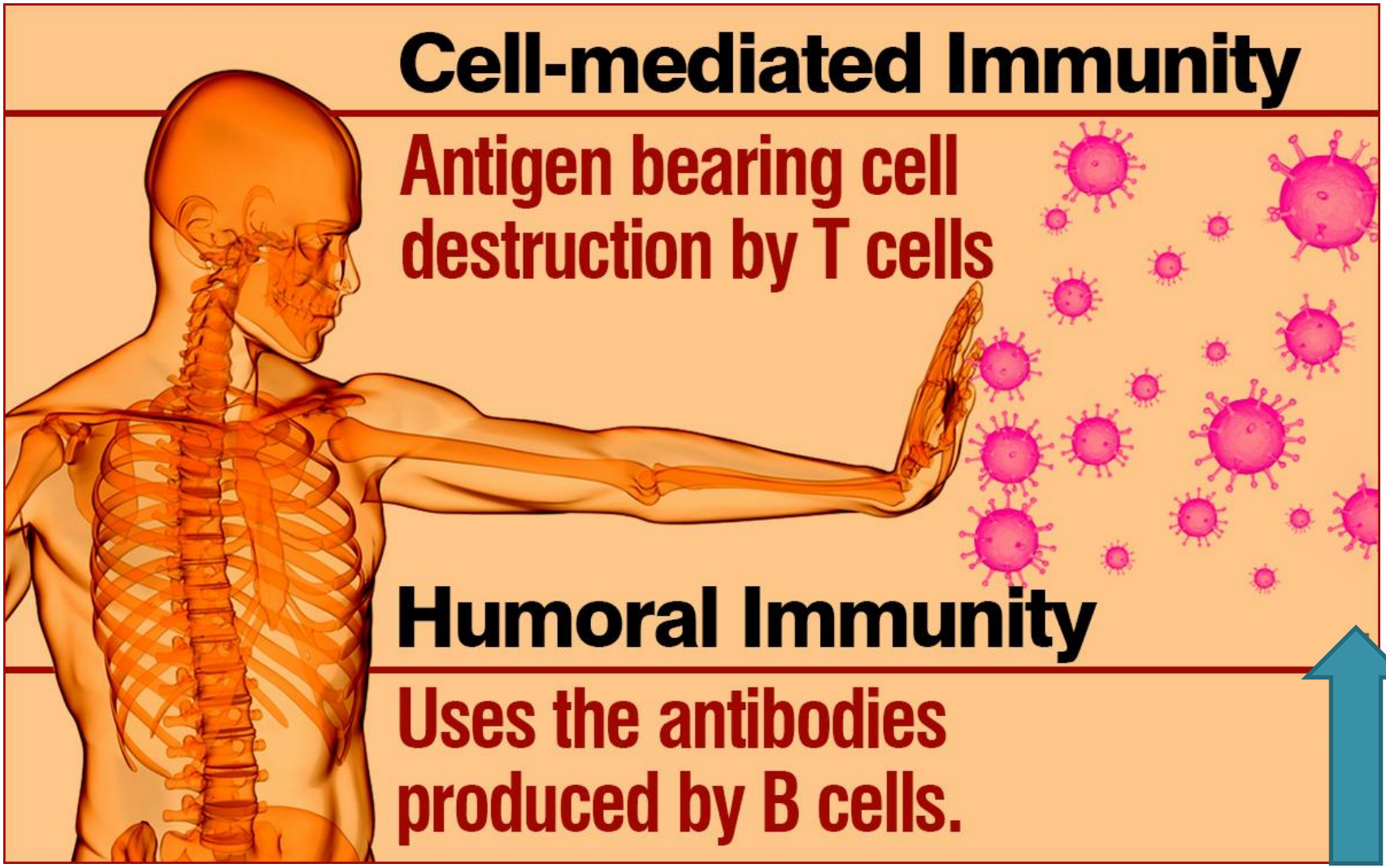
- The virulence of any microorganism depends on its ability to cause damage to the host:-
- A- Exotoxins are digestive enzymes released locally that allow the spread of infection by breaking down host extracellular matrix proteins.

