



BLAST RELATED INJURIES



FMST 501



OVERVIEW

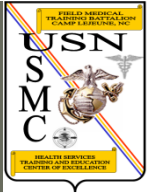


- Five Categories of Blast Effects
- Pattern of Injuries
- Wounding Effects of Fragmentation
- Wounding Effects of Overpressure



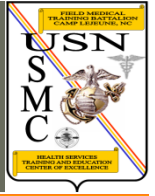
LEARNING OBJECTIVES

Please Read Your
Terminal Learning Objectives
And
Enabling Learning Objectives





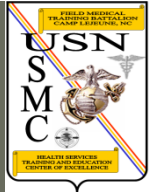
FIVE CATEGORIES OF BLAST EFFECTS



- Primary
- Secondary
- Tertiary
- Quaternary
- Quinary



FIVE CATEGORIES OF BLAST EFFECTS



- Primary
 - Impact = Pressure
 - MOI = Overpressure
 - Injuries = Hollow organs (Lungs and TM)



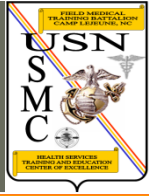
FIVE CATEGORIES OF BLAST EFFECTS

- Secondary
 - Impact = Projectiles
 - MOI = Debris from blast
 - Injuries = Penetrating trauma





FIVE CATEGORIES OF BLAST EFFECTS



- Tertiary
 - Impact = Body vs. hard surface
 - MOI = Structural collapse
 - Injuries = Blunt trauma, crush injuries





FIVE CATEGORIES OF BLAST EFFECTS



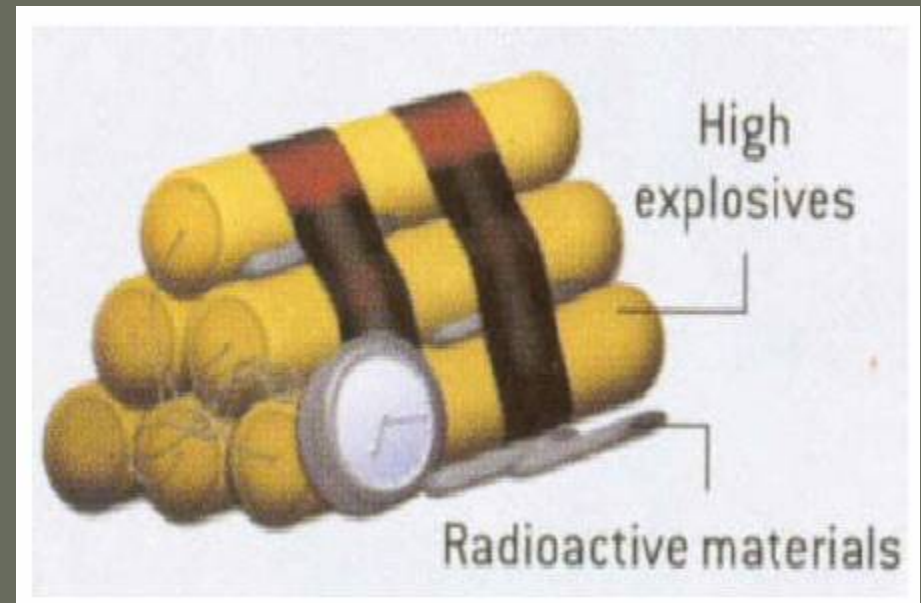
- Quaternary Impact

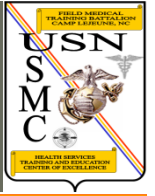
- Impact = Heat/flames
- MOI = Burns and toxic injuries
- Injuries = Burns, asphyxiation



FIVE CATEGORIES OF BLAST EFFECTS

- Quinary
 - Impact = Additives
i.e. radiation (dirty bomb)
 - MOI = Contamination
 - Injuries = Varies

