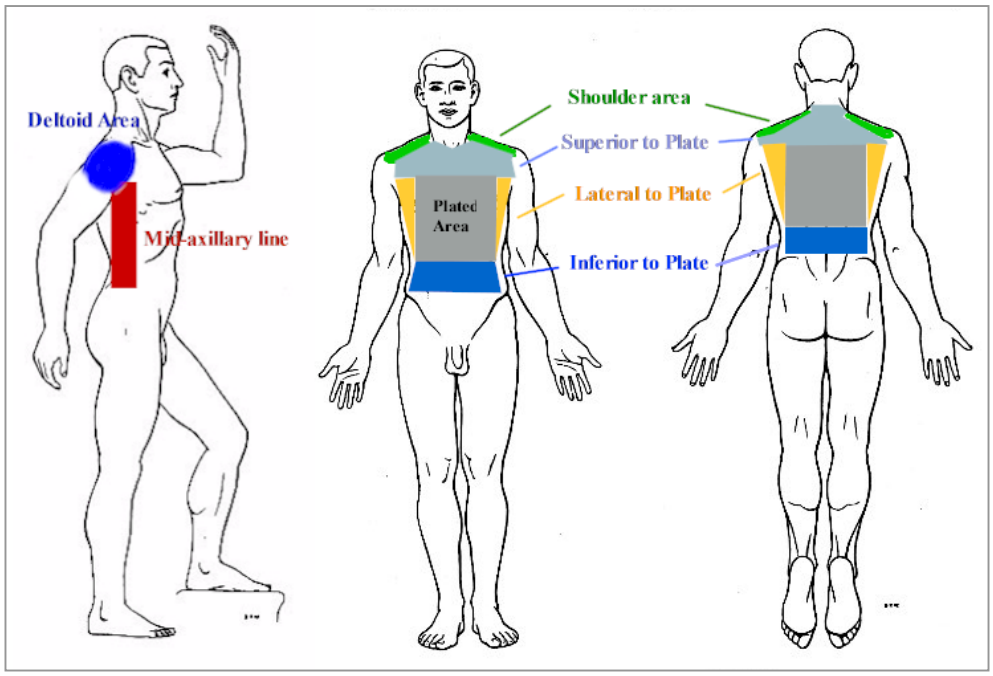
Marine Lethal Torso Injuries: Preliminary Findings

Between March 19, 2003 and December 31, 2004, 315 Marines died from combat injuries during Operation Iraqi Freedom. Nearly 24% (74) died from a primary lethal injury of the torso (Figure 1). Another 54 individuals had multiple lethal injuries with at least one lethal injury of the torso.

Figure 1: Marine OIF Combat Deaths by Injury Site Group from 3/19/2003-12/31/2004

Lethal Injury Site	Total	Percent
Head/Neck	120	38.1%
Multiple	106	33.7%
Torso	74	23.5%
Extremities	10	3.2%
N/A	5	1.6%
Total	315	100%

This summary presents our preliminary findings on the number and distribution of primary lethal injuries of the torso among Marines. For this initial review, we examined 67 OIF Marine casualties with lethal torso injuries for whom we had complete autopsy reports and photographic records. After reviewing each autopsy report and the associated photographs, the entry site for each penetrating injury was assigned to one of the injury entry groupings shown below:



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14. ABSTRACT

Between March 19, 2003 and December 31, 2004, 315 Marines died from combat injuries during Operation Iraqi Freedom. Nearly 24% (74) died from a primary lethal injury of the torso. Another 54 individuals had multiple lethal injuries with at least one lethal injury of the torso. This summary presents our preliminary findings on the number and distribution of primary lethal injuries of the torso among Marines.

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We identified a total of 73 lethal torso injuries in the 67 casualties we reviewed. Figure 2 shows the distribution of the injuries for the categories listed above. We identified 8 deltoid injuries, 2 shoulder injuries, 12 injuries in the mid-axillary area, and 24 injuries outside the plated area. Fourteen of the 24 injuries outside the plated area were very close to the plate edge. Five injuries appeared to have occurred in areas that would routinely be covered by the plate. It is unknown in these cases if armor was worn at the time of injury. Finally, 22 individuals had injuries that were so broad or severe that they could not be categorized using our existing categories. Armor redesign would have a negligible impact on these casualties. The distribution of anterior versus posterior entry injuries was almost evenly distributed with 35 posterior and 37 anterior injuries. One individual had lethal anterior and posterior torso injuries.

Figure 2: Lethal Torso Injuries By Entry Site

Lethal Wounds by Site	Total	%
Deltoid Area	8	11.0%
Shoulder Area	2	2.7%
Mid-axillary line	12	16.4%
Superior to plate (3 at upper edge)	9	12.3%
Lateral to plate (9 near side plate edge)	11	15.1%
Inferior to plate (2 near bottom plate edge)	4	5.5%
In plated area	5	6.8%
Extensive injury	22	30.1%
Total wounds	73	100%

Figure 3 summarizes the wounds that might be impacted by a change in armor design.

Figure 3: Injuries Potentially Impacted By Armor Redesign

Lethal Wounds by Site	Total	%*
Deltoid & Shoulder	10	13.7%
Mid-axillary line	12	16.4%
Outside of plated area (14 Close to edge)	24	32.9%
Total wounds	46	63.0%

*Percent is the percent of lethal torso injuries.

Ten wounds might have been prevented or less extensive if deltoid or shoulder protection had been available. Twelve injuries might have been prevented or minimized by protection around the mid-axillary line. Finally, the areas around the plate (generally above and to the side) accounted for nearly 33% of the lethal wounds we examined. Fourteen of these were in close proximity to the plate edges. Either a larger plate or superior protection around the plate would have had the potential to alter the fatal outcome.

It is important to note that this study does not take the type of weapon or explosive into account. The ammunition and explosive fragments are frequently not recovered during autopsy. Moreover, the Marines do not provide enough information about the circumstances surrounding the casualty to infer the mechanism of injury. Investigating the mechanism will be important for determining what type of armor will prevent or minimize these types of injuries.

Our preliminary research suggests that as many as 49% of the Marine casualties who died from isolated torso injuries could have been prevented with improved protection in the non-plated areas of the vest. Another 13% died from impacts through the unprotected shoulder and upper arm. Further short-term research will include the torso injuries that occurred in the context of multiple lethal injuries, distribution of penetration site in head and neck injuries and a review of deaths occurring after isolated injury of an extremity.