- B- Endotoxins are components of gram-negative cell walls that are released only after bacterial cell death.
- Endotoxins trigger a severe and rapid systemic inflammatory response by releasing various endogenous mediators such as cytokines, bradykinin, and prostaglandins.

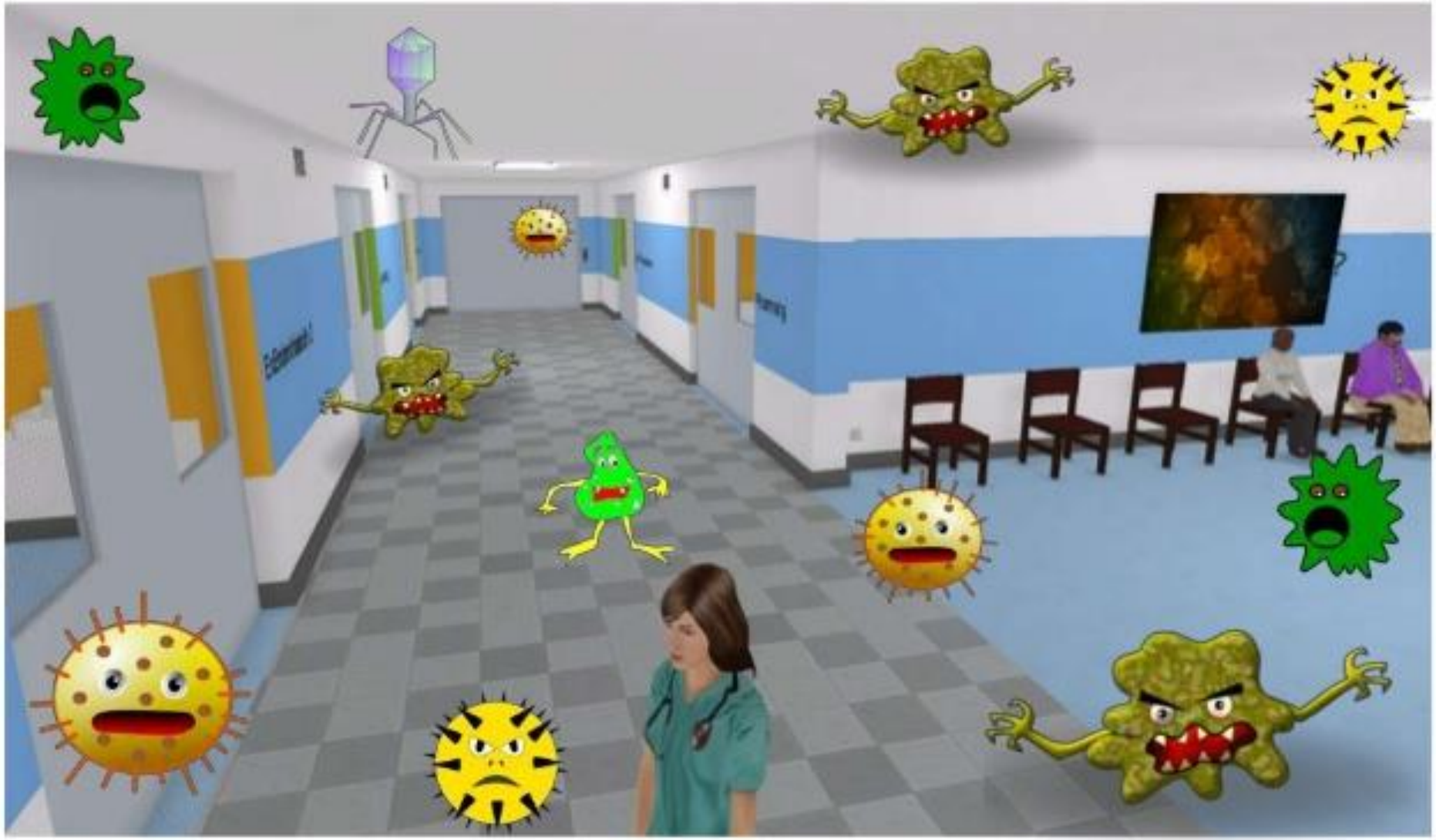
- The size of the inoculum is the number of colonies of microorganisms per gram of tissue.
- In general,if the bacterial population in a wound exceeds 100,000 organisms per gram of tissue, invasive infection is present

