NECROTIZING SOFT TISSUE INFECTIONS

AN OVERVIEW FOR NON-SURGEONS

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Rocky Mountain WOCN – 2020
Phoenix, Arizona

PART 1

INTRODUCTION – BASIC CONCEPTS

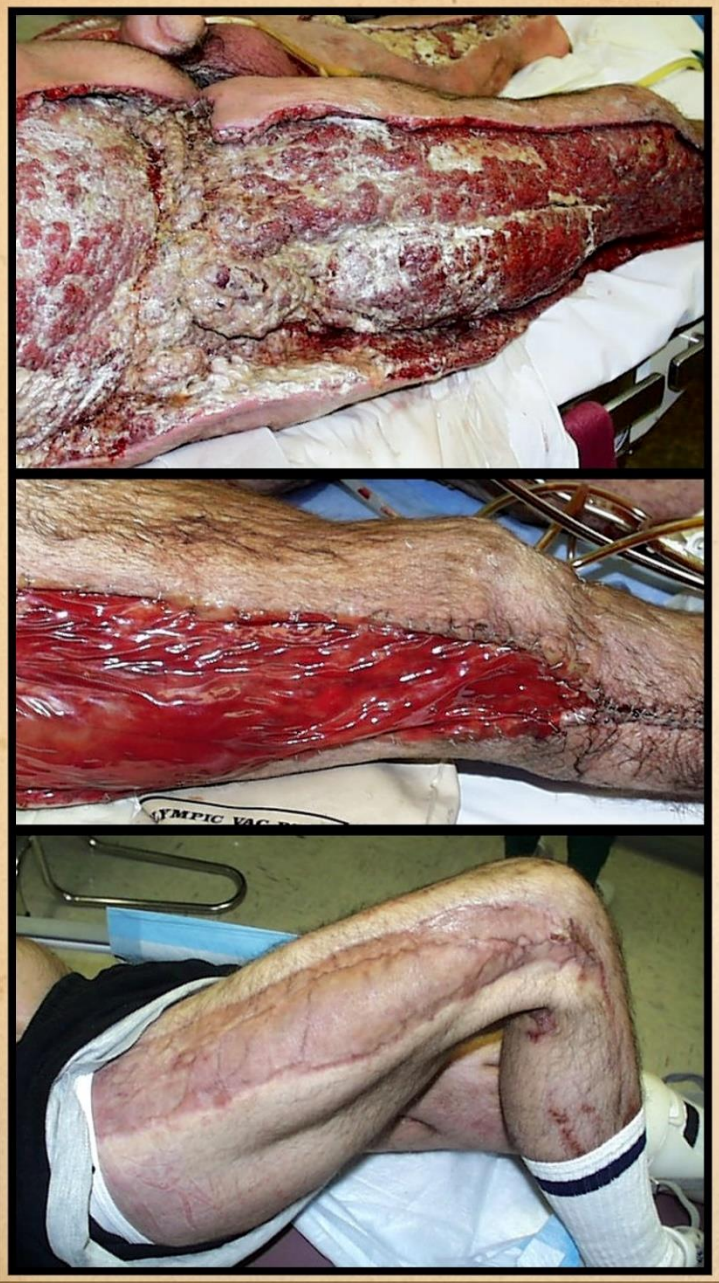
PART 2

MAIN FOCUS OF THIS PRESENTATION

ACCURATE RECOGNITION OF DISEASE

EARLY AND EFFECTIVE CARE

CONSEQUENCES OF INACCURATE CARE



Necrotizing fasciitis:

infectious-suppurative panniculitis
("*fasciitis*")
with tissue infarction
("*necrotizing*").

Why it is important – the obvious:

- clinical morbidity & mortality
- spectrum of care required

Why it is important – non-obvious:

- impaired or delayed recognition
- delayed & inadequate treatment
- evaluation & rx by non-surgeons
- misdiagnosis of other conditions

Necrotizing Fasciitis

"Definition"

Spectrum of disorders based on cause, organisms, and comorbid risk profile.

Synergistic gangrene

enteric, fournier's, ischemia

Clostridial myofasciitis

gas gangrene

Streptococcal (Gram +)

"flesh-eating", erysipelas / -oid

Fungal & Atypical

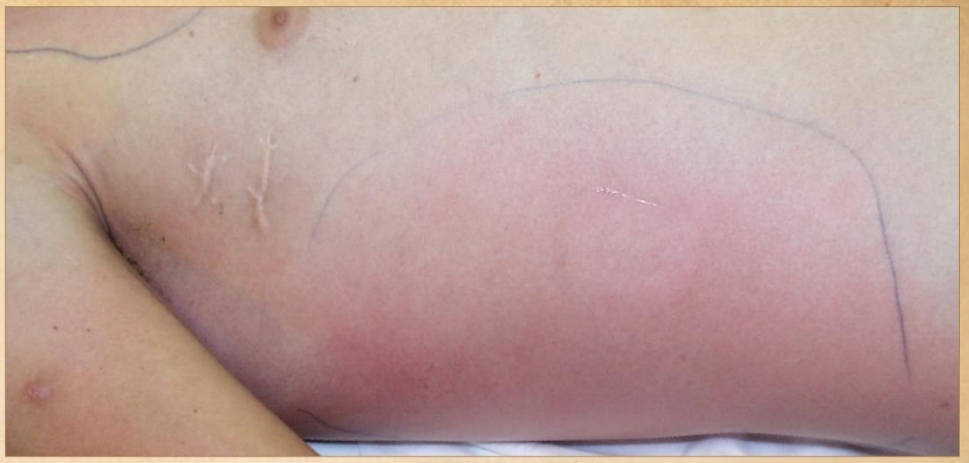
mucormycosis et al, immunocompromised

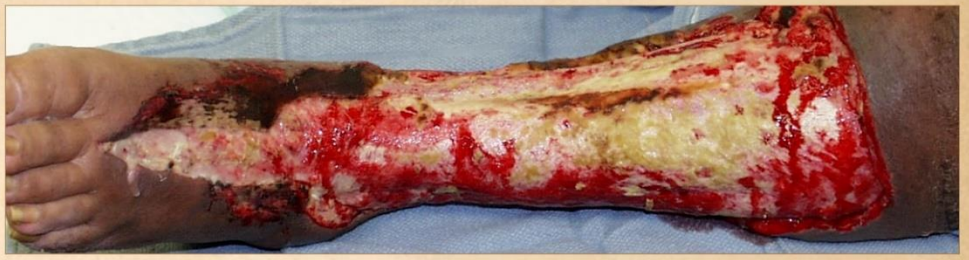
Semi-comparable non-infections

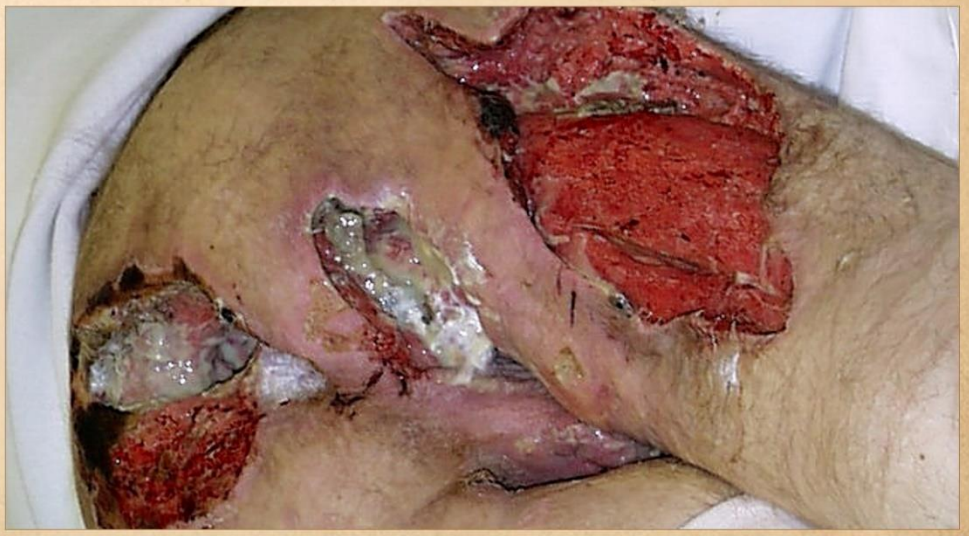
Burns

Degloving

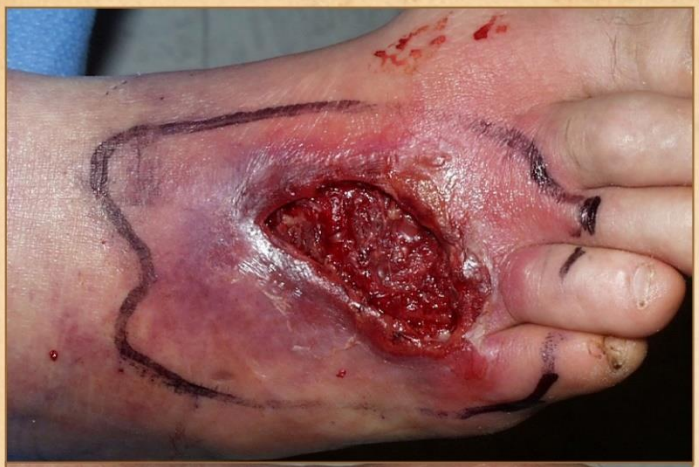
TEN – toxic epidermal necrolysis

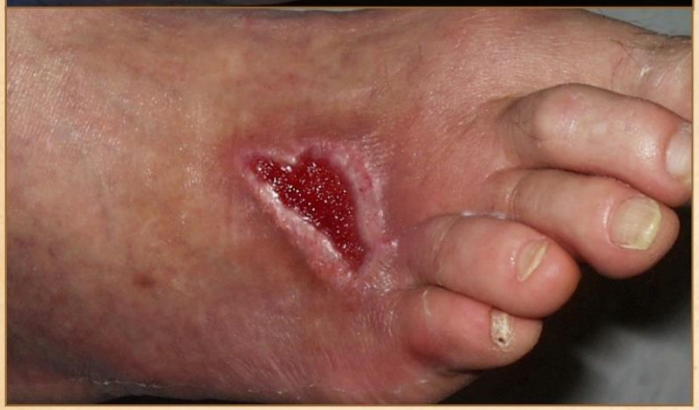


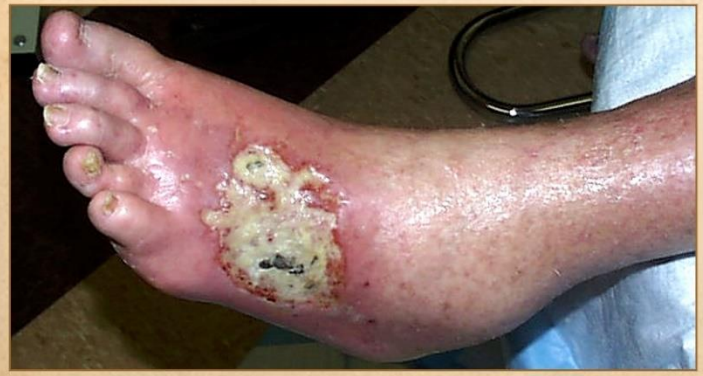


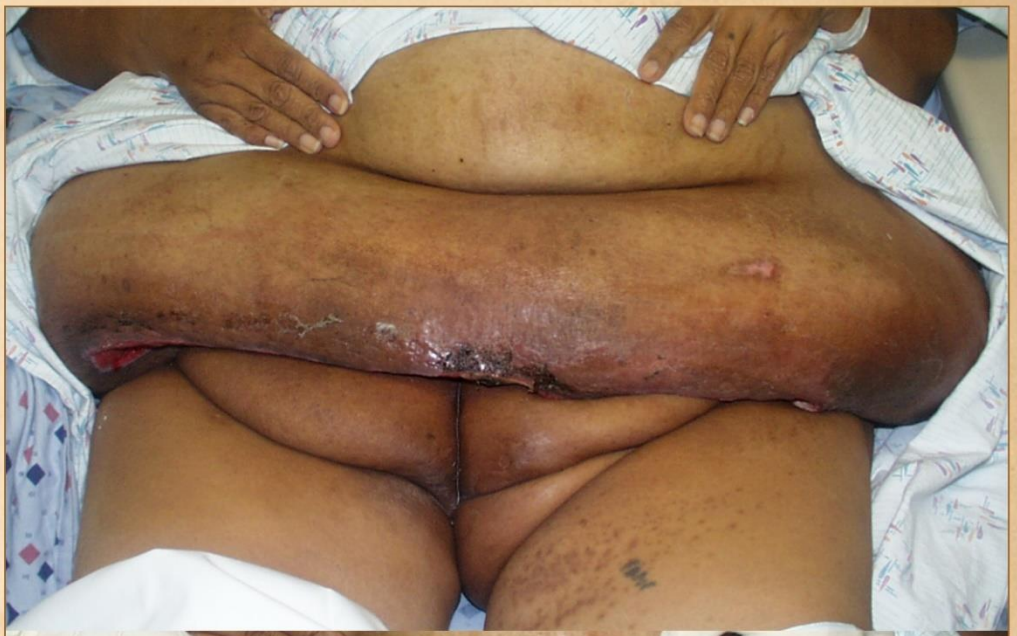


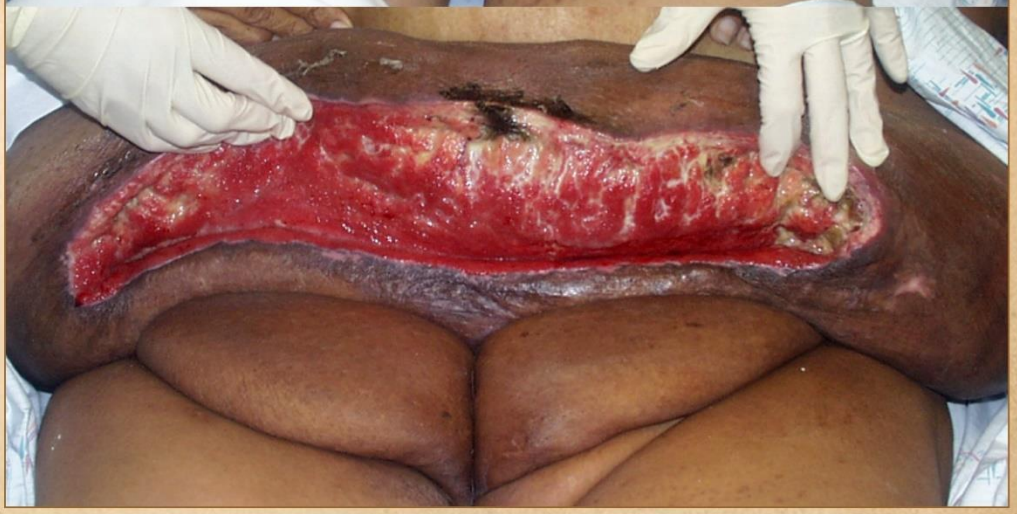
Diagnostic miscalls. Understand "necrotizing".





