



核心課程編號：B39

蜂窩性組織炎Cellulitis

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學習目標

PGY

知識

1. 認識壞死性筋膜炎及蜂窩組織炎的區別
2. 成因及臨床症狀
3. 處置及防治



考題

- ❖ 蜂窩性組織炎的原因及誘因（至少3個）？ [20分]
- ❖ 蜂窩性組織炎的致病機轉？ [10分]
- ❖ 蜂窩性組織炎的常見致病菌？ [10分]
- ❖ 利用表格呈現病史詢問、身體檢查及實驗室檢查幫助蜂窩性組織炎／丹毒／壞死性筋膜炎／皮下膿瘍鑑別診斷？ [30分]
- ❖ 蜂窩性組織炎的治療原則？ [10分]
- ❖ 蜂窩性組織炎的抗生素選擇？ [10分]
- ❖ 蜂窩性組織炎的非藥物輔助性治療？ [10分]



Cellulitis

- ❖ Cellulitis is an acute inflammatory condition of the skin that is characterized by localized pain, erythema, swelling, and heat.
- ❖ Caused by indigenous flora colonizing the skin and appendages (e.g., *S. aureus* and *S. pyogenes*) or by a wide variety of exogenous bacteria.



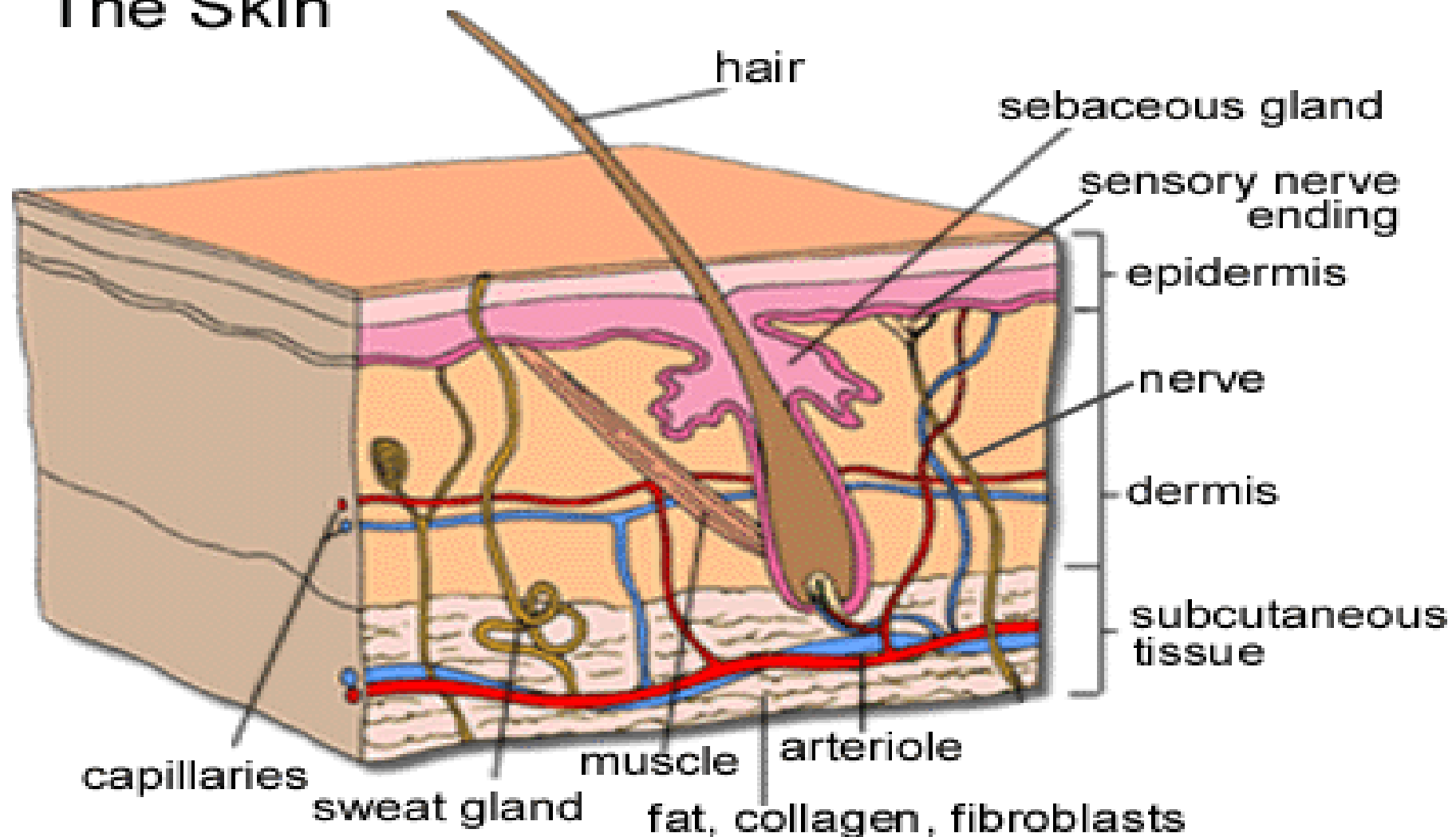
Cellulitis

- ❖ Bacteria may gain access to the epidermis through cracks in the skin, abrasions, cut, burns, insect bites, surgical incisions, and intravenous catheters.



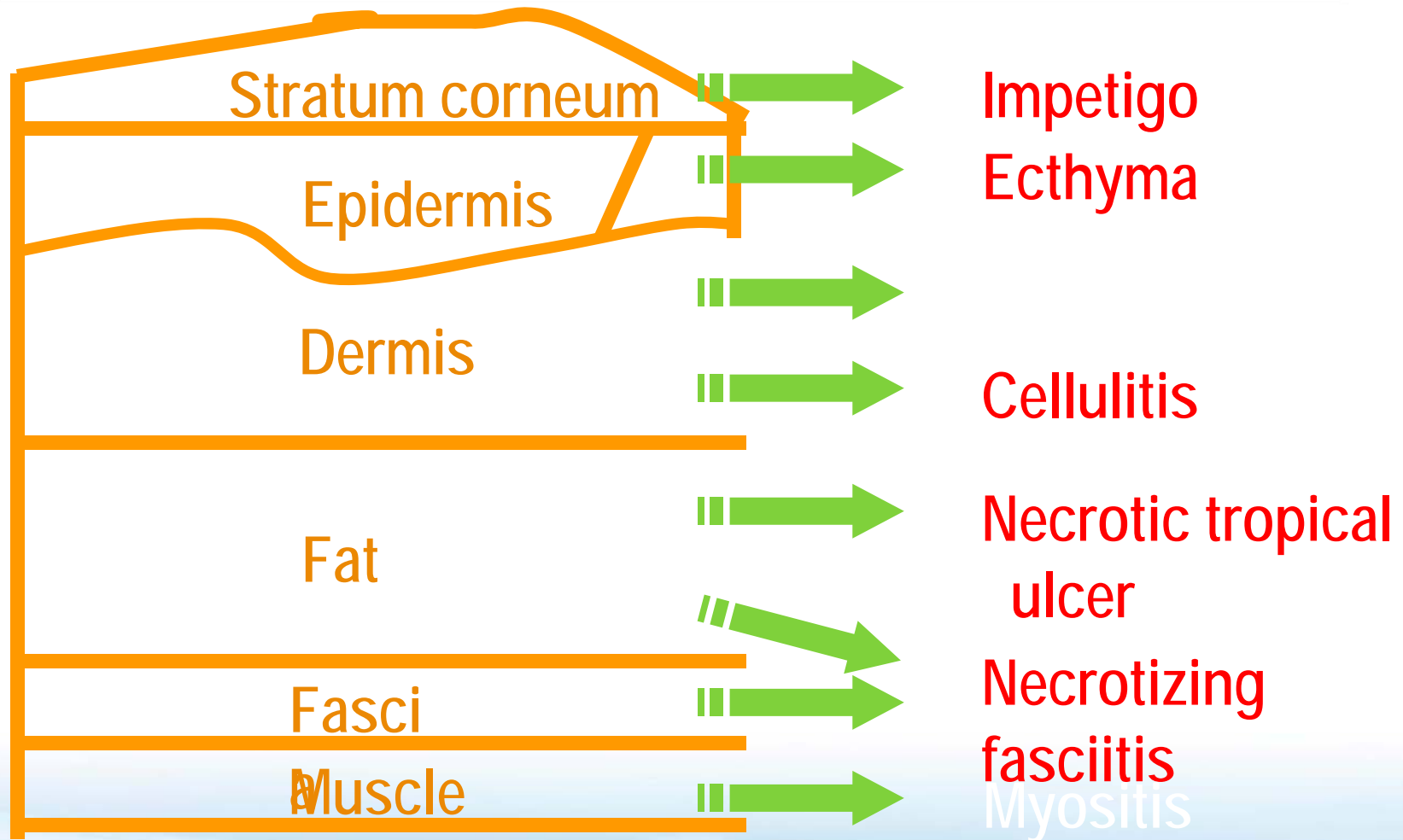
Anatomy of skin

The Skin





Tissue planes involvement of soft-tissue infections





Classification of spreading soft-tissue infections

Level	All tissue viable	Dead tissue
Skin	Erysipelas, cellulitis	Necrotizing cellulitis
Fascia	Fasciitis	Necrotizing fasciitis
Muscle	Myositis	Myositis, myonecrosis

