

# Brass Fetcher Ballistic Testing

Exterior Ballistics • Terminal Ballistics

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**.380ACP JHP performance through Bone Simulant plates  
With Ballistic Gelatin backing**

**06 October 2011**

## Abstract

Five different brands of premium Defensive and Law Enforcement hollowpoints were evaluated in .380ACP. Tested ammunition was Winchester 95gr Ranger-T, Remington 102gr Golden Saber, RBCD 45gr TF/SP, Federal 90gr Hydra-Shok and Double Tap 90gr Gold Dot.

The ammunition was fired from a Sig Sauer P238 handgun, through a bone simulant plate backed by 10% ballistic gelatin blocks. Of the five brands tested, **four of the five ammunition types failed to expand** in the bone plate/gelatin target. The RBCD projectile functioned similarly through the bone plate as it does in bare and heavily clothed ballistic gelatin.

## Introduction

Ballistic gelatin is an industry-standard medium used for evaluating the terminal performance of hunting and self-defense ammunition. Gelatin blocks offer many advantages in this role – it is a highly viscous liquid, offering a density close to that of human body fluids and the low-velocity characteristics of muscle tissue. It is a highly consistent material, which makes it very useful for making accurate measurements of damage done to the gelatin by a bullet penetrating *soft tissue only*.

The critical areas of the body are generally protected in some manner by the presence of bone immediately behind the skin. The large percentage of the vital areas of the chest that are protected by the rib cage and sternum make it desirable to simulate bone and then the soft tissue behind the bone. A priority of this report was in choosing a caliber and ammunition that was relevant to both civilian law enforcement and civilian gun owners. We evaluated several popular .380ACP JHPs from a common CCW firearm – a SIG P238 with 2.75” barrel length.

Bone simulation was effected by placing a bone simulant plate, produced by Synbone AG of Switzerland, in front of blocks of 10% ballistic gelatin (Figure 1.) Tested plates were 6mm ( ¼” ) thick and covered by a rubberized ‘skin’ layer. Product number of these plates is PR0114.G. Density for the tested samples came out to be 809 kg/m<sup>3</sup> and the failure mode for these was ‘brittle’ failure, similar to bone.

Five different brands of premium Law Enforcement and Defensive hollowpoints were evaluated in .380ACP. Tested ammunition was Winchester 95gr Ranger-T, Remington 102gr Golden Saber, RBCD 45gr TF/SP, Federal 90gr Hydra-Shok and Double Tap 90gr Gold Dot.

