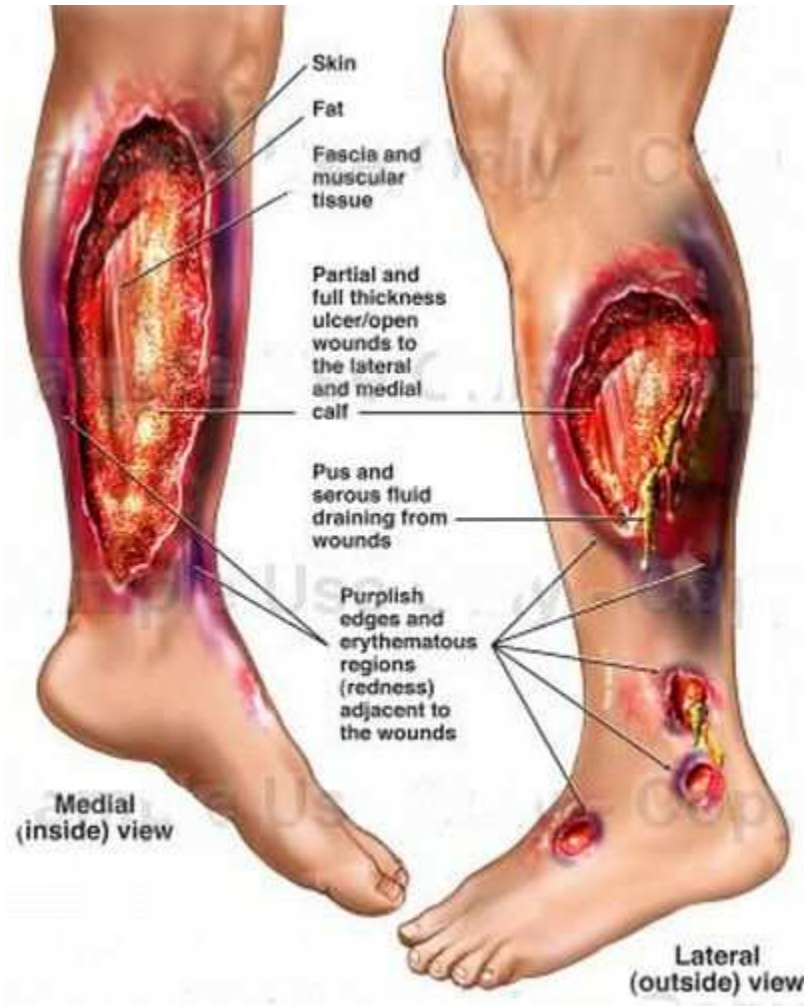
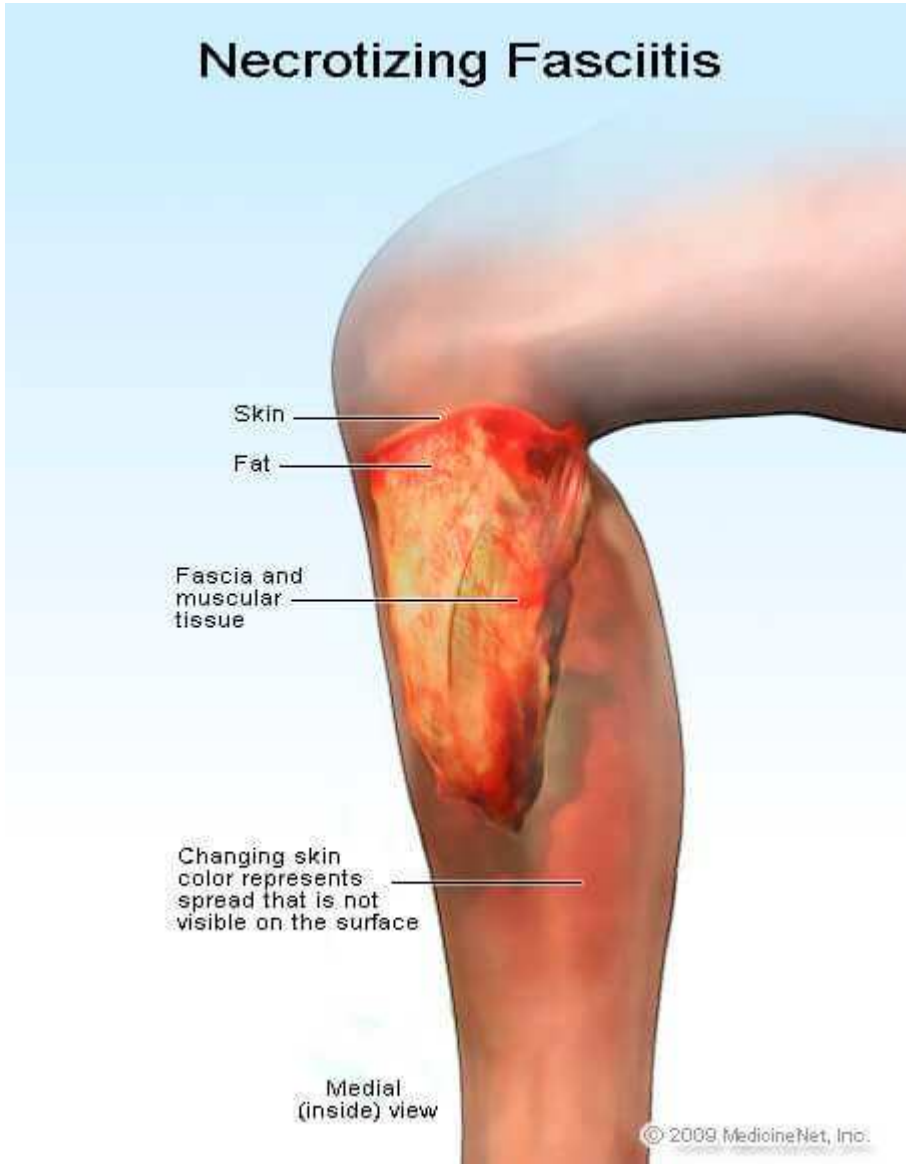
NECROTIZING SOFT TISSUE INFECTIONS – FASCITIS, MYOSITIS, CELLULITIS