Three Lines of Defense Against Infection

NONSPECIFIC DEFENSE MECHANISMS		SPECIFIC DEFENSE MECHANISMS (IMMUNE SYSTEM)
First line of defense	Second line of defense	Third line of defense
• Skin • Mucous membranes • Secretions of skin and mucous membranes	• Phagocytic white blood cells • Antimicrobial proteins • The inflammatory response	• Lymphocytes • Antibodies


Cell-mediated Immunity
Antigen bearing cell destruction by T cells
Humoral Immunity
Uses the antibodies produced by B cells.

Nosocomial Infections



- Kalpesh Zunjarrao

- Nosocomial infections are defined as those infections that are hospital acquired.
- After urinary tract infection, surgical site infections (SSI) are the most common nosocomial infections in hospitalized patients

TYPES OF INFECTION

- Surgical site infections
- Urinary Tract Infection (UTI)
- Catheter/cannula Infection
- Pulmonary Infection
- Diarrhea
- Sepsis

- Surgical Site Infection (SSI) is defined as purulent discharge, abscess or spreading cellulitis at surgical site occurring within 30 days after a surgical procedure.

Microbiology of SSIs

- The most commonly isolated organisms are S. aureus, coagulase-negative staphylococci, Enterococcus spp. and Escherichia coli; however, the pathogens isolated depend on the procedure

Type of surgery	Common pathogens
Placement of graft, prosthesis or implant	Staphylococcus aureus
Cardiac	S. aureus
Neurosurgery	S. aureus
Breast	S. aureus
Ophthalmic	S. aureus
Orthopaedic	S. aureus
Vascular	S. aureus

Type of surgery	Common pathogens
Appendectomy	Gram-negative bacilli; anaerobes
Biliary tract	Gram-negative bacilli; anaerobes
Colorectal	Gram-negative bacilli; anaerobes
Gastroduodenal	Gram-negative bacilli; streptococci; oropharyngeal anaerobes
Obstetric and gynaecological	Gram-negative bacilli; enterococci; Group B streptococci; anaerobes
Urological	Gram-negative bacilli