**Figure 1.** Bone simulant plate and ballistic gelatin block



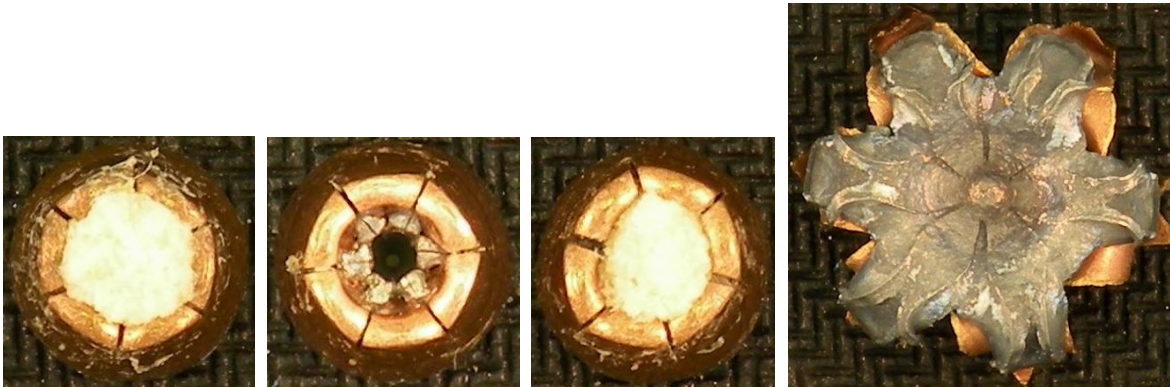
**Figure 2.** Bone simulant plate



## Results

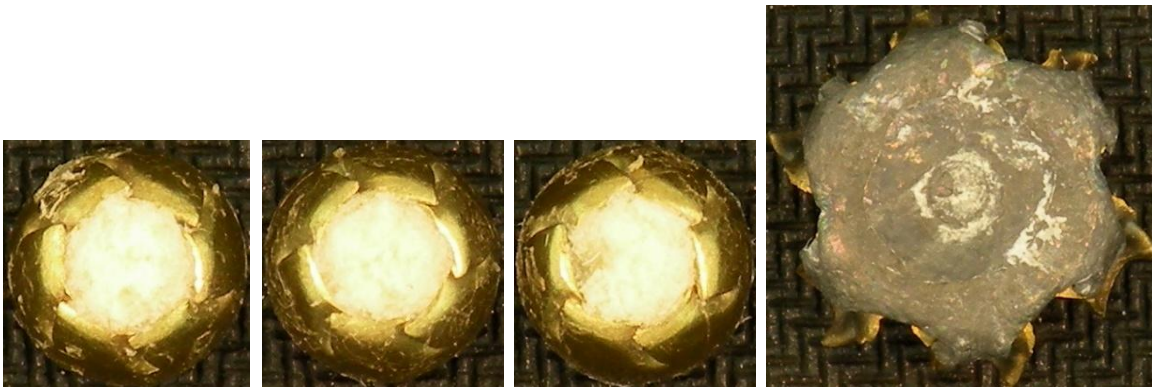
### ***Winchester 95gr Ranger-T***

**Figure 3-6.** Winchester 95gr Ranger-T recovered bullet (Shots 1-3 through bone; Shot 4 bare gelatin)



### ***Remington 102gr Golden Saber***

**Figure 7-10.** Remington 102gr Golden Saber recovered bullet (Shots 1-3 through bone; Shot 4 bare gelatin)



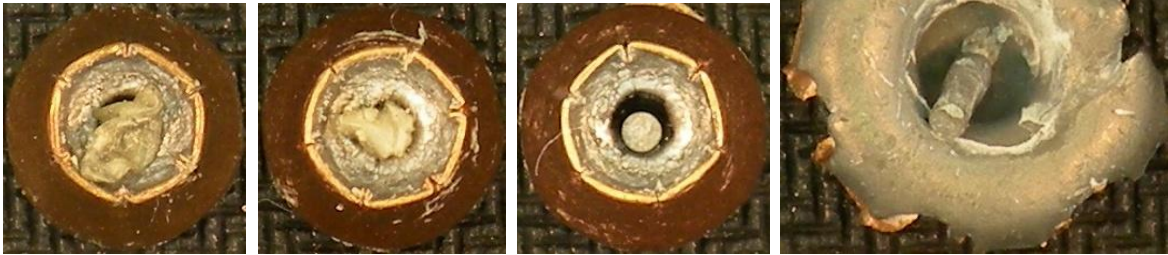
### ***RBCD 45gr TF/SP***

**Figure 11-14.** RBCD 45gr TF/SP recovered bullet (Shots 1-3 through bone; Shot 4 bare gelatin)



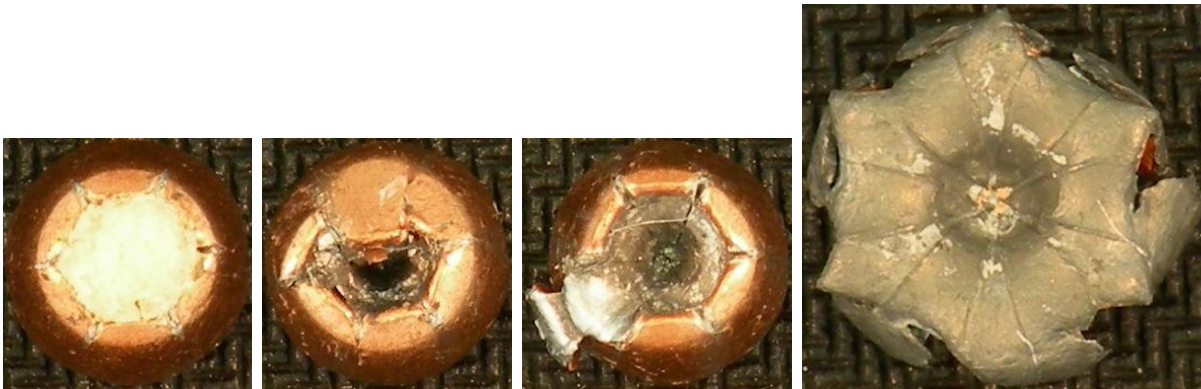