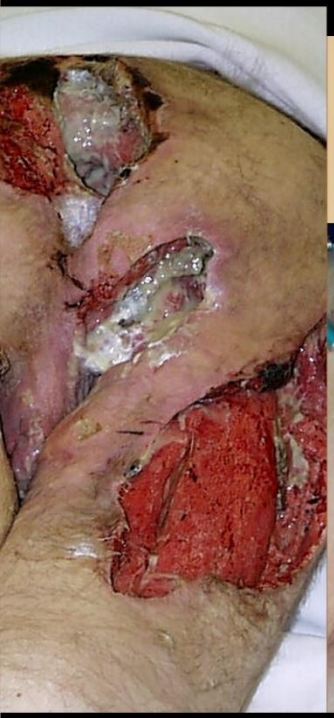




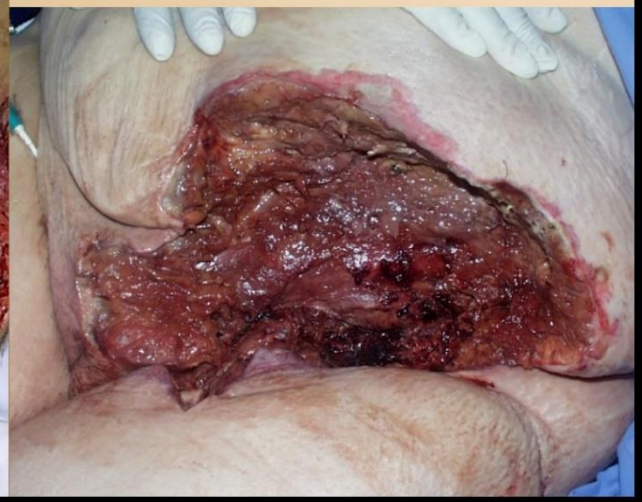


Clinical pathology, profiles for each type .

Synergistic / Enteric

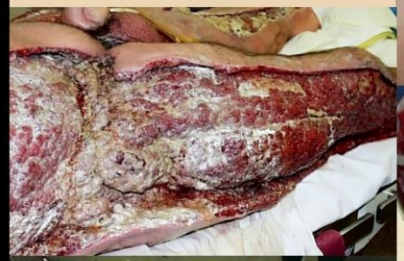


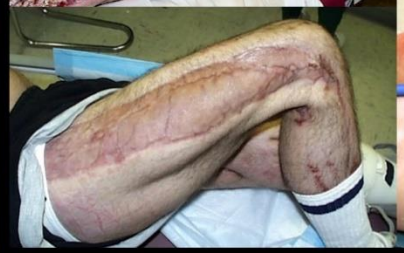
Enteric flora, mixed aerobic & anaerobic.
Endotoxins & endotoxin shock.
Epicentric spread, & along anatomical planes and in muscular compartments.
Higher risk with vascular disease & diabetes.

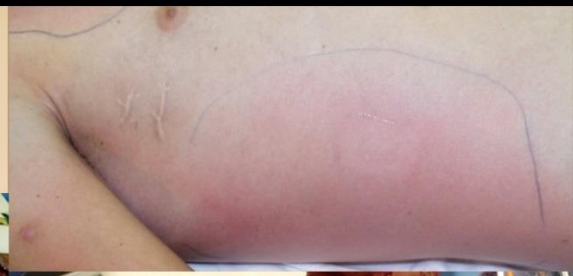


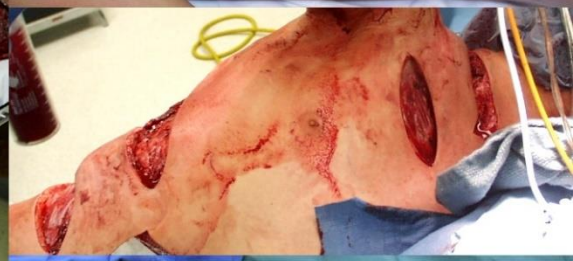
Streptococcal / Gram+

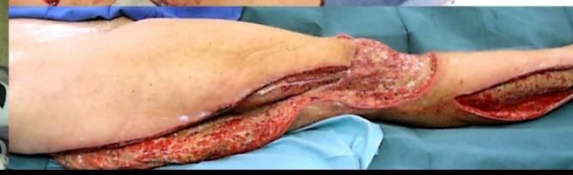
Gram + flora, aerobic.
Exotoxins & remote injury.
Radical & lymphatic spread.
Inoculation injury.
Young healthy people.



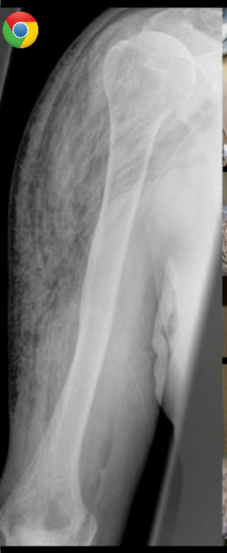


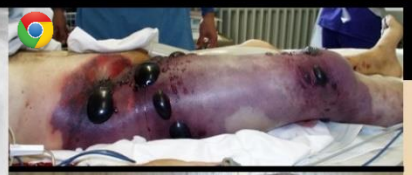


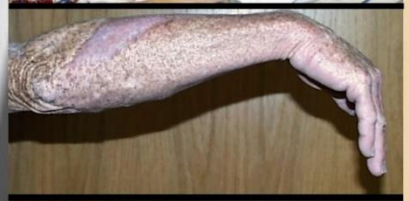


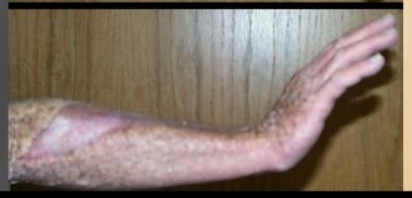


Clostridial - gas gangrene









Clostridial myonecrosis.
Clostridial myofasciitis.

Mixed flora, dominant Clostridium spp.

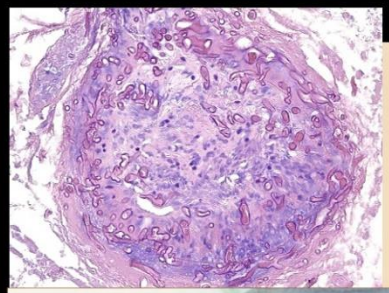
Ranch, farm, soil injury, & other circumstances.

Young / healthy people.
Other profiles.

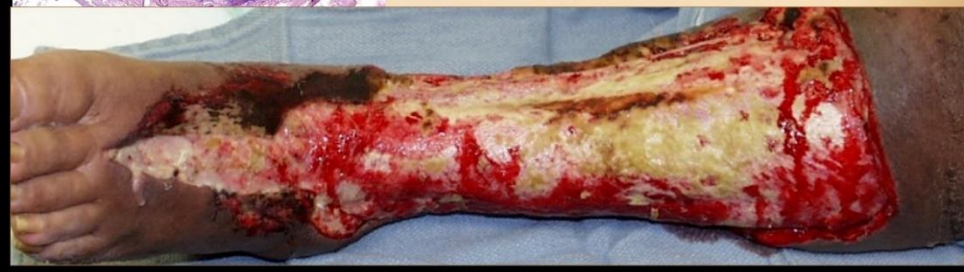
Exotoxin injury.
Multi-system injury.

Muscles / compartments.
Ischemia / infarction.

Fungal & Atypical



Fungal - mucormycosis, aspergillus.
Vascular invasion, thrombosis, ischemia.
Inflammation & systemic toxicities less.
Trauma-inoculation injury (young-healthy).
Immunosuppression & chronic illness.
Head and neck involvement.



Clinical context is important. **Each of these has distinctive risk profiles and presenting features.**

Necrotizing Fasciitis
General Management

Phase 1

Control the acute disease
Stabilize the patient

Phase 2

Close the wounds
Restore the patient

Phase 3

Manage late sequelae

Necrotizing Fasciitis
Managing the Wound

A

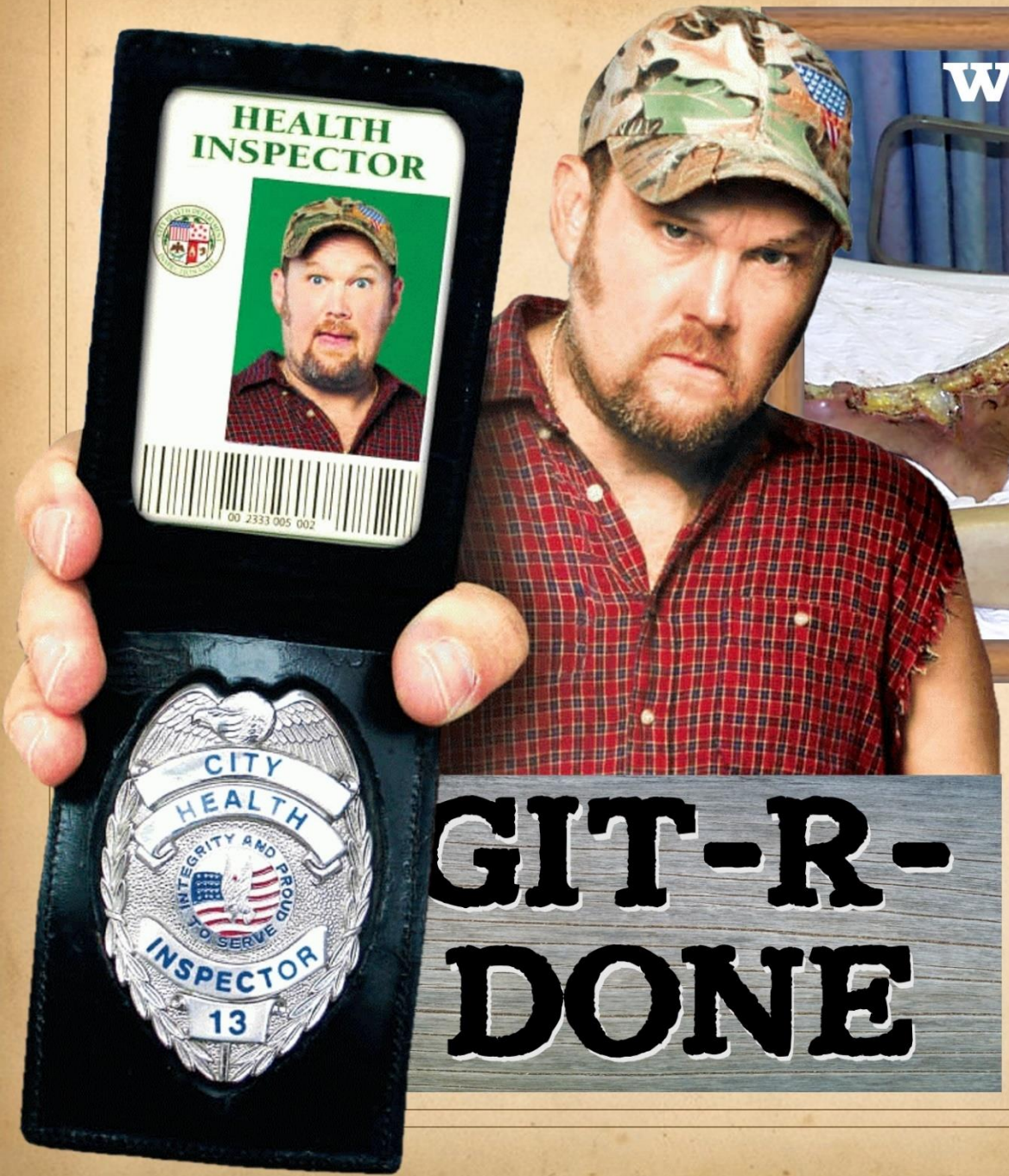
Control the acute disease
(Drain – Debride - Excise)

B

Care for the wounds
(Silver based topicals)

C

Close the wounds
(Old and new methods)