Source of Microbes

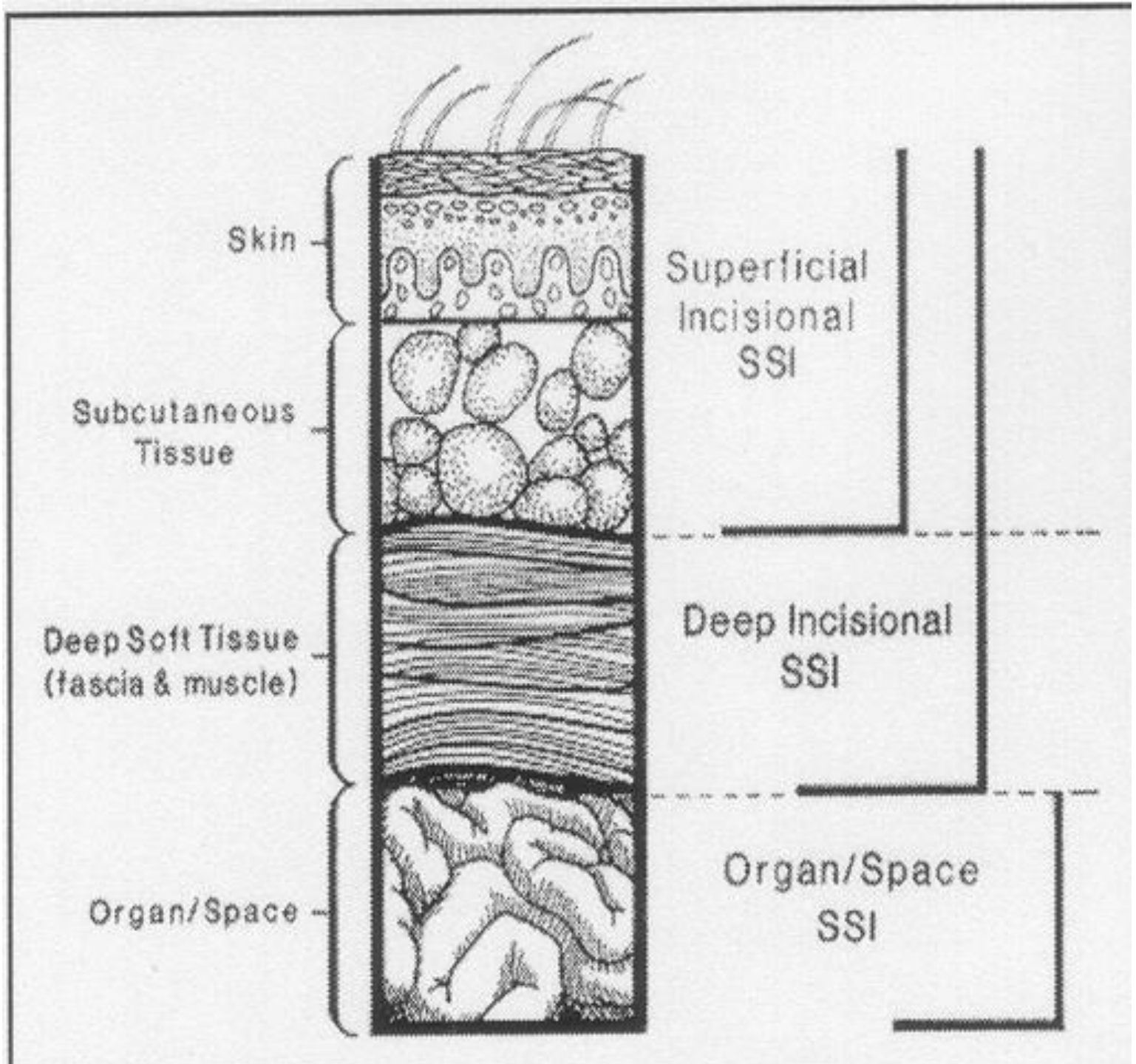
SSI Sources

- Exogenous
  - Surgeons, nurses and other staff
  - Medical equipment
  - Other patients
- Endogenous
  - Skin flora
  - Other infections in patient
  - Blood transfusion (rare)

Types of SSI.

- 1-Superficial SSI: This infection occurs just in the skin or subcutaneous tissue where the incision was made.
- 2-Deep SSI: This infection occurs beneath the incision area in muscle and fascia .

- 3-Organ or space SSI: This type of infection can be in any area of the body other than skin, muscle, fascia and surrounding tissue that was involved in the surgery. This includes a body organ or a space between organs.


Skin
Subcutaneous Tissue
Deep Soft Tissue (fascia & muscle)
Organ/Space
Superficial Incisional SSI
Deep Incisional SSI
Organ/Space SSI

- An abscess is a localized collection of pus in a cavity formed by an expanding infectious process .
- The usual cause is the staphylococcal species in combination with one or more organisms.
- The treatment is incision and drainage, followed by antibiotic therapy if associated with cellulitis

- Pus is a combination of leukocytes, necrotic material, bacteria, and extracellular fluid.