***Federal 90gr Hydra-Shok***

**Figure 15-18.** Federal 90gr Hydra-Shok recovered bullet (Shots 1-3 through bone; Shot 4 bare gelatin)



***Double Tap 90gr Gold Dot***

**Figure 19-22.** Double Tap 90gr Gold Dot recovered bullet (Shots 1-3 through bone; Shot 4 bare gelatin)





## ***Relevance to the Tactical Situation***

**Figure 23.** Adult Male rib cage with circulatory system visible (0 degree obliquity)

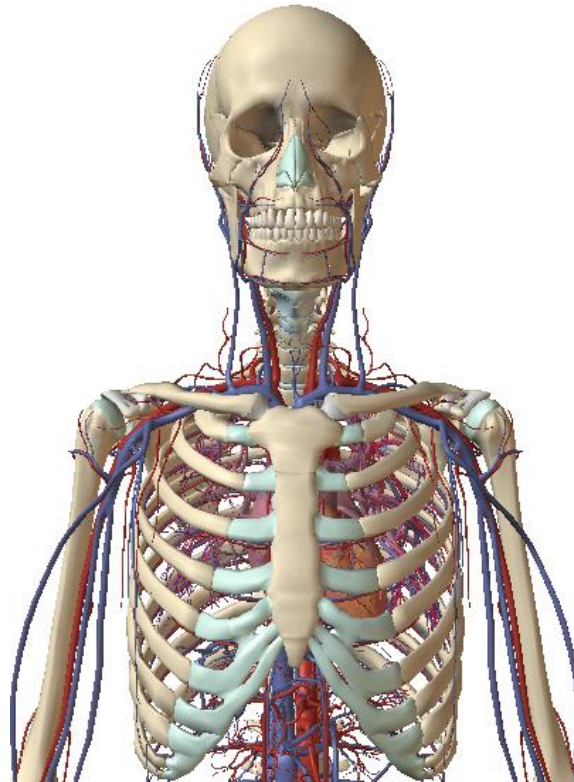


Figure 23 shows a 'head-on' view of the human weapon system. Note the size of heart relative to the rib cage and sternum.