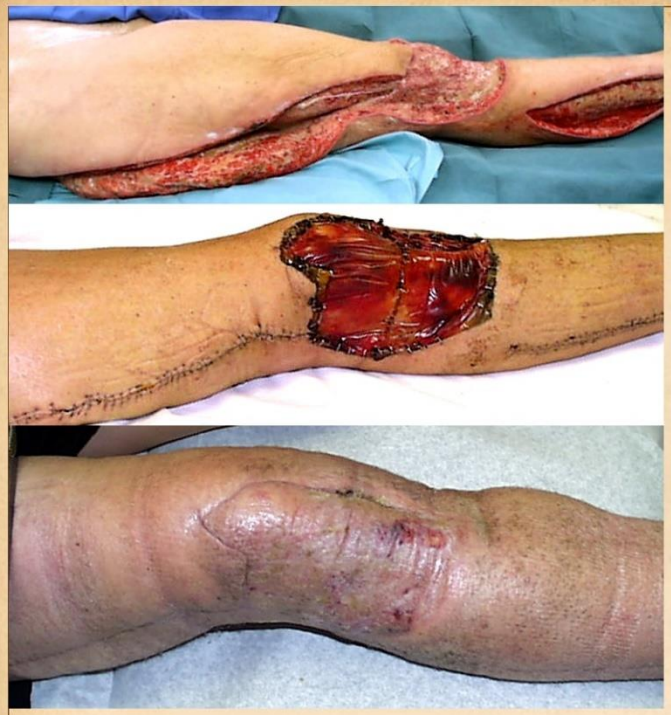


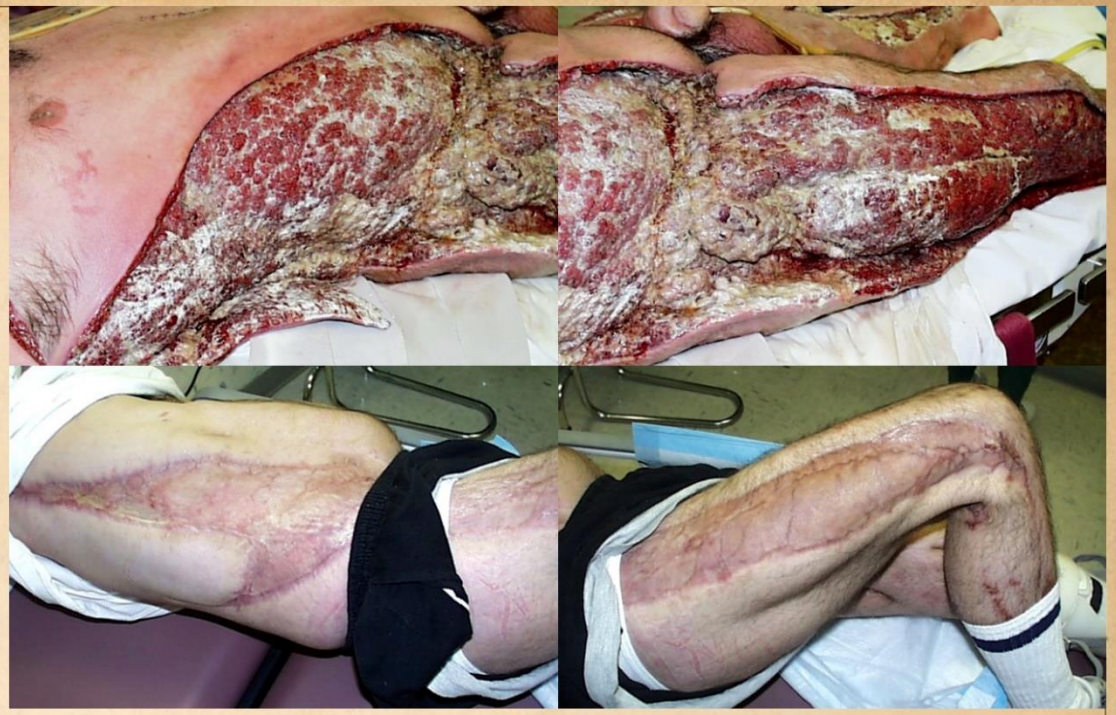
GIT-R-DONE

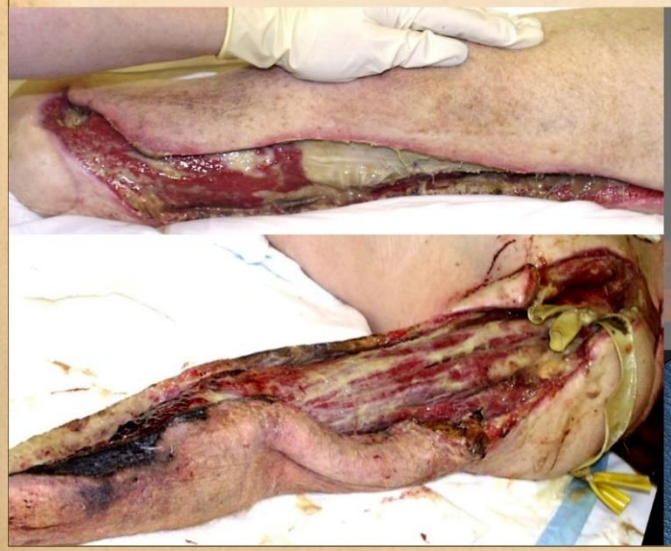
DO A GOOD DEBRIDEMENT

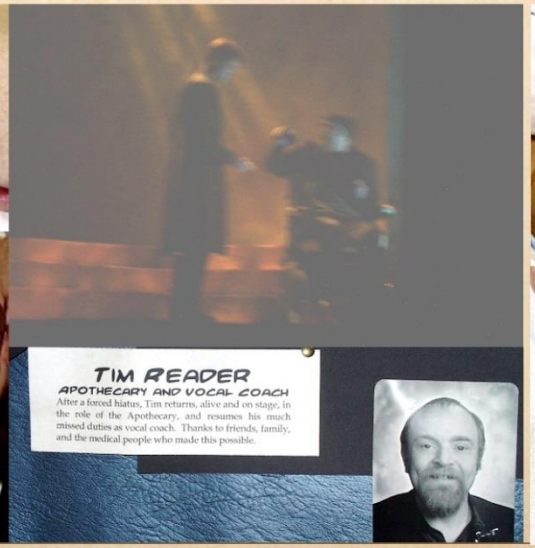
CURE WITH ONE OPERATION

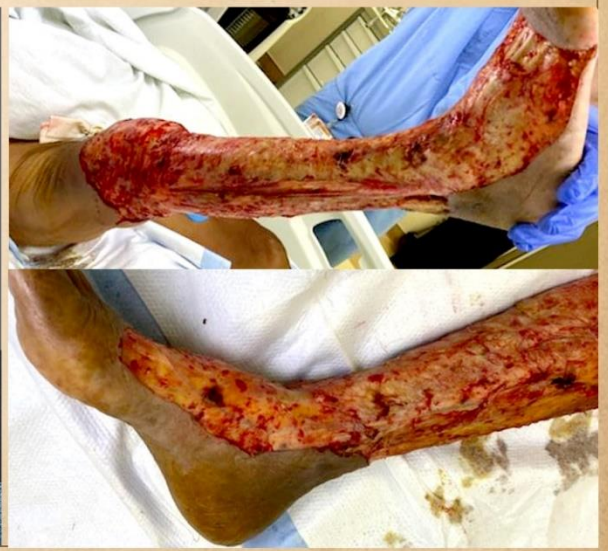
Illustrative examples .











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MAIN FOCUS OF THIS PRESENTATION

ACCURATE RECOGNITION OF DISEASE

EARLY AND EFFECTIVE CARE

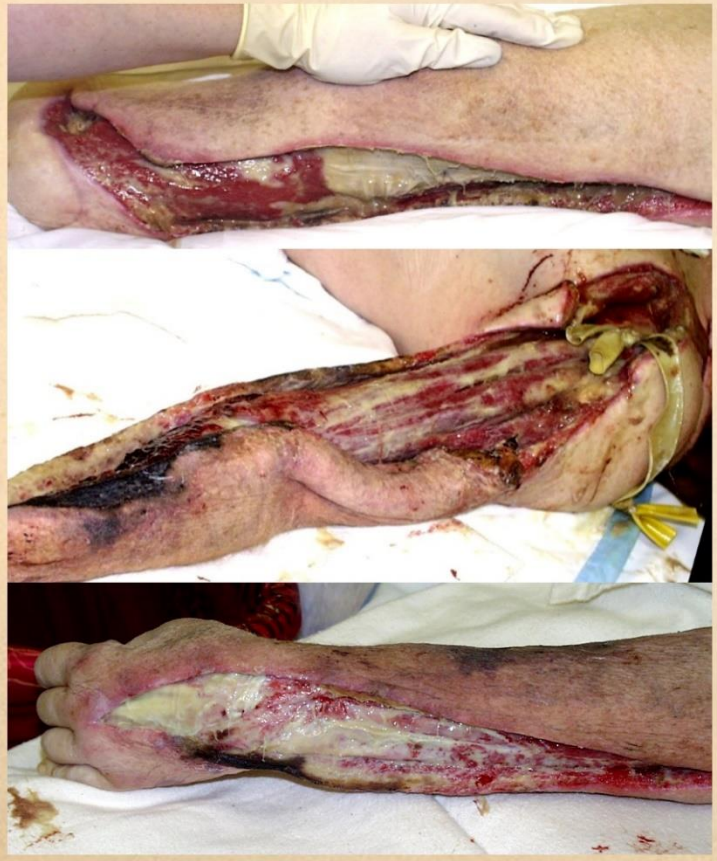
CONSEQUENCES OF INACCURATE CARE

PITFALLS IN DIAGNOSIS

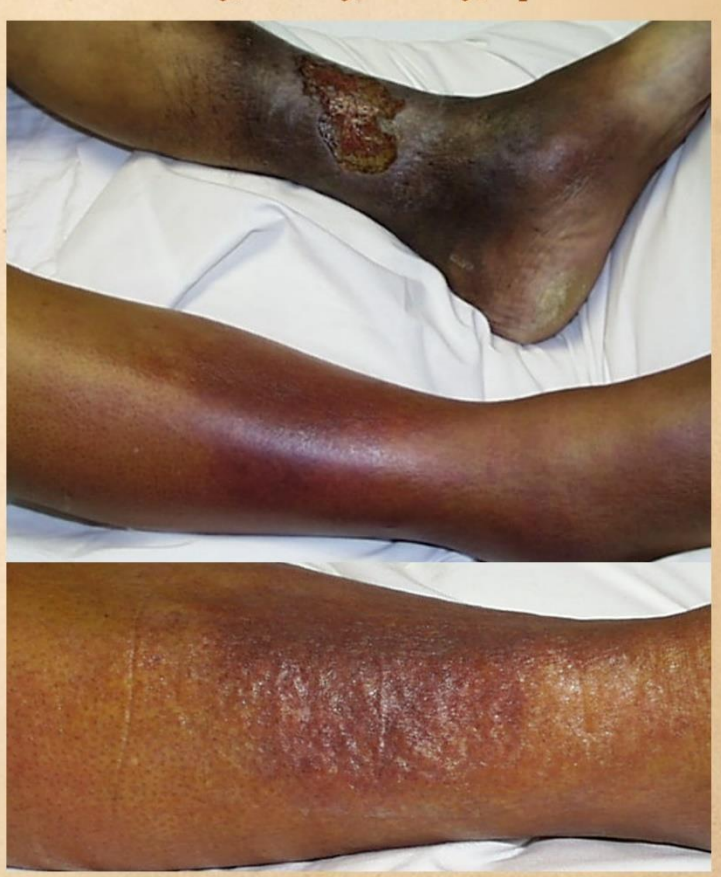
Lack of knowledge of the subject.
Erroneous use of lab & imaging.

Uncertain early findings.
Other disorders that are confused.

Failure to recognize necrotizing fasciitis means delays in diagnosis and treatment, resulting in increased morbidity, mortality, disability, expense.



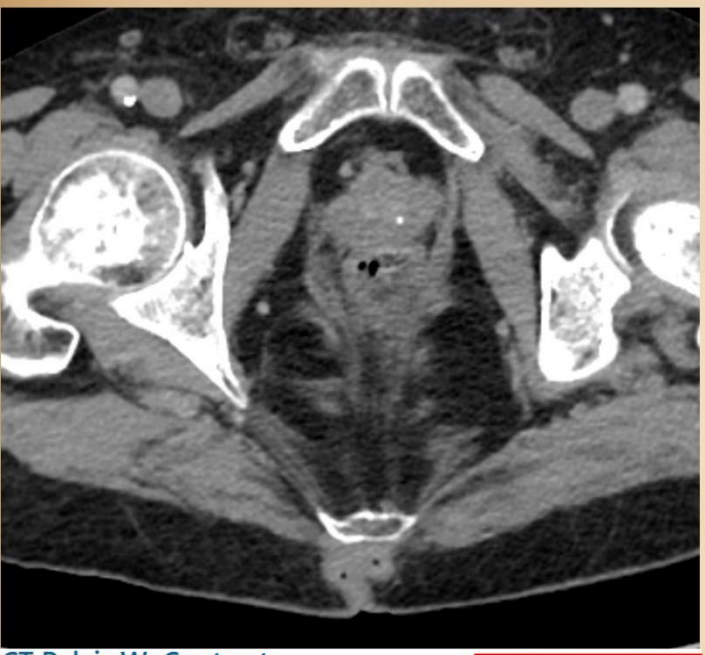
Failure to understand soft tissue infections means non-infections get incorrect care, with increased morbidity, mortality, disability, expense.

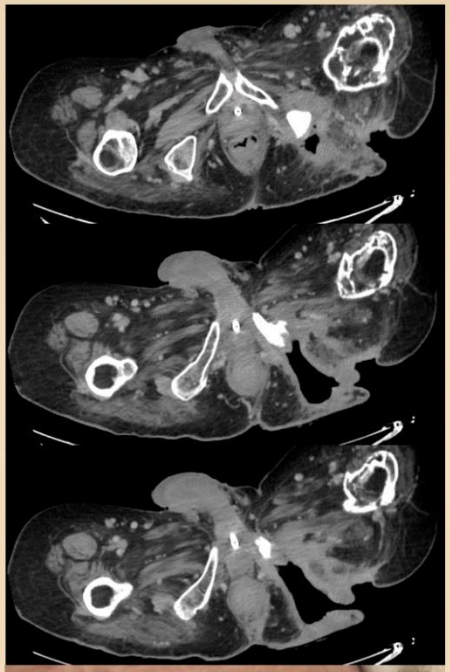


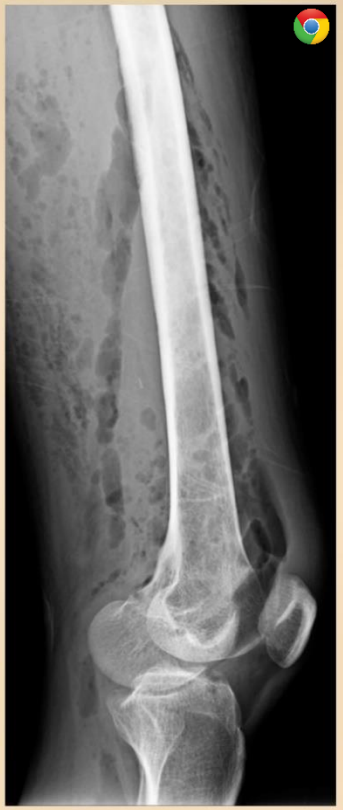
PITFALLS Lack of knowledge of the subject
Uncertain early findings
Erroneous use of lab & imaging
Other disorders that are confused

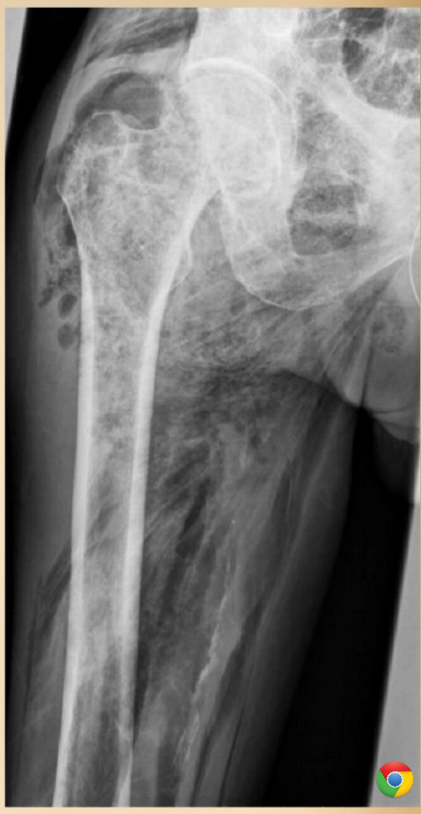
" AIR IN TISSUES "