Diagnosis and treatment of SSI

- Erythema, fever, leukocytosis, tenderness, crepitus, and suppuration are diagnostic signs
- Treatment may include oral or intravenous antibiotics, simple incision and drainage, or extensive surgical debridement.

Necrotizing Soft Tissue Infection

- Is a rapidly progressing infection of the fascial tissues and overlying skin.
- necrotizing fasciitis is more likely in immunocompromised patients.

- Type I (polymicrobial infections) predominate in children.
- Type II (monomicrobial infection,group A streptococcus remains the most common pathogen followed by Staphylococcus aureus) occur in adults.

- Because the diagnosis is often not obvious, the clinician must look for clinical clues such as edema beyond the area of erythema, crepitus, skin vesicles, or cellulitis refractory to intravenous antibiotics.

- High fever, delirium, leukocytosis, and severe pain are hallmarks of the patient’s presentation

- Skin necrosis is generally a late sign and is indicative of thrombosis of vessels in the subcutaneous tissue.
- Necrotizing fasciitis most common occurs in the truncal region in children as opposed to adults where infection in the extremities.

- Prompt surgical intervention, including wide excision of all necrotic and infected tissue, along with the institution of antibiotics including penicillin, is mandatory to avoid progression and mortality.

Guidelines for Prevention of Surgical Site Infections

- 1-Treat remote infections before elective surgery
- 2-Do not remove hair preoperatively unless it will interfere with operation
- 3-Adequately control serum blood glucose levels
- 4-Require patients to shower or bathe with an antiseptic agent before the operative day

- 5-Use an appropriate antiseptic agent for skin preparation
- 6-Surgical scrub.
- 7-Administer a prophylactic antimicrobial agent only when indicated

- 8-Normothermia
- 9-Sterilize all surgical instruments
- 10-Wear a surgical mask
- 11-Wear a cap or hood to fully cover hair on head and face
- 12-Wear sterile gloves
- 13-Use sterile gowns and drapes that are effective barriers when wet

- 14-Handle tissue gently, maintain effective hemostasis, minimize devitalized tissue and foreign bodies, and eradicate dead space at the surgical site
- 15-If drainage is necessary, use closed suction drain
- 16-Protect with a sterile dressing for 24 to 48 hours postoperatively an incision that has been closed primarily

Surgical scrub

- the conventional method for scrubbing consists of a five-minute first scrub followed by subsequent two- or three-minute scrubs for subsequent cases with either 5% povidone-iodine or 4% chlorhexidine gluconate. These scrubbing protocols can achieve a 95% decrease in skin flora.

Your Hands can be Dangerous…

Wash them with Soap & Water
to keep bacteria away

Antibiotic Prophylaxis

- Important points for preoperative antibiotic prophylaxis include using agents that cover the most probable intraoperative contaminants for the operation, optimal timing for the initial dose of antibiotic so that bactericidal concentrations are reached at the time of incision.
- The first dose is generally given 30 minutes to one hour before the start of the operation.

Wound Classification

- Clean :-uninfected operative wound in which the respiratory, alimentary, genital, or urinary tract is not entered
- Clean–contaminated :-operative wound in which the respiratory, alimentary, genital, or urinary tract is entered without contamination

- Contaminated :-Open, fresh, accidental wounds or operative wound in which the respiratory, alimentary, genital, or urinary tract is entered with gross spillage
- Dirty :-old traumatic wounds or perforated viscera

Post-Operative Surgical Wound Management

- 1-Clean ,a septic, non-touch technique for changing dressings
- 2-Aim to leave the wound untouched for up to 48 h after surgery.

- 3-Antibiotic treatment
- 4-Debridement
- 5-Post-operative Pain Management
- 6-Treatment of complications of Surgical Wound


Thank You