Necrotizing soft tissue infection can include involvement of the epidermis, dermis, subcutaneous tissue, fascia, and muscle . Necrotizing infection may be categorized based on microbiology and presence or absence of gas in the tissues





- These infections are characterized clinically by fulminant tissue destruction, systemic signs of toxicity, and high mortality.
- **Necrotizing fasciitis** - Necrotizing fasciitis is an infection of the deep soft tissues that results in destruction of the muscle fascia and overlying subcutaneous fat. Infection typically spreads along the muscle fascia due to its relatively poor blood supply; muscle tissue is frequently spared because of its generous blood supply .

- Necrotizing fasciitis may be divided into two microbiologic categories:
- 1. poly microbial (many bugs which include anerobic (live without much oxygen and aerobic-need oxygen)
- 2. mono microbial infection (one bug) usually caused by streptococci. Infection may also occur as a result of *Staphylococcus aureus* . ½ are caused by infection with no clear wound source and may be spread through the blood from the throat. Or it can occur from blunt trauma or muscle strain

Approach to microbiologic diagnosis of necrotizing infections

Presence of gas in soft tissue (on radiographic imaging)*
Polymicrobial (gram-positive cocci, gram-positive rods, gram-negative cocci, and gram-negative rods)
Necrotizing fasciitis type I (polymicrobial)
Necrotizing cellulitis: Nonclostridial anaerobic (crepitant) cellulitis
Gram-positive rods
Acute clinical presentation
▪ Clostridial myonecrosis (gas gangrene)
• *C. perfringens* – Traumatic
• *C. septicum* – Spontaneous
• *C. sordellii* – Gynecologic
Indolent clinical presentation
▪ Clostridial (anaerobic) cellulitis
• *C. perfringens* – More common
• *C. septicum* – Less common
Absence of gas in soft tissue (on radiographic imaging)*
Gram-positive cocci
Necrotizing fasciitis type II (monomicrobial)
▪ Group A *Streptococcus* or other beta-hemolytic streptococci
▪ *Staphylococcus aureus* (methicillin-sensitive [MSSA] or methicillin-resistant [MRSA])
Necrotizing myositis due to group A *Streptococcus* or other beta-hemolytic streptococci
Gram-negative rods
Aeromonas species – Freshwater exposure
Vibrio species – Saltwater exposure

* Radiographic imaging can be useful to help determine if necrotizing infection is present but should not delay surgical intervention when there is crepitus on examination or rapid progression of clinical manifestations. The most useful radiographic finding is presence of gas in soft tissues; computed tomography is the most sensitive radiographic modality for detection of this finding.