Misunderstood, misinterpreted, over diagnosed.
*** Not all air is fasciitis. * Not all fasciitis has air.**









CT Pelvis W Contrast

Status: Final result

Study Result

CT PELVIS WITH CONTRAST

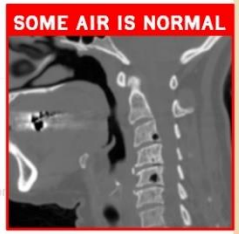
HISTORY: Tailbone wound

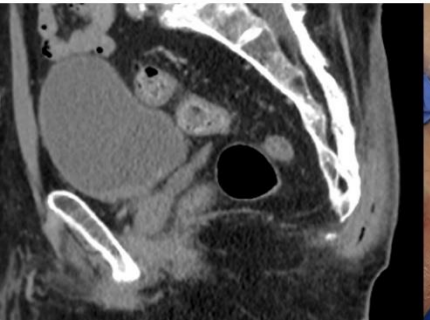
COMPARISON: None

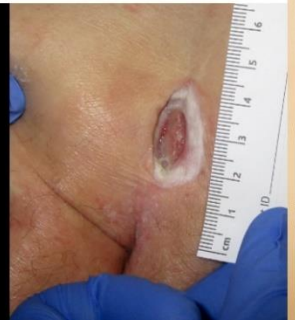
TECHNIQUE: Intravenous low osmolar contrast. Coronal and sagittal refor

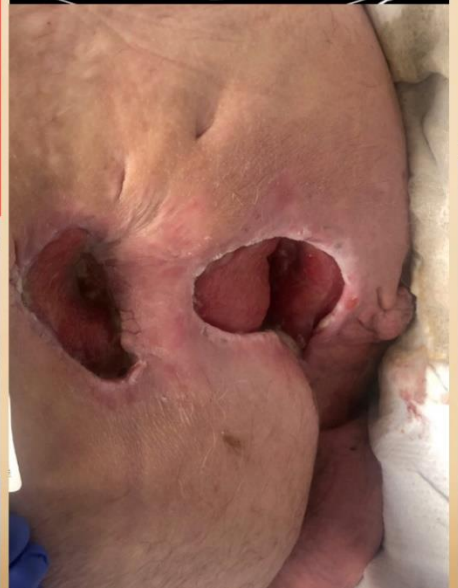
FINDINGS:

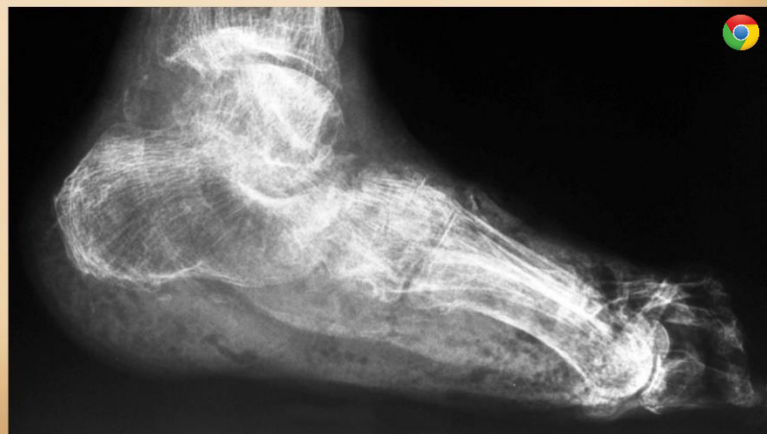
A small amount of gas and density appears to be present within subcutaneous tissue along the intergluteal cleft











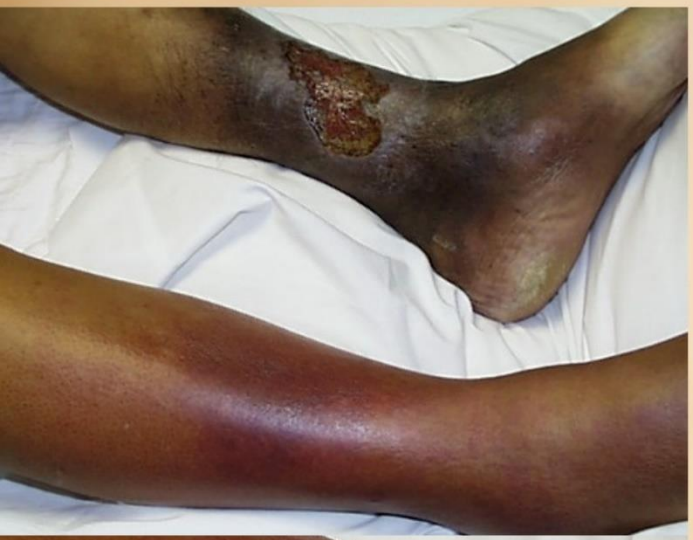
PITFALLS IN DIAGNOSIS

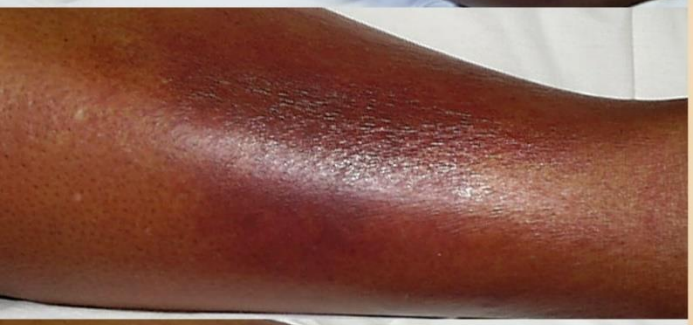
Lack of knowledge of the subject

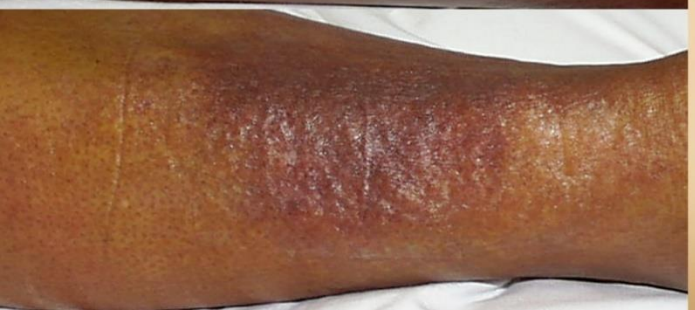
Uncertain early findings

Erroneous use of lab & imaging

Other disorders that are confused

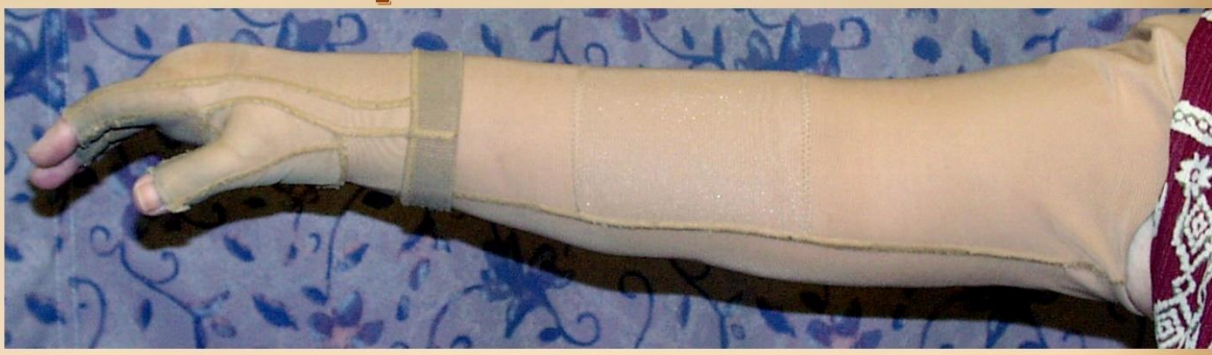


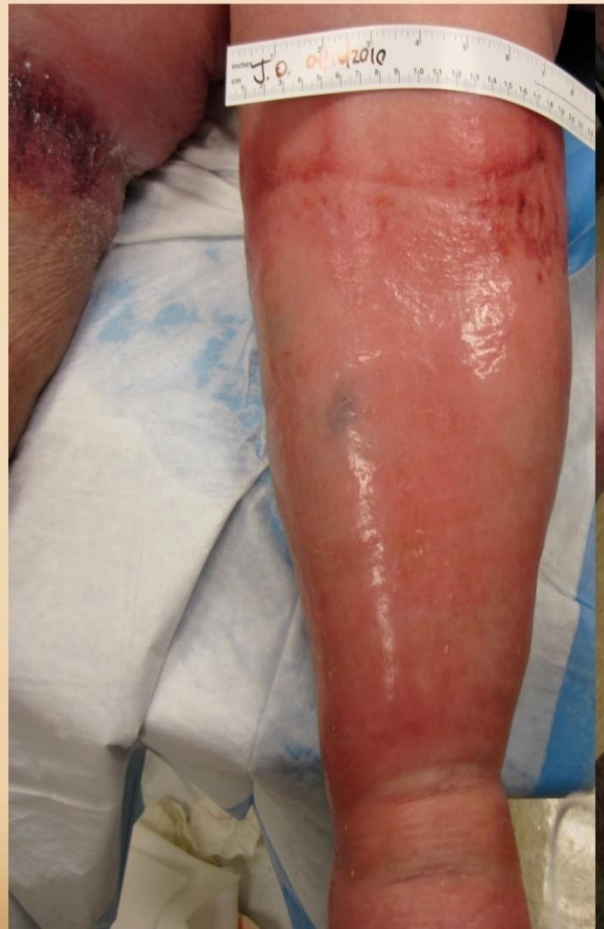


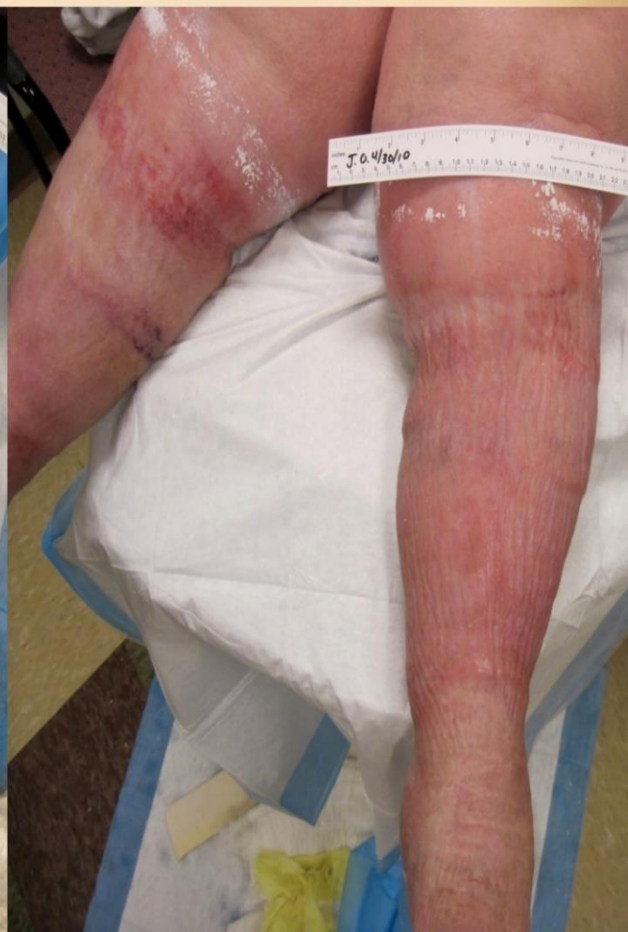


These are NOT necrotizing fasciitis .

They are not even infections, just immune disorders in outpatients with no life-&-death risk.



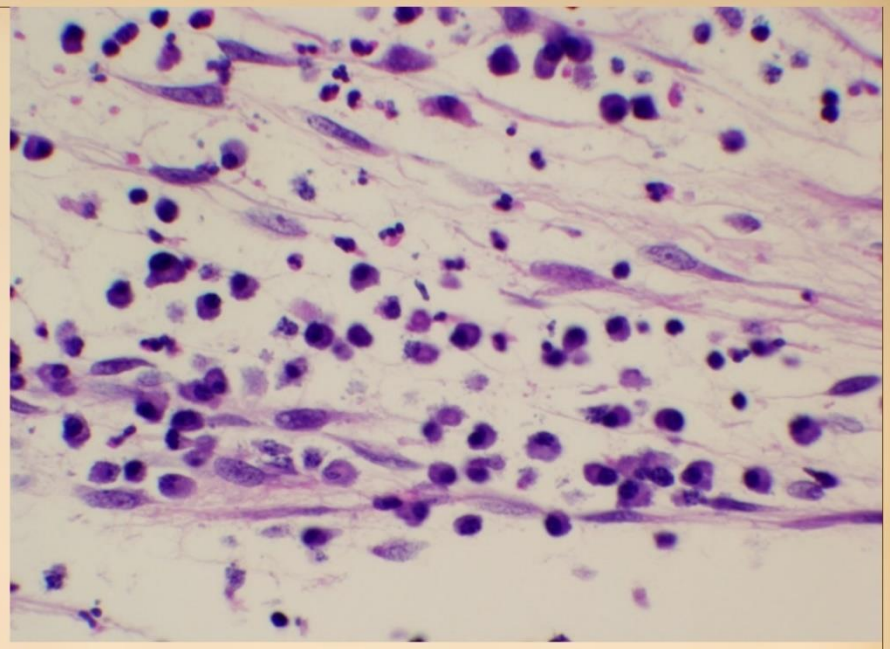


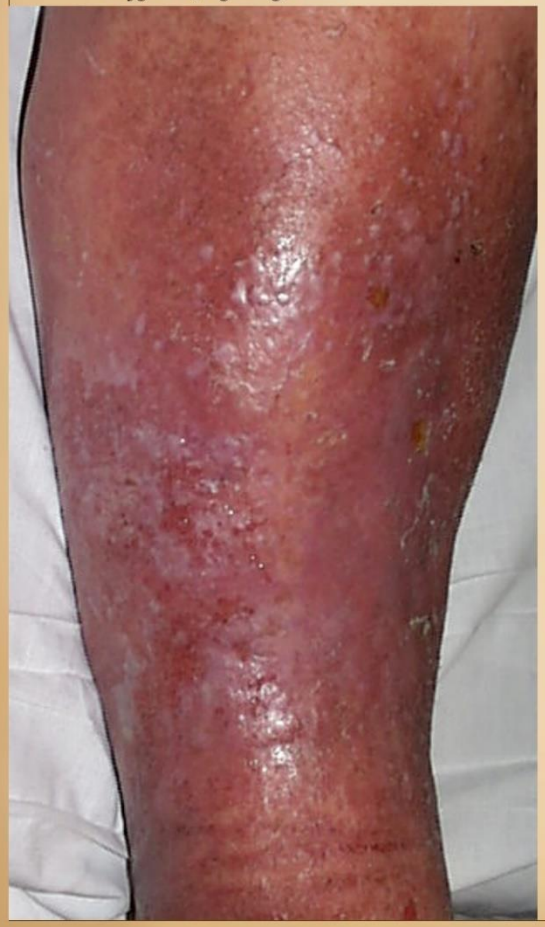


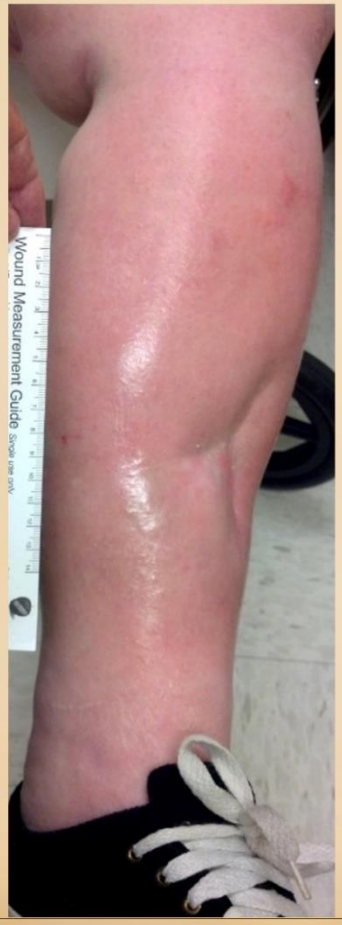
Immune panniculitis, not infection – BECAUSE – edema is the playground of leukocytes – BUT – a caveat in diagnosis – comprehensive H&P is crucial.