Type I: viable cellulitis, erysipelas ⇒ antibiotics

Type II: dead tissue or deep infection ⇒ operation and antibiotics

- Am J Surg 1996;172(suppl 6A):7-12S



Cellulitis - clinical presentation





Cellulitis - clinical presentation





Cellulitis - clinical presentation



Figure 2. Cellulitis Due to Group A Beta-Hemolytic Streptococci in Leg (Previously Mildly Edematous) of a Patient with Paraplegia.

Some of the superficial skin is eroded. The initiating event was an abrasion on the lower leg.



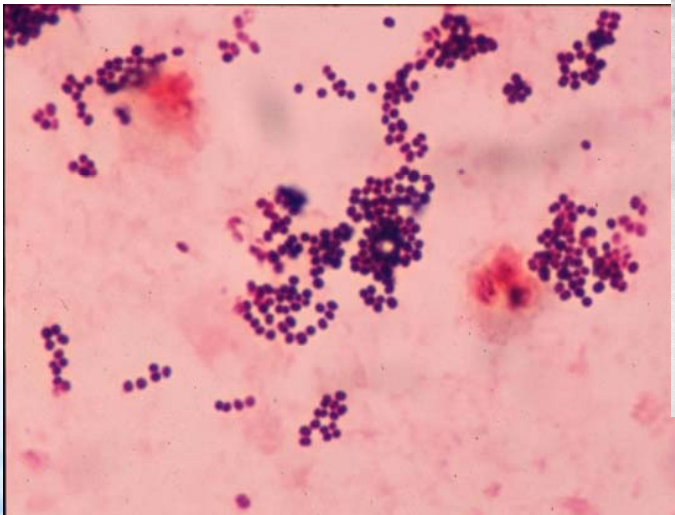
Risk factors for erysipelas/cellulitis of legs – Multivariate analysis

Risk factor	Odds ratio	95% CI
Lymphoedema	71.2	5.6-908
Site of entry*	23.8	10.7-52.5
Leg edema	2.5	1.2-5.1
Venous insufficiency	2.9	1-8.7
Overweight	2	1.1-3.7

*leg ulcer (OR:62.5), traumatic wound (13.9), fissurated toe-web intertrigo (10.7)

- No association with diabetes, alcohol or smoking

- [BMJ1999;318:1591-4](#)





Necrotizing fasciitis (壞死性筋膜炎)

- ❖ Rapidly spreading gangrene of skin and subcutaneous tissue above the fascial layer
- ❖ Originated in
 - traumatic musculoskeletal wounds
 - operative sites
 - other types of injuries such as minor cuts, scrapes, or insect bites.



Necrotizing fasciitis (壞死性筋膜炎)

- ❖ The abdominal wall, **extremities**, and **perineum** (*Fournier's gangrene*) appear to be most commonly affected but NF can occur in any region of the body.
- ❖ Because of the presence of gas-forming organisms, detection of subcutaneous air is a classic finding in NF. (Crepitant)



Necrotizing fasciitis (壞死性筋膜炎)

- Clinical Scenario -

- ❖ An erythematous, tender, swollen, hot area of cellulitis, accompanied by local pain and fever within *24 h*
- ❖ Smooth, shiny, and tensely swollen
 - Induration or distinct margins are absent
- ❖ Purple or blue change, blisters and bullae in the next *24-48 h*
- ❖ Bullae: serous ⇒ hemorrhagic
- ❖ **Necrosis** of superficial fascia (hyaluronidase) & fat (lipases)
- ❖ Deep thermal burn-like areas develop, if vascular thrombosis are present
- ❖ “**Dishwater pus**”
- ❖ Gangrene in 4-5 days
- ❖ Sepsis syndrome, if untreated





Fig. 10.51 Fournier's gangrene. Extensive necrosis of the skin and subcutaneous tissues of the scrotum and abdominal wall in a diabetic man. The presence of necrosis extending beyond the upper margin of the wound shows that insufficient debridement has been performed and further surgery is necessary.