- **RISK FACTORS** — (Though NSTI can occur among healthy individuals with no past medical history or clear wound source and in any age group) **However the following are risk factors**:
- ●Major penetrating trauma
- ●Minor laceration or blunt trauma (muscle strain, sprain, or contusion)
- ●Skin breach (varicella lesion, insect bite, injection drug use)
- ●Recent surgery
- ●Immunosuppression (diabetes, cirrhosis, neutropenia, HIV infection)
- ●Malignancy
- ●Obesity
- ●Alcoholism
- ●In women: pregnancy, childbirth, pregnancy loss, gynecologic procedures
- ****Diabetes is a particularly important risk factor for necrotizing infection involving the lower extremities, perineum, and head and neck region**

- Presents acutely (over hours)
- Rapid progression can lead to limb loss, and/or death.
- **Clinical manifestations of necrotizing infection include:**
- ●Erythema (without sharp margins72 percent)
- ●Edema that extends beyond the visible erythema (75 percent)
- ●Severe pain ●Fever (60 percent)
- ●Crepitus (50 percent)
- ●Skin bullae, necrosis, or ecchymosis (38 percent)


Necrotizing Fasciitis
Changing
Skin Color
Fatal Bacterial Infection
Facia and
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- Fever (102 to 105°F), tachycardia, and systemic toxicity
- Hypotension
- Malaise, myalgias, diarrhea, and anorexia.

- The process progresses rapidly over several days, with changes in skin color from red-purple to patches of blue-gray. Within three to five days after onset, skin breakdown with bullae (containing thick pink or purple fluid) and frank cutaneous gangrene can be seen.

Involved Sites

- **Perineum (Fournier's gangrene)** – Necrotizing fasciitis (many bug type) of the perineum is known as Fournier's gangrene. It typically begins abruptly with severe pain and may spread rapidly to the anterior abdominal wall and the gluteal muscles. Men are more commonly affected than women. Involvement in men may include the scrotum and penis; involvement in women may include involvement of the labia.
- ●**Head and neck region** – Necrotizing fasciitis of the head and neck can result from surgery or instrumentation or in the setting of a tooth infection.

- Surgical exploration is the **only** way to diagnose. Exam shows swollen and dull-gray appearance of the fascia, thin exudate without clear purulence, and easy separation of tissue planes

Gas Gangrene is Different

- Gas gangrene (clostridial myonecrosis) is an acute invasion of healthy tissue that occurs spontaneously or as a result of traumatic injury. Both gas gangrene and polymicrobial (type I) necrotizing soft tissue infection are associated with gas in the tissues.

Types of Gangrene

- 2 main forms of gangrene
- **Dry gangrene**
- **Wet Gangrene**
  - **Gas gangrene**: a kind of wet gangrene

High Mortality

- ●Polymicrobial (type I) necrotizing fasciitis – 21 percent
- •Fournier's gangrene – 22 to 40 percent
- •Cervical necrotizing fasciitis – 22 percent
- •Neonatal necrotizing fasciitis – 59 percent
- ●Monomicrobial (type II) necrotizing fasciitis – 14 to 34 percent
- ●White blood cell count >30,000/microL; band neutrophils >10 percent
- ●Serum creatinine >2.0 mg/dL (177 mmol/L)
- ●Age >60 years
- ●Streptococcal toxic shock syndrome
- ●Clostridial infection
- ●Delay in surgery for more than 24 hours
- ●Infection involving the head, neck, thorax, or abdomen

- Soft tissue infections can occur after both freshwater and saltwater exposure, particularly if there is associated trauma
- Trauma — Trauma leading to infection with AEEVM includes puncture wounds due to fishhooks and fish spines and lacerations due to boat motor propeller blades. In addition to trauma by accidental puncture, bites from fish, alligators, crocodiles, sharks, and turtles can transmit these infections .

- Infections due to *V. vulnificus* are more often limited to salt or brackish water exposure.