**Figure 24.** Adult Male rib cage with circulatory system visible (30 degree obliquity)

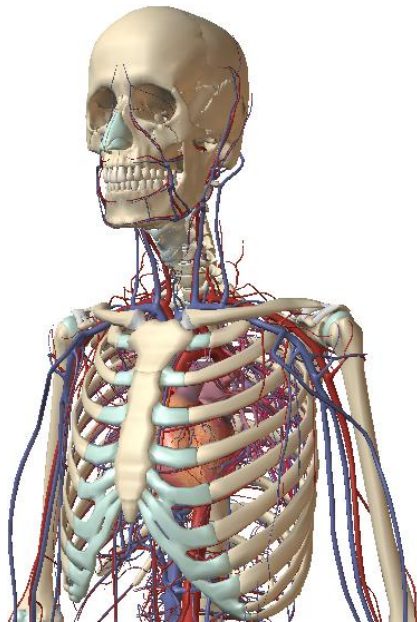
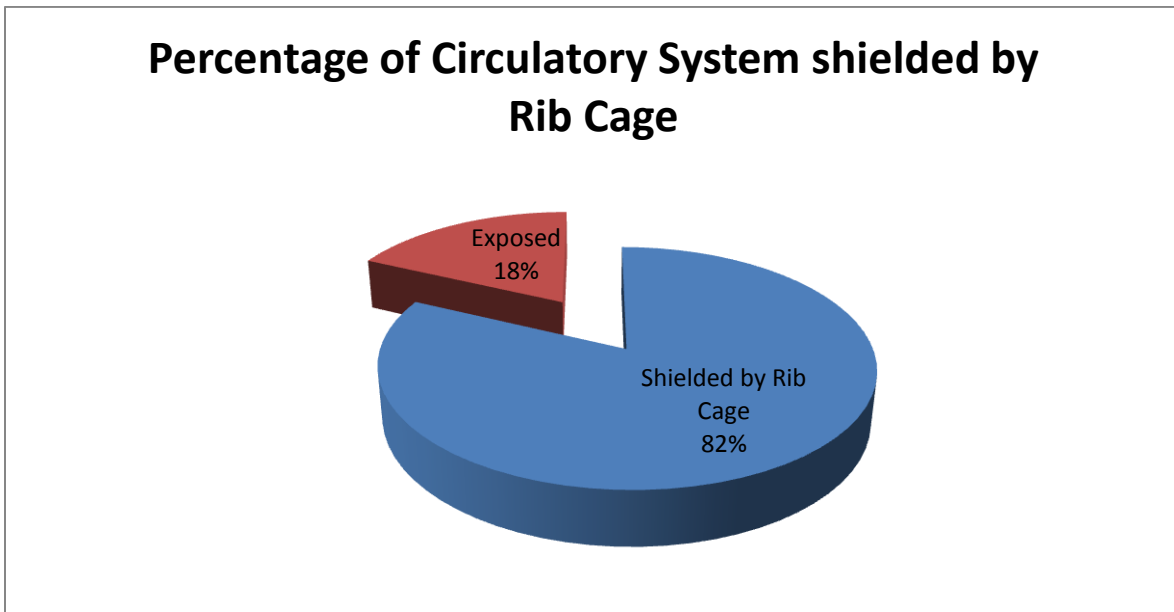
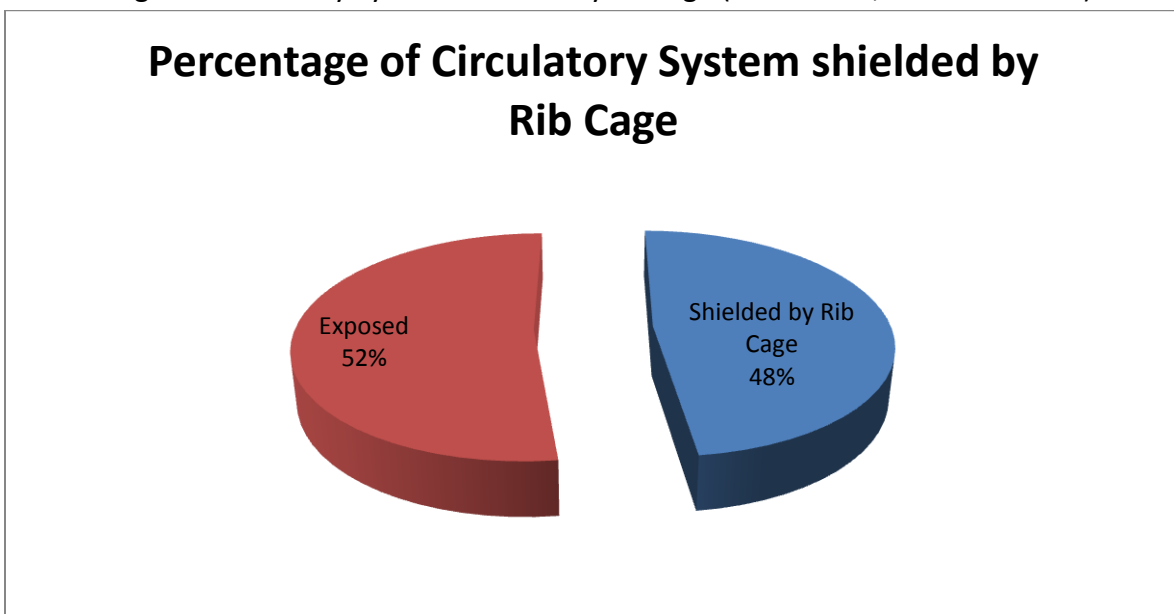