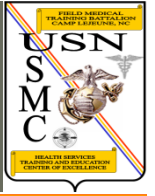




PATTERN OF INJURIES

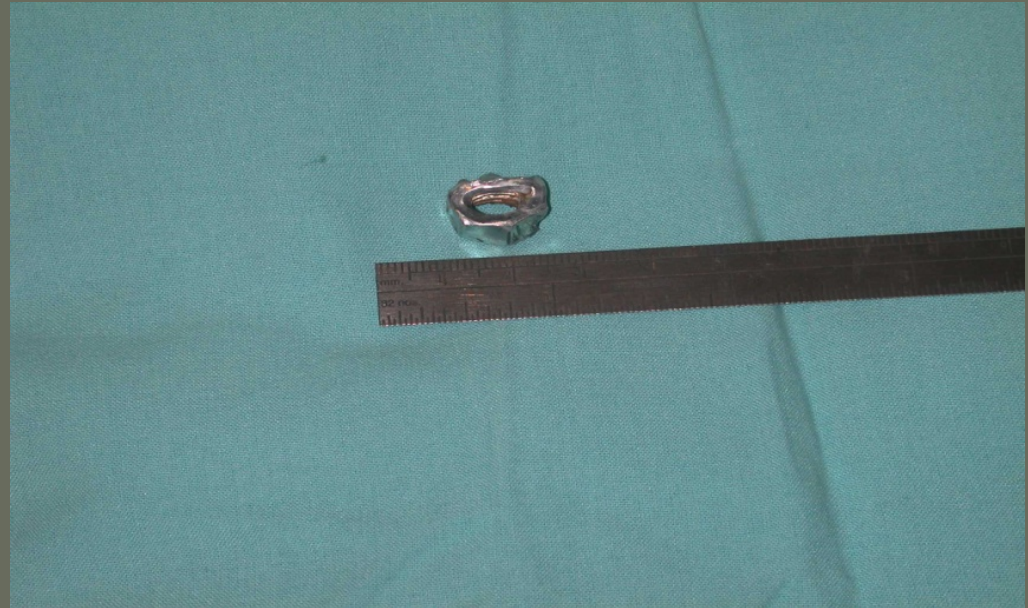
- Military
 - Young and healthy
 - Protective gear
- Civilian
 - Very young or old
 - Poor health
 - Little protective gear





EFFECTS OF FRAGMENTATION

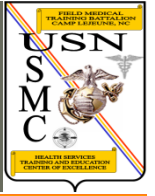
- Fragments from:
 - Bomb
 - Environment
 - Human Body



EFFECTS OF FRAGMENTATION

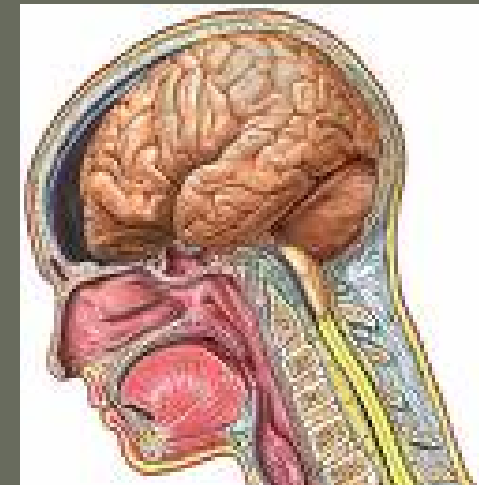
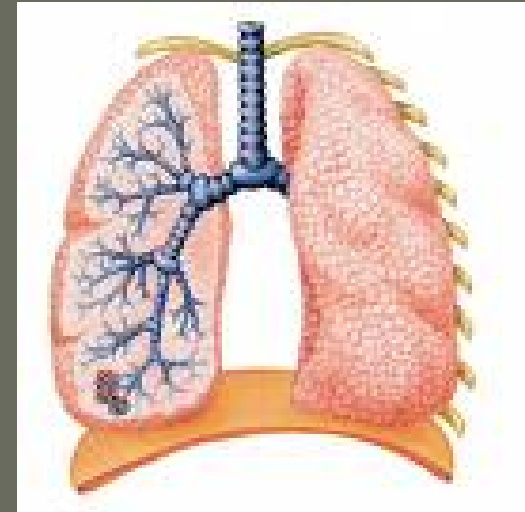
- Limbs
 - Most commonly affected
- Eyes
 - Susceptible to secondary and tertiary effects