Diagnosis of Necrotizing Fasciitis

- ❖ **History and diagnostic features:** clinical diagnosis
- ❖ **Surgical exploration:** confirm diagnosis and perform appropriate debridement
 - Lack of resistance of normally adherent fascia to blunt dissection is diagnostic of NF
- ❖ **Full-thickness biopsy**
 - Less invasive
 - Performed early, it has been showed to significantly improve outcome
- ❖ **Radiological studies**
 - Accuracy for **soft-tissue gas**: CT > plain radiograph > physical exam
 - CT scan: delineating the extent of spread of the infection
 - **Ultrasonography**: extent of Fournier' s gangrene, differentiate causes of 'acute scrotum'
 - **MRI**: **sensitively detect soft-tissue fluid** and actually visualize the pathologic process; expensive, no significant impact on morbidity & mortality



Necrotizing fasciitis

- ❖ Prompt surgical exploration down to the deep fascia and muscle is essential.
- ❖ Necrotic tissue must be surgically removed, and Gram's staining and culture of excised tissue are useful in establishing whether group A streptococci, mixed aerobic-anaerobic bacteria, or *Clostridium* spp. are present.



Primary pyodermas (i)

- MICROBIOLOGY -

- ❖ Impetigo and erysipelas : group A streptococcus and *S. aureus*
- ❖ Folliculitis: *S. aureus*, *Candida*, *P. aeruginosa* (“Hot tub folliculitis”)
- ❖ Furuncles and carbauncles: *S. aureus*
- ❖ Paronychia: group A streptococcus, *Candida*, *P. aeruginosa*
- ❖ Ecthyma : group A streptococcus - immunocompetent cases; *P. aeruginosa* - neutropenic patients
- ❖ Cellulitis: group A streptococcus, *S. aureus*; group C, G, B streptococci
- ❖ Membranous ulcers: *Corynebacterium diphtheriae*
- ❖ Chancriform lesions: *Treponema pallidum*, *Haemophilus ducreyi*, *Sporothrix*, *Bacillus anthracis*, *Francisella tularensis*, *Mycobacterium ulcerans*, *Mycobacterium marinum*



Primary pyodermas (ii)

- MICROBIOLOGY -

❖ Erythrasma:

Corynebacterium minutissimum

❖ Nodular lesions:

Candida, *Sporothrix*, *S. aureus* (botryomycosis),
Mycobacterium marinum, *Nocardia brasiliensis*, *Leishmania
brasiliensis*

❖ Vascular papule/nodules (bacillary angiomatosis):

Bartonella henselae, *B. quintana*

❖ Annular erythema:

Borrelia burgdorferi

❖ Hyperplastic and proliferative lesions:

Nocardia, *Pseudallescheria boydii*, *Blastomyces
dermatitidis*, *Paracoccidioides brasiliensis*, *Phialophora*,
Cladosporium



Specific Etiology of Soft-Tissue Infections

- MICROBIOLOGY -

- ✦ Cat bite: *Pasteurella multocida*
- ✦ Dog bite: *Pasteurella multocida*, *Capnocytophaga canimorsus*, *Staphylococcus intermedius*
- ✦ Diabetes mellitus or peripheral vascular disease: group B streptococcus
- ✦ Saphenous vein donor site cellulitis: groups C or G streptococci
- ✦ Fresh water laceration: *Aeromonas hydrophila*
- ✦ Sea water exposure, cirrhosis, raw oysters: *Vibrio vulnificus*, *V. cholera* non-01, 0139
- ✦ Hot tub exposure: *Pseudomonas aeruginosa*



Specific Etiology of Soft-Tissue Infections

- MICROBIOLOGY -

- ✦ Fish tank exposure: *Mycobacterium marinum*
- ✦ Ecthyma gangrenosum: *Pseudomonas aeruginosa*
- ✦ Human bite: *Eikenella corrodens*; *Fusobacterium*, *Prevotella*, *Porphyromonas* spp., *Streptococcus pyogenes*
- ✦ Tick bite with erythema chronicum migrans: *Borrelia burgdorferi*





Infections secondary to pre-existing lesions (i)