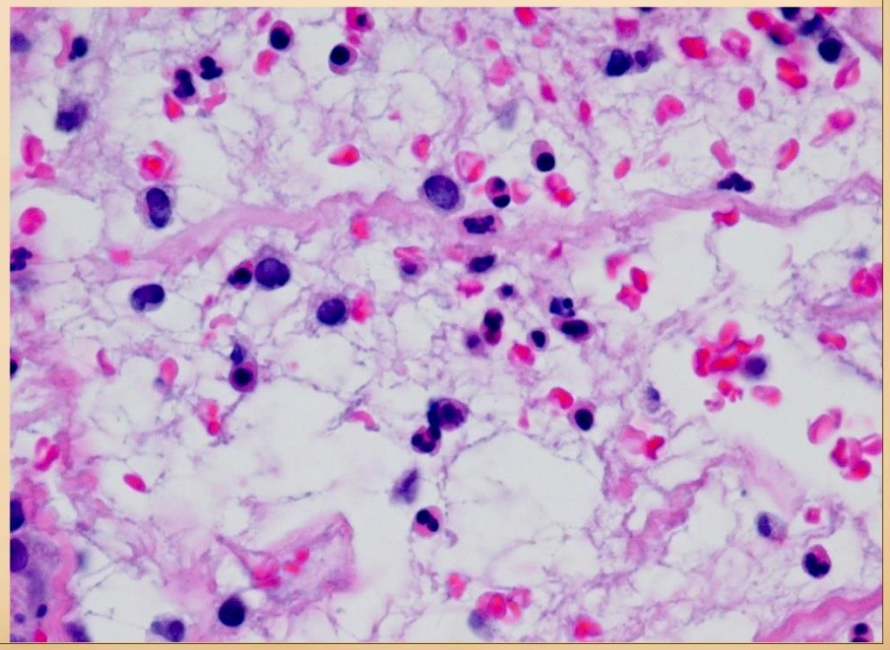
Playground, engraving, c 1860.

The Wild One, Columbia Pictures, 1953









NECROTIZING FASCIITIS

How to recognize the problem, and how to establish a positive diagnosis.

Thorough History

Chief complaint
Details of onset
Timeline
Specific symptoms
Risk factors and other disorders
Constitutional signs & symptoms
Comorbid acute illness
General "look & feel"

Proper Exam

Extremities
Skin and fascias
Muscles and compartments
Peripheral nerve and motor
Vascular
Internal viscera, especially pelvis
Turn and look
Stick your fingers in the relevant holes

Surgery (as diagnostic)

Debride / Biopsy
Explore in OR

Pattern Matching

Know & recognize distinctive features
Understand the differential dx
Exclude or recognize other problems
Understand explicit signs of infection

xx — Lab — xx

Non-specific
Misleading
Positive results are too late

xx — Imaging — xx

Could be helpful, but usually not
Misleading
Misinterpreted
Wastes time

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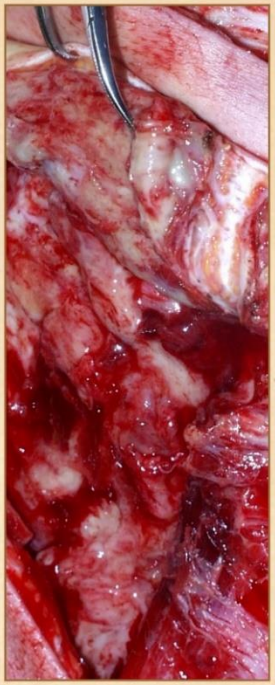
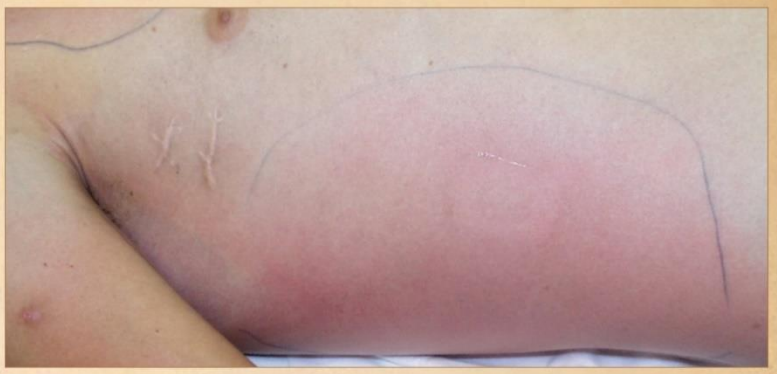
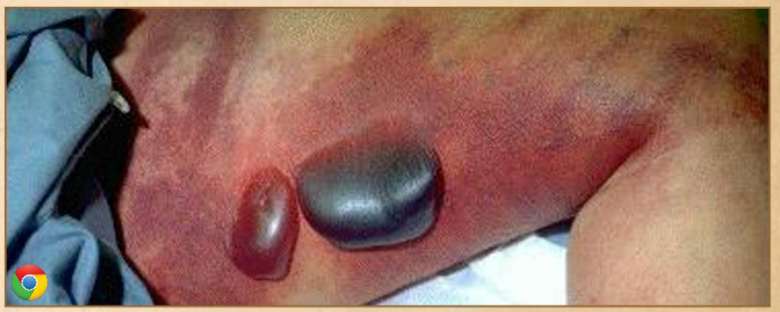
Peripheral nerve and motor
Vascular
Internal viscera, especially pelvis
Turn and look
Stick your fingers in the relevant holes

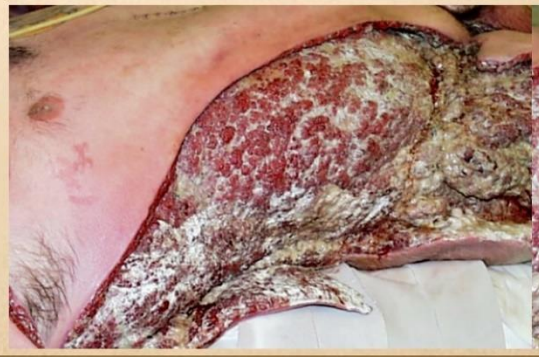
Surgery (as diagnostic)

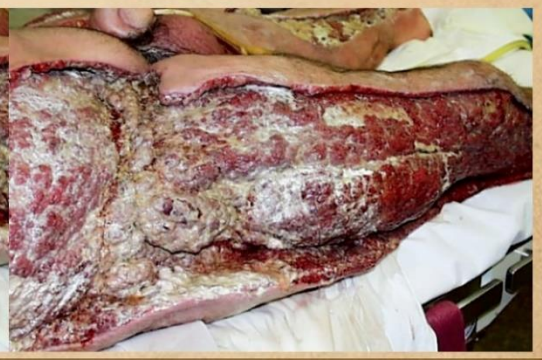
Debride / Biopsy
Explore in OR











NECROTIZING FASCIITIS

How to recognize the problem, and how to establish a positive diagnosis.

Thorough History

Chief complaint
Details of onset
Timeline
Specific symptoms
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Constitutional signs & symptoms
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General "look & feel"

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Peripheral nerve and motor
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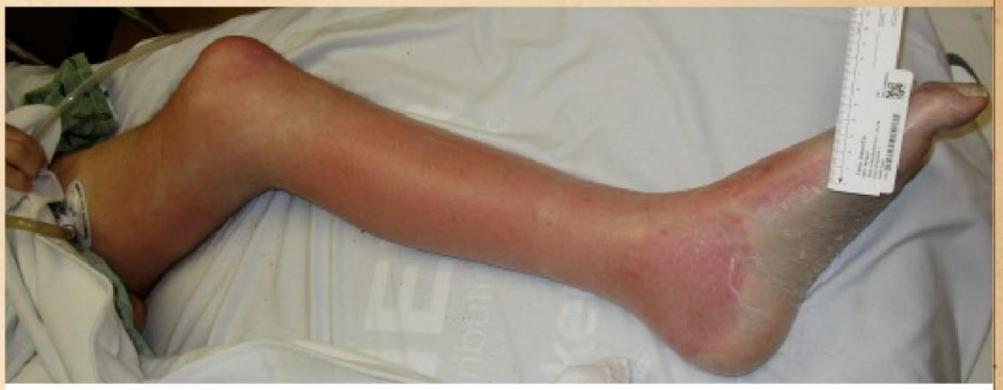
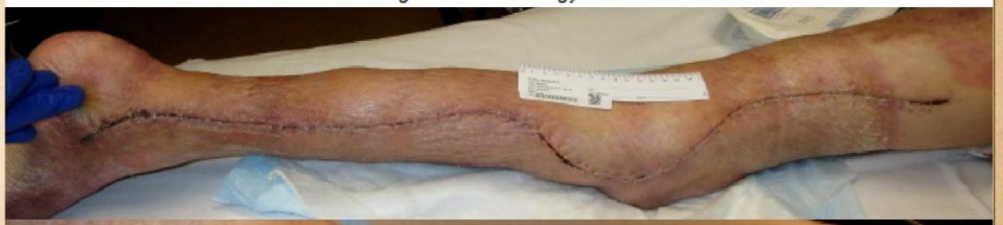
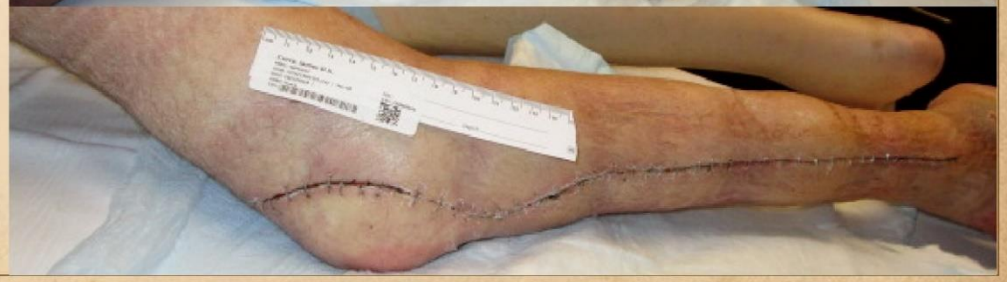


FINAL DIAGNOSIS
Soft tissue, left lower extremity wound, debridement:
- Benign mature adipose tissue with neutrophil margination and early migration into the surrounding soft tissue, suggestive of early necrotizing fasciitis. See comment.

Comment: Clinical correlation along with microbiology studies is recommended.





NECROTIZING FASCIITIS

Logistics of treatment – moving from diagnosis to timely effective care.

Mandatory Surgery Quickly

Surgery is the cure.
Time is tissue.
To surgery as soon as possible.
Thorough debridement.
Complete the job in one operation.

Discretionary Surgery

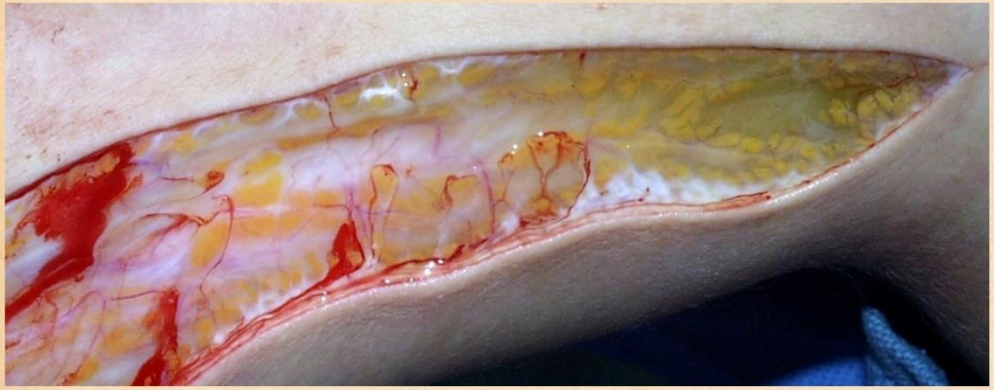
Selective – e.g. colostomy, tracheostomy.
AFTER disease & wounds are better.
Wound closure when ready.
Closure and repair - vs - reconstruction.
Long term physical and surgical rehab.