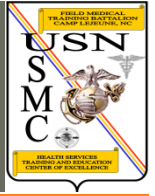
EFFECTS OF OVERPRESSURE

- Physics of Blast Waves
 - Stress Waves – Injures gas-filled organs (lungs, ears, intestines)
 - Sheer Waves – Cause tissue to move back and forth





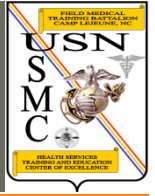
EFFECTS OF OVERPRESSURE



- Lung Injuries (injuries at 40 psi)
 - Most common cause of death associated with the primary blast effect
 - Signs and Symptoms
 - Onset may be immediate or delayed up to 48 hrs
 - Internal hemorrhage
 - Frothy, bloody secretions
 - Hypoxic



EFFECTS OF OVERPRESSURE



- Lung Injury Treatment
 - Difficult in a tactical setting
 - Monitor for dyspnea and frothy sputum
 - Provide oxygen as soon as it is available
 - Limit IV solutions
 - TACEVAC ASAP



EFFECTS OF OVERPRESSURE



- Ear Injuries (Injuries at 5-15 psi)
 - Absence of tympanic membrane rupture can help rule out other blast injuries
 - Signs and Symptoms
 - Loss of hearing
 - Bleeding from ears
 - Visualization of the ear drum



EFFECTS OF OVERPRESSURE

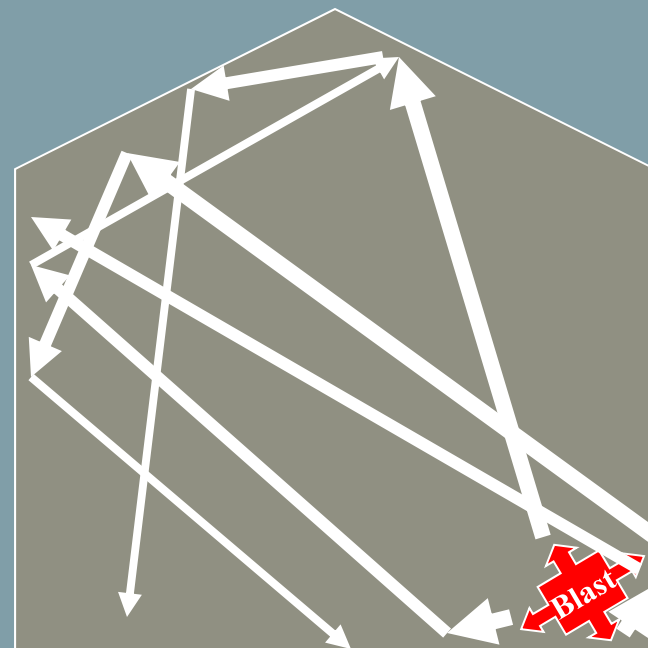


- Treatment of tympanic membrane rupture
 - Most will heal on their own
 - Avoid probing or irrigating
 - Refer to Medical Officer within 24 hrs

EFFECTS OF OVERPRESSURE

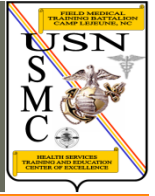
- Gastrointestinal
 - Higher probability with detonations inside a building
- Solid Organs
 - Very rare in open air blasts
 - Reported in underwater blasts

Indoor Blasts





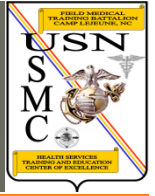
EFFECTS OF OVERPRESSURE



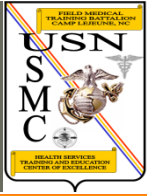
- CNS/Traumatic Brain Injury
 - Common with blast injuries
 - Mild TBI may go undiagnosed, therefore ALL PERSONNEL involved in a blast incident should be referred to a medical officer for documentation and evaluation



MULTIPLE ETIOLOGY INJURIES

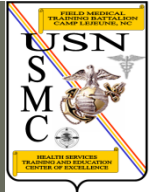


- Explosions create different injury patterns based on various factors.
- The patient may have multiple injuries
 - Performing a systematic casualty assessment will identify and allow you to treat life-threatening injuries first.





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