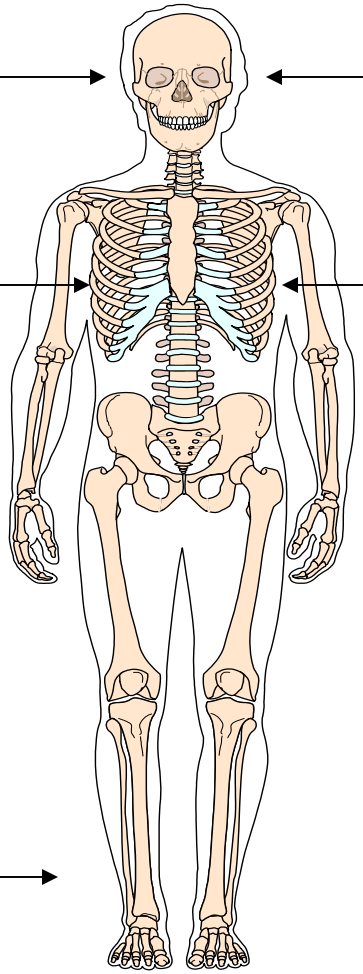
Injury Pattern
Abu Musab Al-Zarqawi

Primary Blast Injury
Ear

Primary Blast Injury
Ear

Primary Blast Injury
Lung

Primary Blast Injury
Lung

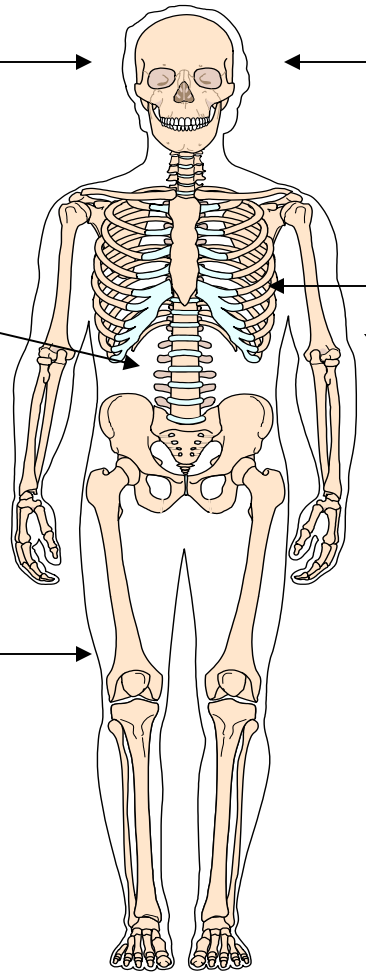


Multiple Bruises, Abrasions,
Lacerations of Head, Body
and Extremities

Fracture

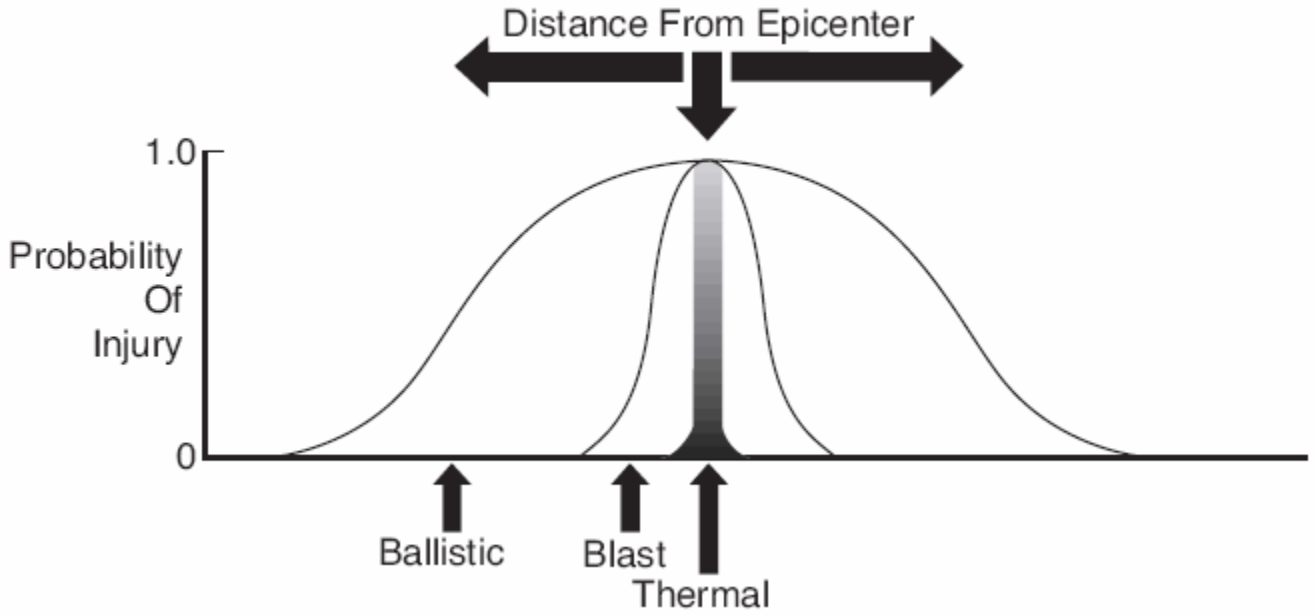
Cause of Death: Closed Space Primary Blast Injury

Injury Pattern
Sheik Abd Al Rahman



Cause of Death: Secondary and Tertiary Blast Injuries

Mechanisms of Injury
Explosive Munitions



The probably of sustaining a given injury is related to the distance from the epicenter of the detonation

Source: Emergency War Surgery Handbook, Third United States Revision Army Medical Department Center and School and the Borden Institute

Mechanisms of Blast Injury

- Primary : Unique to high explosives, results from the impact of the over-pressurization wave with body surfaces
- Secondary: Results from flying debris and bomb fragments
- Tertiary: Results from individuals being thrown by the blast wind
- Quaternary: All explosion-related injuries, illnesses, or diseases not due to primary, secondary, or tertiary mechanisms

Source: Explosions and Blast Injuries: A Primer for Clinicians
Centers for Disease Control and Prevention

Factors Affecting the Severity of Blast Injuries

- Peak Pressure, distance from the explosion
- Body position and orientation
- Effects of confinement
- Protection from the blast

Source: Medical Department United States Army in World War II; Wound Ballistics Office of the Surgeon General

Peak Pressures at Varying Distances from Point of Detonation

General-Purpose Bomb	Pressure at		
Pounds	30 feet	60 feet	90 feet
100	17	4	---
500	80	6	3
1,000	200	20	7
2,000	400	50	13
4,000	1,000	170	40

Effects of Peak Pressure

- 15 pounds per square inch eardrums ruptured
- 60-100 pounds per square inch 50% seriously injured
- 500 pounds per square inch 50% killed

Source: Medical Department United States Army in World War II; Wound Ballistics Office of the Surgeon General