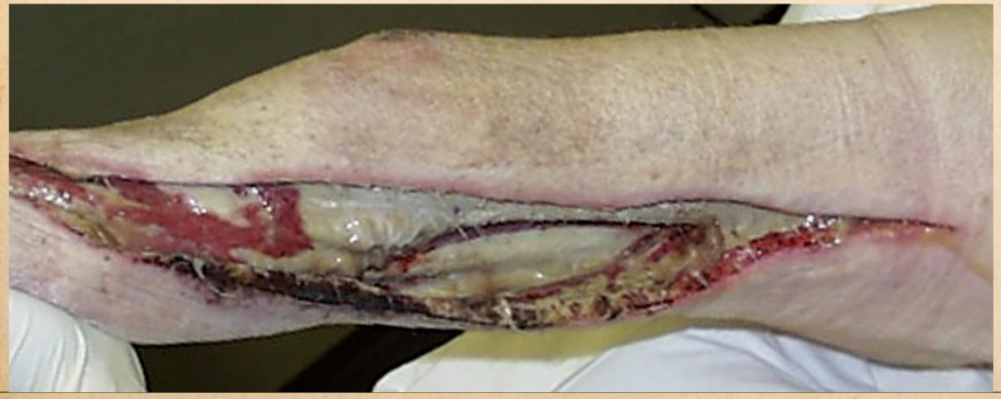
Bedside Surgery

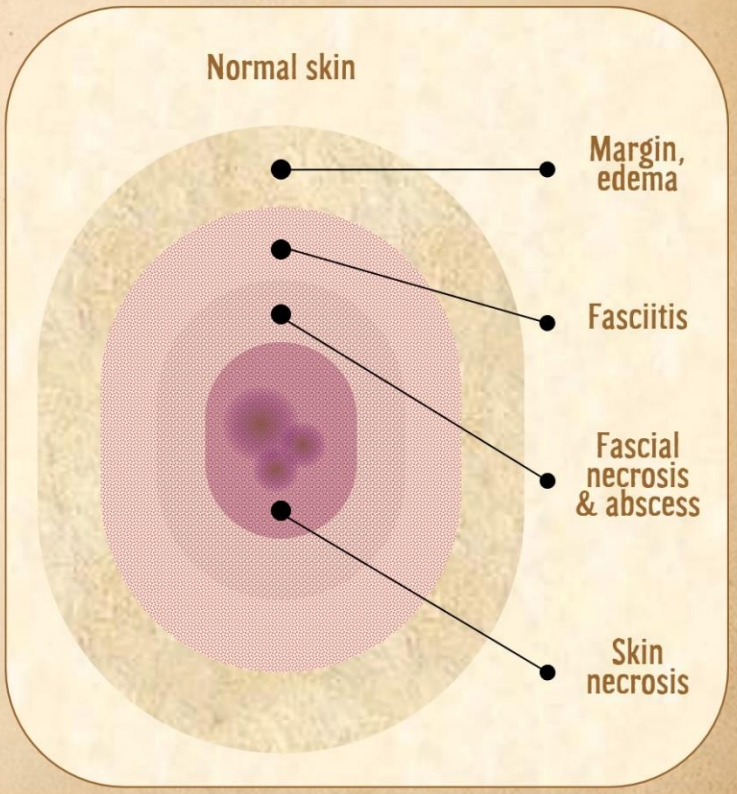
Yes – selective - tourniquet

Adjuvant Treatment

Topicals, compression-edema ctrl
Antibiotics, HBO







NECROTIZING FASCIITIS

The "team" – who & how to muster the necessary resoucres.

TIER 1

Surgery

General , Plastic , Orthopedics , Hand
(whoever is on call or willing).

Hospital / ER has a call schedule,
or call the known enthusiast.

Anesthesia & OR

Notify the OR.

This will alert Anesthesia.

Call Anesthesia direct for special patients.

Blood Bank

+ / - for acral extremities (tourniquet).

All else, send T&C as soon as possible.

Major extremity : 2u prbc

Multi-region : 4u prbc, 1-2 u ffp, 1u plt

TIER 2

Specialty Surgery

Surgical specialists not usually needed
for the intial debridement.

But, they might be needed for focal
problems after "the dust has settled".

Hyperbarics

Might or might not be useful.

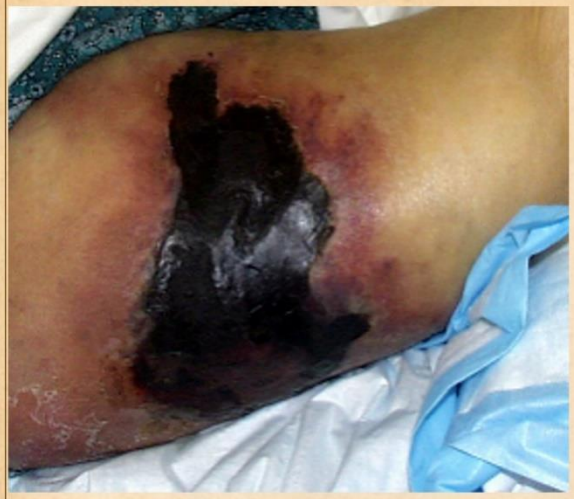
NOT in lieu of surgery.

Post-op Resources

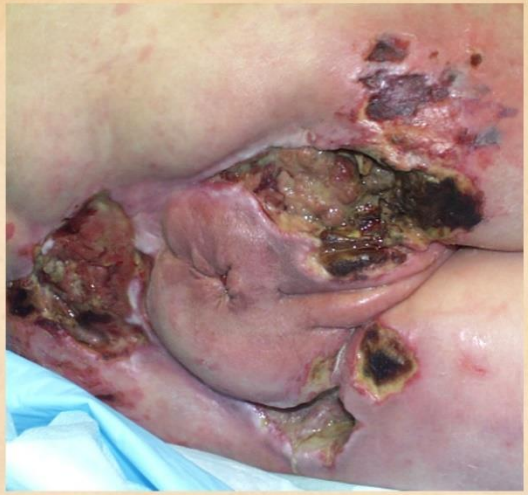
ICU or not.

Dressing materials, comparable to burns.

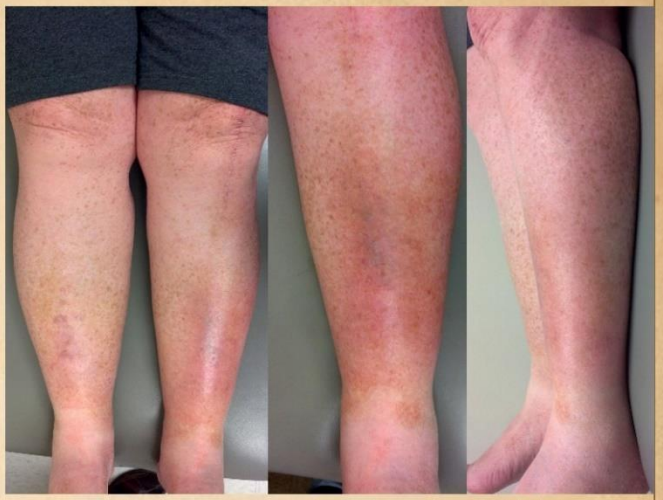
Necrotizing fasciitis - Do not miss the diagnosis - Do not over diagnose other conditions.



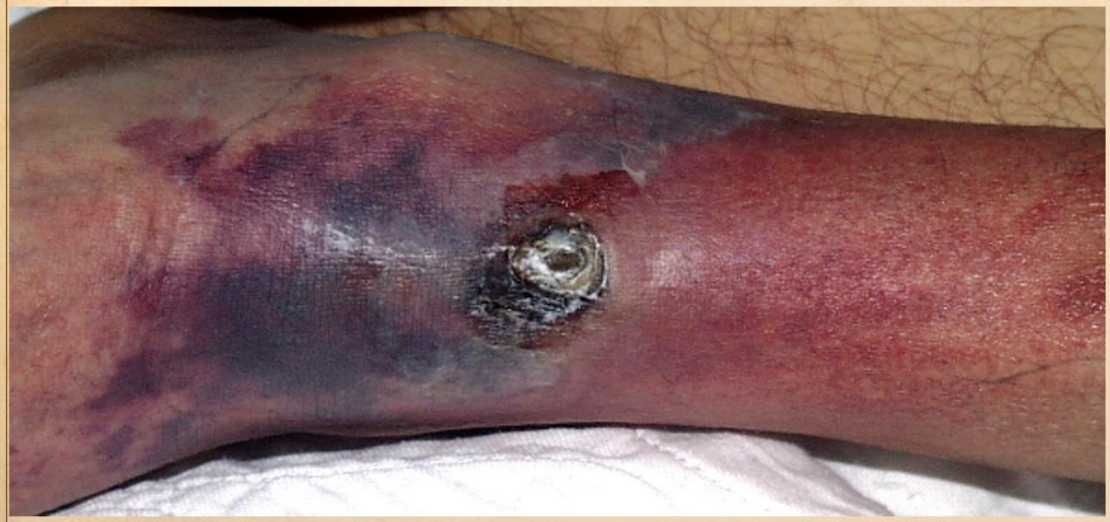
Trauma - hematoma



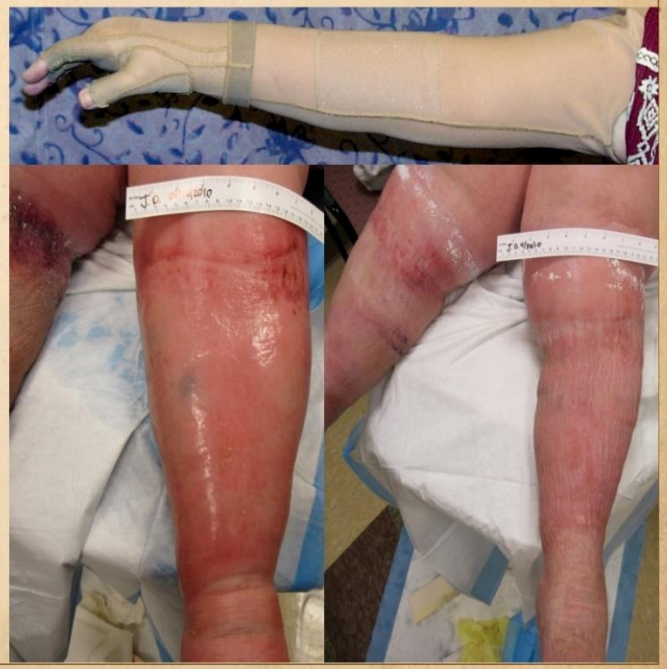
Simple pressure injury



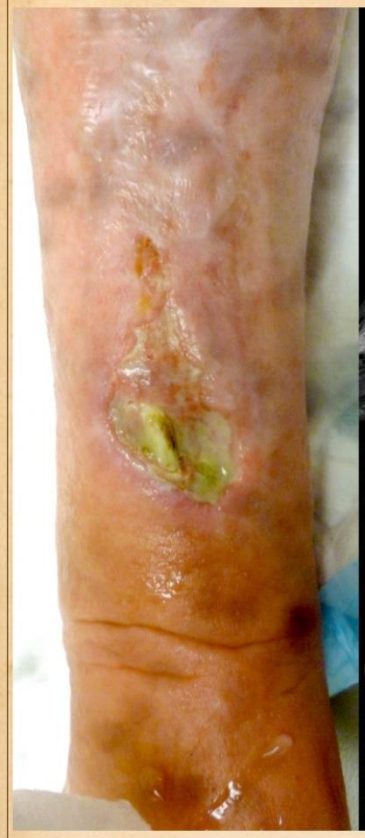
Obesity — postural stasis — family SLE



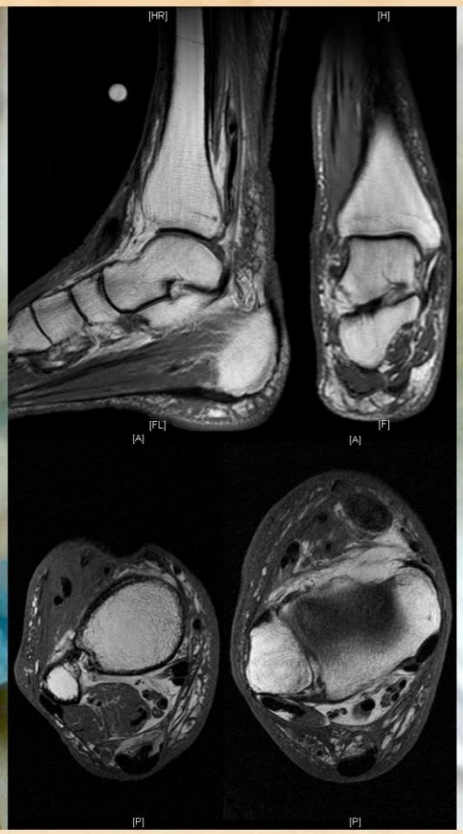
Minor injury - plus - aso-pvod = vascular stasis & ischemic infarct



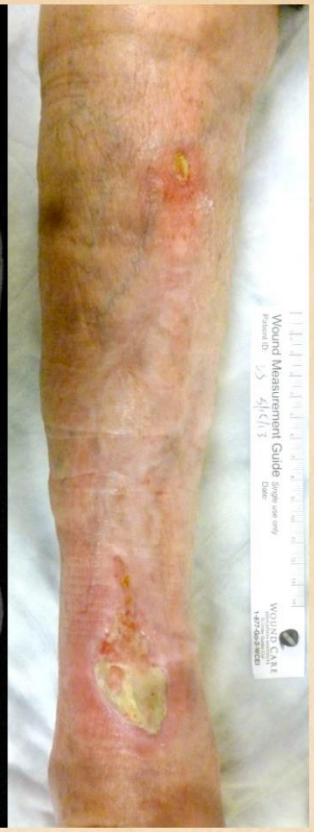
Necrotizing fasciitis - Do not miss the diagnosis - Do not over diagnose other conditions.



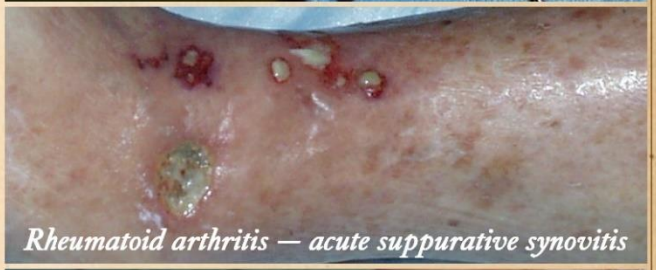
69 F
Scleroderma-lupus
Factor V Leiden

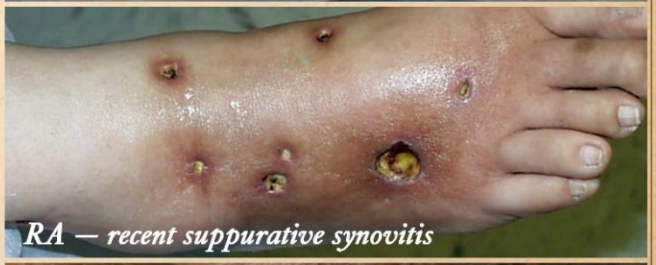


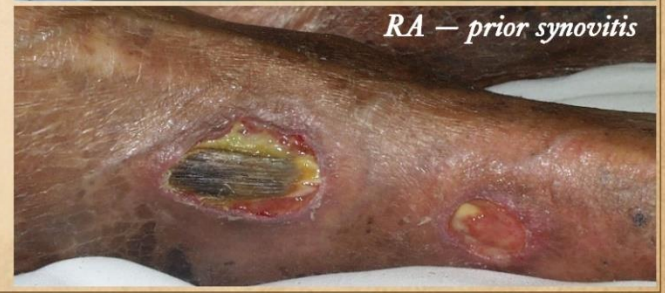
Allergy induced
acute synovitis-panniculitis.
Acute elevation rheumatoid factor.