Figure 24 shows the adversary turned at a 30 degree angle to represent the Weaver shooting stance.

**Figure 25.** Percentage of Circulatory System shielded by rib cage (Adult Male, 0 degree obliquity)



**Figure 26.** Percentage of Circulatory System shielded by rib cage (Adult Male, Weaver stance)



We see that there is a good chance that a shot to the upper chest will encounter some bone prior to impacting with soft tissue. Given the 48% odds of engaging an attacker through bone if they have taken a fighting stance prior to the shot, it greatly benefits a shooter of jacketed hollowpoints if the JHP expands after contact with a bone.

**Table 1.**

Cartridge	Impact Velocity (ft/sec)	Surface Area (in <sup>2</sup> )	Penetration Depth in 10% gelatin (inch)
Winchester 95gr Ranger-T	897	0.099	20.0 +
Winchester 95gr Ranger-T	885	0.099	20.0 +
Winchester 95gr Ranger-T	885	0.099	20.0 +
Winchester 95gr Ranger-T (Bare Gelatin)	844	0.271	10.0
Remington 102gr Golden Saber	911	0.099	20.0 +
Remington 102gr Golden Saber	879	0.099	20.0 +
Remington 102gr Golden Saber	901	0.099	20.0 +
Remington 102gr Golden Saber (Bare Gelatin)	896	0.240	9.7
RBCD 45gr TF/SP	1525	0.100	10.8
RBCD 45gr TF/SP	1572	0.100	10.8
RBCD 45gr TF/SP	1598	0.100	10.8
RBCD 45gr TF/SP (Bare Gelatin)	1576	0.100	9.0
Federal 90gr Hydra-Shok	928	0.099	20.0 +
Federal 90gr Hydra-Shok	882	0.099	20.0 +
Federal 90gr Hydra-Shok	929	0.099	20.0 +
Federal 90gr Hydra-Shok (Bare Gelatin)	911	0.171	11.0
Double Tap 90gr Gold Dot	1016	0.099	20.0 +
Double Tap 90gr Gold Dot	1015	0.099	20.0 +
Double Tap 90gr Gold Dot	981	0.099	20.0 +
Double Tap 90gr Gold Dot (Bare Gelatin)	997	0.187	9.4



## **Summary**

Of the five cartridge types tested, only the RBCD projectile performed similarly after impacting the bone simulant and ballistic gelatin as compared to its nominal behavior in bare ballistic gelatin. The wounding mechanism of a jacketed hollowpoint is the crushing of tissue through bullet expansion. Failing this, the lethality of a JHP is oftentimes lower than a full metal jacket which wounds through tumbling. FMJ bullet shapes lend themselves more readily to tumbling than a JHP that failed to expand – though many of the unexpanded JHPs did tumble, it was far too deep into the track to have influenced the lethality of the bullet to any extent.

Generally speaking, the expansion of the four conventional bullets tested was unreliable and inadequate after impact with the bone simulant plate and gelatin while the wounding efficiency of the RBCD is questionable due to its expanded surface area being very similar to that of a 380ACP FMJ.