- MICROBIOLOGY -

- ❖ **Surgical wound infections:** *S. aureus*, *Enterococcus*, *Enterobacteriaceae*, *Pseudomonas*, anaerobes
- ❖ **Bite wound infections**
 - Dog, cat: *Pasturella multocida*, *S. aureus*
 - Humans: oral anaerobes
- ❖ **Trauma infections: commonly - *S. aureus*, *S. pyogenes***
 - Fresh water injury: *Aeromonas hydrophila*, *Plesiomonas shigelloides*
 - Salt water injury: *Vibrio vulnificus*
 - Butchers, fisherman, abattoir workers: *Erysipelothrix rhusiopathiae*



Infections secondary to pre-existing lesions (ii)

- MICROBIOLOGY -

- ❖ **Nail puncture of foot: *P. aeruginosa***
- ❖ **Pressure (decubitus) ulcer infections: usually polymicrobial**
- ❖ **Cutaneous abscess infections**
 - **Hidradenitis suppurativa, anorectal abscess, pilonidal cyst abscess: usually mixed aerobic-anaerobic**
- ❖ **Diabetic ischemic foot infections**
 - **Superficial: *S. aureus*, beta-hemolytic *Streptococcus***
 - **Deep: *S. aureus*, *Streptococcus*, *Enterobacteriaceae*, *Pseudomonas*, *Enterococcus*, anaerobes (usually **polymicrobial**)**



Empiric Antimicrobial Therapy for Soft-tissue Infections

- TREATMENT -

❖ Impetigo

- group A streptococcus, *S. aureus*
- topical agent (mupirocin) or oral antibiotic, for 1 week

❖ Folliculitis

- *S. aureus*, *P. aeruginosa* (“hot tub folliculitis”) in immunocompetent hosts; *Candida* in critically ill patients
- depend on clinical settings or gram staining of pustule content
- warm/moist packs + oral therapy for 1-7 days

❖ Furuncles or carbuncles

- *S. aureus*
- I&D + oral anti-staphylococcal agent (Oxacillin or cefazolin) for 1-7 days



Empiric Antimicrobial Therapy for Soft-tissue Infections

- TREATMENT: EMPIRIC ANTIBIOTICS -

- ❖ **Erysipelas** : group A streptococcus, *S. aureus*
 - **Penicillin; oxacillin or cefazolin**
- ❖ **Cellulitis**: Group A streptococcus, *S. aureus*; group C, G, B streptococci
 - **Oxacillin or cefazolin ± clindamycin;
penicillin ± clindamycin**



Treatment of Necrotizing Fasciitis

- TREATMENT: ANTIBIOTICS -

❖ Antibiotics

- Initially, **broad coverage of aerobic G(+) & G(-) organisms and anaerobes**: a penicillin or cephalosporin + an aminoglycoside + clindamycin or metronidazole, then tailored to culture and susceptibility results
- High-dose penicillin remains the drug of choice for NF due to *S. pyogenes*
- Thrombosis of superficial vessels
 - ↓ effective antibiotic penetration
 - Tissue hypoxia impairs oxidative killing mechanism of WBC
 - Accumulation of bacteria & toxins

❖ **Early surgical intervention is crucial**



厭氧培養之傳送

- MICROBIOLOGY -

- ✚ 針筒抽取之膿，滲出液置於無菌厭氧檢體收集瓶
- ✚ 針筒抽取後，針頭刺入塞子
 - 傳送過程，有針刺危險
- ✚ 拭子取樣：紅頭長管之厭氧檢體運送培養基
- ✚ 組織檢體：含生理食鹽水或濕潤紗布包覆組織之無菌容器



皮膚及軟組織感染：檢體採檢

- MICROBIOLOGY -

- ✚ 清楚標明取樣部位及取樣方式
- ✚ 表淺傷口檢體不適做厭氧培養
- ✚ 皮膚菌叢污染：革蘭氏染色 100倍下一視野可見 25個鱗狀上皮細胞
- ✚ 最佳取樣：手術取得組織，膿，滲出液；空針抽取所得之膿，滲出液最佳，厭氧培養才有意義；或是病灶擴散邊緣
- ✚ 開放型病灶：儘可能消毒去除表面菌叢，移除滲出物；自病灶邊緣取樣；不做厭氧培養



Take home message

- ❖ 診斷皮膚軟組織感染必需瞭解感染的部位深度為何，是否有擴散，是否有壞死性組織。
- ❖ 如果有壞死性組織的感染必需配合手術治療
- ❖ 蜂窩性組織炎常見的細菌是Streptococcus, Staphylococcus
- ❖ 壞死性筋膜炎是一種進展速度很快的疾病，死亡率達到26%，需要儘早診斷及外科手術介入
- ❖ 肌膿炎好發在免疫不全的病人，G(+)及G(-)都必需cover