No response to abx.
Thorough response
to high dose steroids.







We are trying to save a life by accurately recognizing and treating necrotizing fasciitis.

NECROTIZING FASCIITIS

How to recognize the problem, and how to establish a positive diagnosis.

Thorough History

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Skin and fascias
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Vascular
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Turn and look
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Surgery (diagnostic)

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Explore in OR

Necrotizing fasciitis

Direct focus of the complaint
Acute, sudden, unanticipated
Previously healthy
Known inciting event
Prodrome and evolution consistent

Random pattern or anatomical pathways
Rapid spreading
Skin infarcts
Pain
Fever
Acute onset intercurrent organ failure
Patient is sick and getting sicker

Any one or two of these features can be present with non-infectious and non-threatening acute conditions.

Not all are present with necrotizing fasciitis, but distinctive ones will be.

Diagnosis depends on recognizing an overall pattern in which 5 or 6 features are present.

NOT Necrotizing fasciitis

Incidental to chief complaint
Chronic or recurring problem
Chronicity implies comorbidities
No specific trigger
Disease pattern does not match

Focal or distribution of non-infections
Fixed location or extent
No infarcts or bland infarcts
Pain + / - , or same as usual
Afebrile
No or no new intercurrent morbidity
Unpleasant condition but not in jeopardy

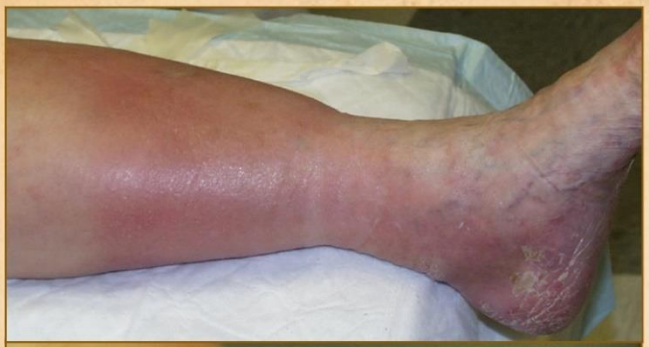
Any one or two of the nec.-fasc. criteria can be present, but these "negative" criteria will predominate.

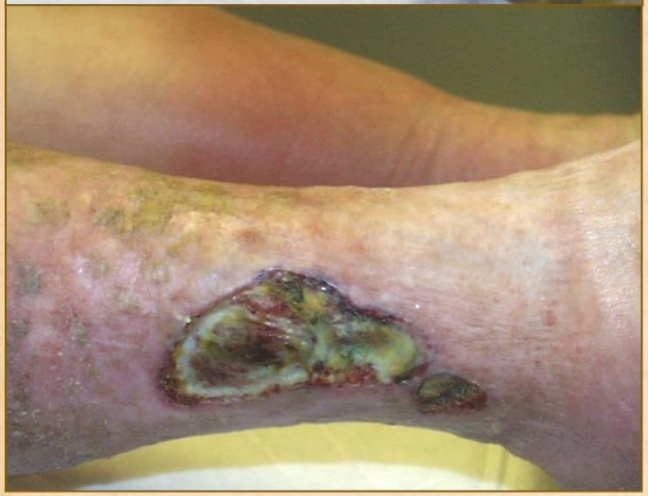
"How sick?" is relevant, not "how ugly?"
Judge problem objectively with an educated mind.

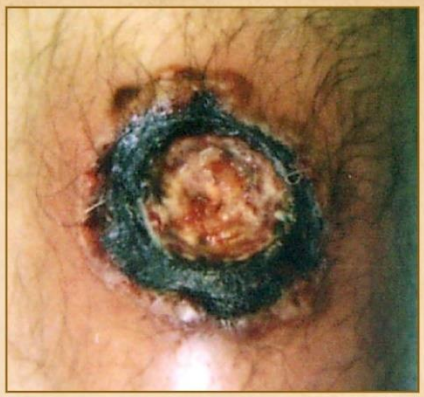
Dx depends on recognizing known disease patterns.
Even for bona fide infections, most are not necrotizing.

We are trying to save a life by not subjecting chronic and benign conditions to nec-fasc rx.

Examples – understand necrotizing fasciitis by appreciating what is not .





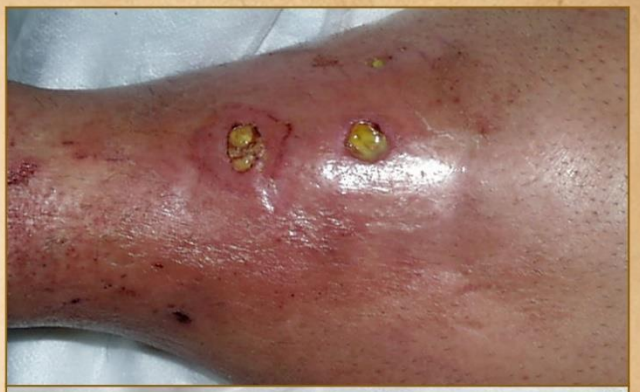


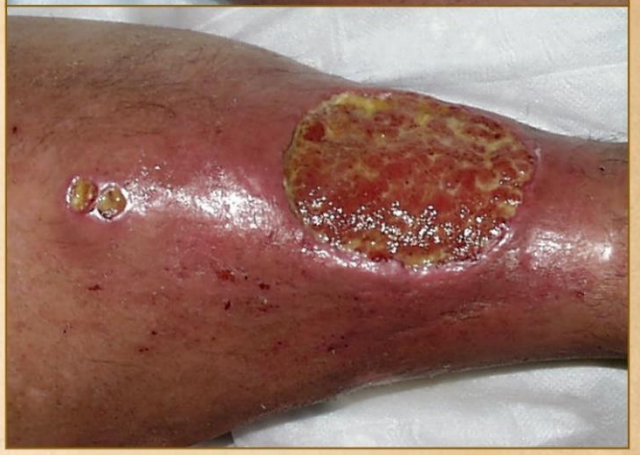
Pyoderma gangrenosum

Sjögren's, autoimmune panniculitis

Necrobiosis lipoidica

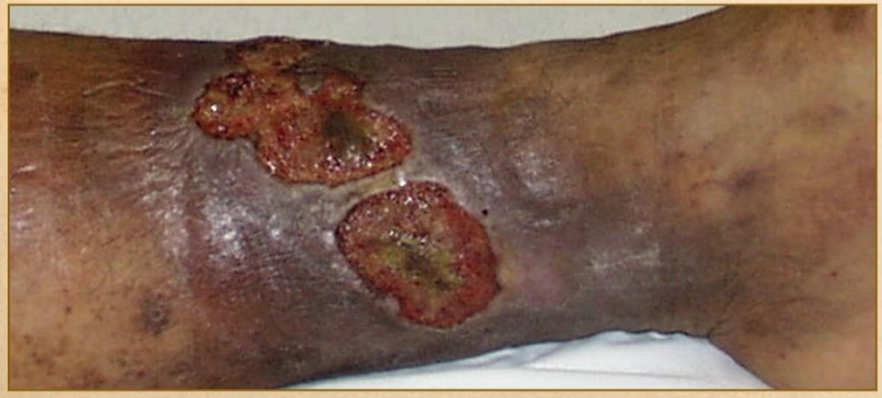
Remember the importance of comprehensive history and exam, looking for syndromic features typical of the various diseases.

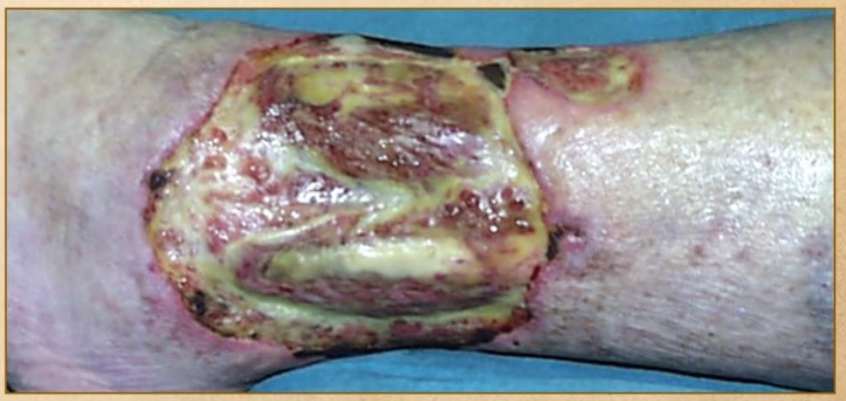




Venous stasis

Rheumatoid arthritis





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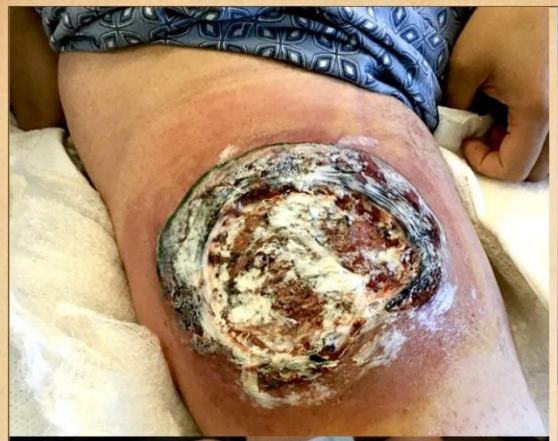

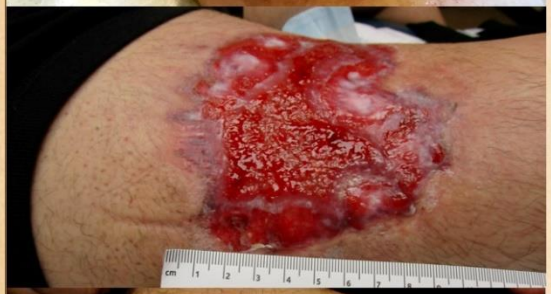

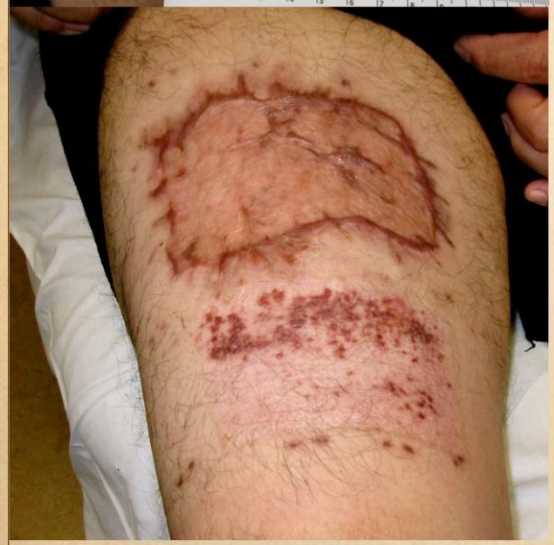

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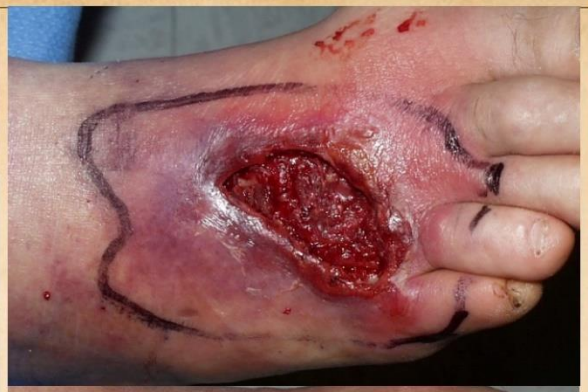

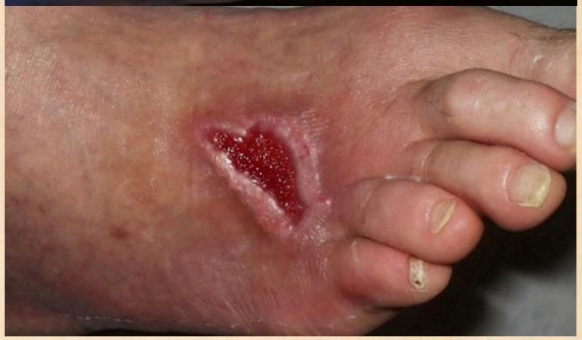

Simple injury wound and hematoma, poor care

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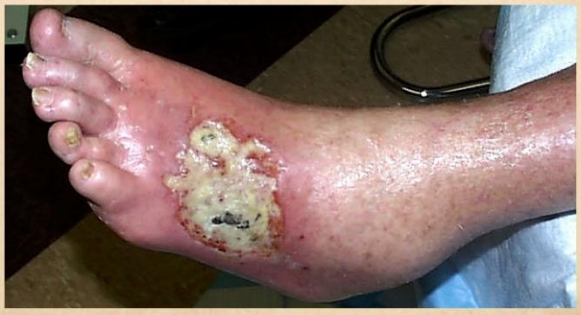
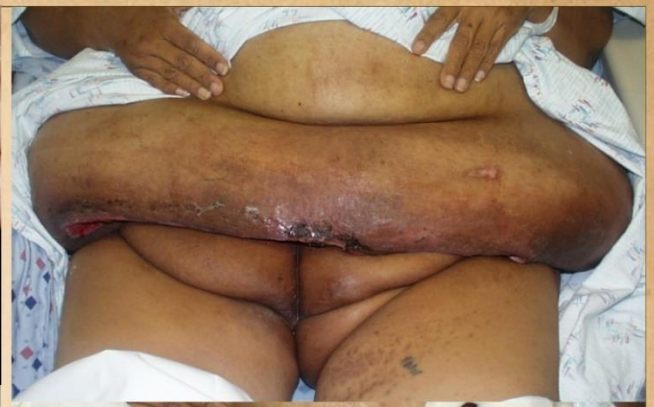
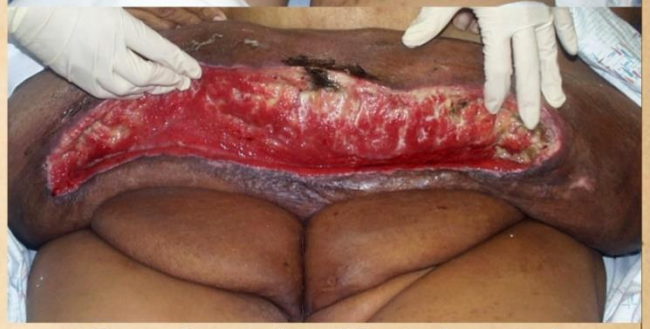
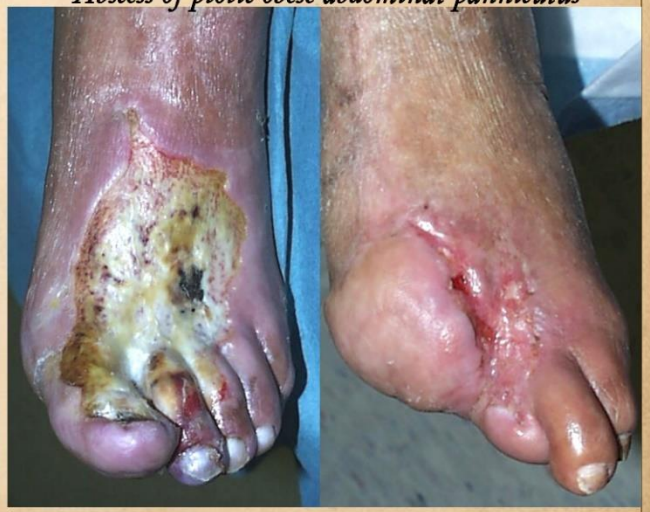


Staphylococcal "scalded skin"



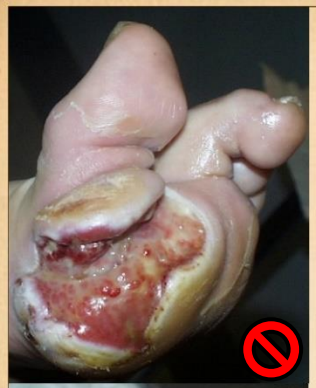


Abscess of ptotic obese abdominal panniculus



Burn injury - and - arterial aso-pvod

Examples – understand necrotizing fasciitis by appreciating what is not .



DM malperforans ulcer – without arteriopathy

Diabetic malperforans ulcer – with arteriopathy and ascending infection

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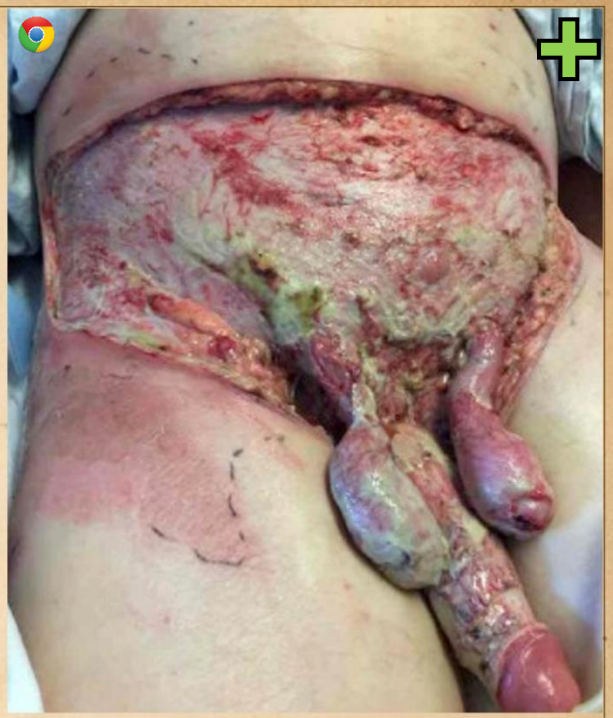
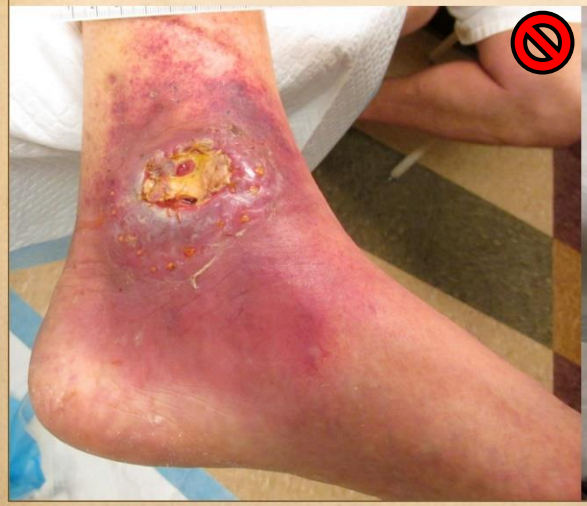
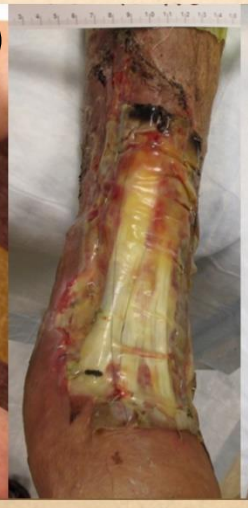
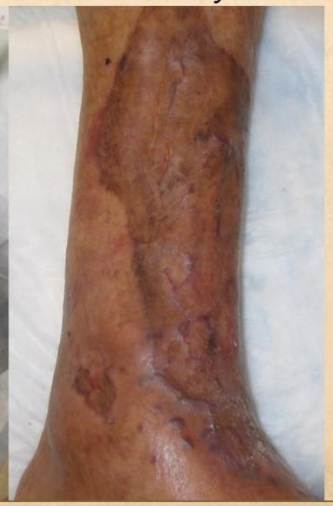


Fournier's gangrene

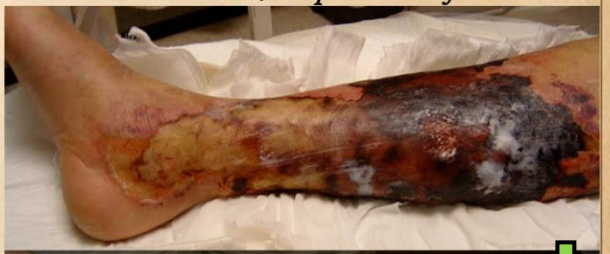
Minor trauma, streptococcal infection

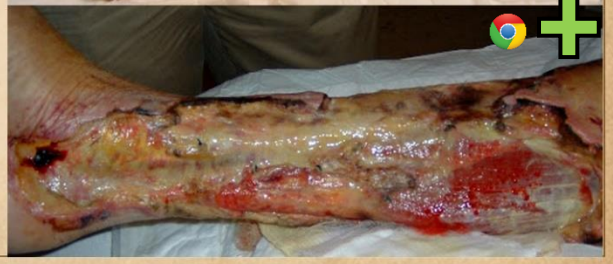






Diabetes, ordinary abscess and tenosynovitis





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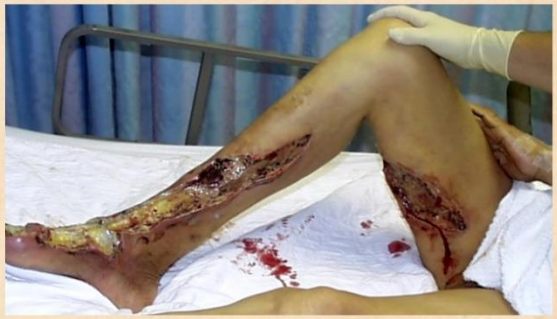

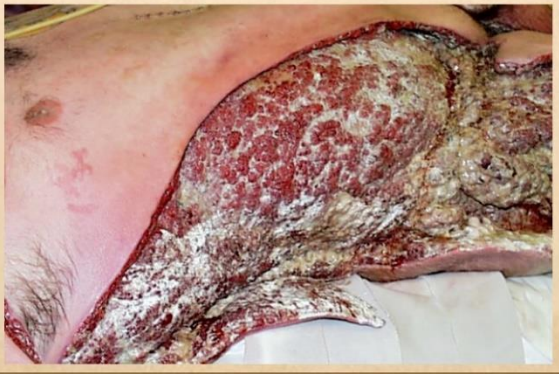

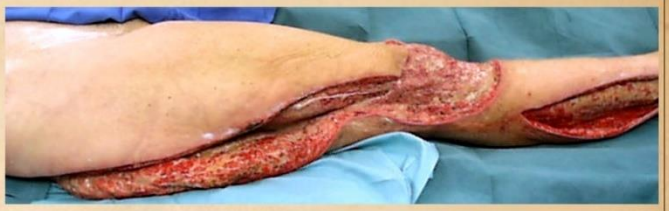

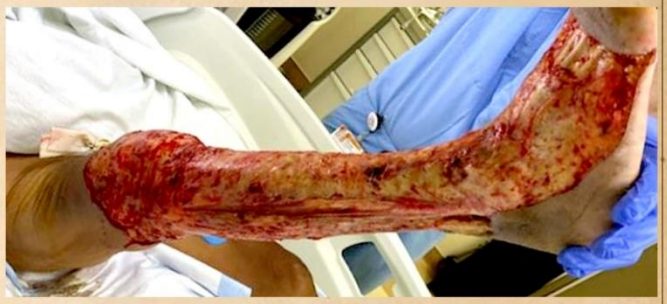

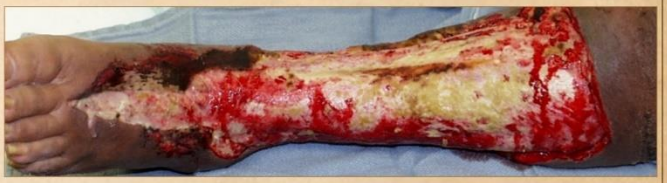

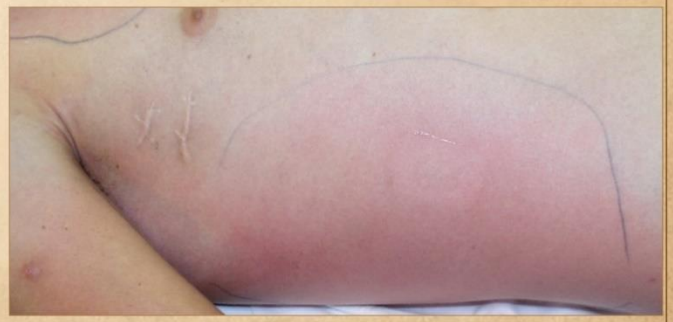

We are trying to save a life by accurately recognizing and treating necrotizing fasciitis.

NECROTIZING FASCIITIS

How to recognize the problem, and how to establish a positive diagnosis.

Thorough History

Chief complaint
Details of onset
Timeline
Specific symptoms
Risk factors and other disorders
Constitutional signs & symptoms
Comorbid acute illness
General "look & feel"

Proper Exam

Extremities
Skin and fascias
Muscles and compartments
Peripheral nerve and motor
Vascular
Internal viscera, especially pelvis
Turn and look
Stick your fingers in the relevant holes

Surgery (diagnostic)

Debride / Biopsy
Explore in OR

Necrotizing fasciitis

Direct focus of the complaint
Acute, sudden, unanticipated
Previously healthy
Known inciting event
Prodrome and evolution consistent

Random pattern or anatomical pathways
Rapid spreading
Skin infarcts
Pain
Fever
Acute onset intercurrent organ failure
Patient is sick and getting sicker

Any one or two of these features can be present with non-infectious and non-threatening acute conditions.

Not all are present with necrotizing fasciitis, but distinctive ones will be.

Diagnosis depends on recognizing an overall pattern in which 5 or 6 features are present.

NOT Necrotizing fasciitis

Incidental to chief complaint
Chronic or recurring problem
Chronicity implies comorbidities
No specific trigger
Disease pattern does not match

Focal or distribution of non-infections
Fixed location or extent
No infarcts or bland infarcts
Pain + / - , or same as usual
Afebrile
No or no new intercurrent morbidity
Unpleasant condition but not in jeopardy

Any one or two of the nec.-fasc. criteria can be present, but these "negative" criteria will predominate.

"How sick?" is relevant, not "how ugly?"
Judge problem objectively with an educated mind.

Dx depends on recognizing known disease patterns.
Even for bona fide infections, most are not necrotizing.

We are trying to save a life by not subjecting chronic and benign conditions to nec-fasc rx.

NECROTIZING FASCIITIS

The Dont's.

DO NOT . . .

. . . Fail to take a proper history.

. . . Fail to examine the whole patient.

There is no neon light that flashes "necrotizing fasciitis" – you must remember to think about it.

. . . But, do not over-diagnose based on just one or two matching symptoms – be objective and accurate.

. . . Forget that the real disease is serious, so no delays or lollygagging in your workup and consultations.

. . . Rely on test and x-rays which are mostly non-diagnostic or even misleading.

. . . Delay in ordering or implementing whatever tests or activities are needed – " time is tissue ".

. . . Allow consultants to delay or get complacent – emphasize the urgency of the diagnosis and care.

. . . Make snap - judgement misdiagnoses.

. . . Make over - diagnoses of benign conditions.

. . . Miss the diagnosis of real fasciitis.

NECROTIZING FASCIITIS

The Do's.

DO . . .

. . . Keep the chief complaint and history in plain sight.

. . . Be detailed and diligent in your history and exam.

. . . Look for the preponderance of features that add up to a positive diagnosis.

. . . Remember that time is crucial.

. . . Expedite diagnostic and preliminary care activities.

. . . Marshal the consultants.

. . . Notify OR and blood bank.

. . . Expedite getting patient to OR and definitve treatment underway.

. . . Understand the importance of correct diagnosis, whatever that might be.

. . . Understand the urgent nature of necrotizing fasciitis.

. . . Get the patient the real treatment that they need.

NECROTIZING FASCIITIS

SUMMARY

Over the past 20 years, social, economic, and professional stresses on medical practice have disrupted effective patterns of care.

For necrotizing fasciitis, we are seeing delays in treatment and poor outcomes as care defaults to non-surgeons lacking explicit education.

For nursing staff, it is vital to help expedite movement of the patient through the steps of correct diagnosis and expeditious treatment.

Diagnosis depends on recognizing a cluster of signs and symptoms that verify an acute inflammatory AND infectious panniculitis.

Treatment depends on rapid surgery – all else is incidental.
Insist on early surgical consultation in lieu of irrelevant tests.
Marshal necessary logistics, including Anesthesia, OR, Blood Bank.

Afterward, general care, wound care, reconstruction will be demanding.

Images with a Google badge have been borrowed from internet sources. All authors are patients and photos of Marc E. Gottlieb, MD.