

Brass Fetcher Ballistic Testing

Exterior Ballistics • Terminal Ballistics

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**.38 Special JHP performance through Bone Simulant plates
With Ballistic Gelatin backing**

22 September 2011

Abstract

Six different brands of premium Defensive hollowpoints were evaluated in .38 Special. Tested ammunition was Winchester 130gr +P SXT, Speer 135gr Short Barrel Gold Dot, Hornady 110gr FTX, Federal 129gr +P Hydra-Shok, Cor-Bon 110gr DPX and Buffalo Bore 158gr LHP.

The ammunition was fired from a Smith and Wesson 642 handgun, through a bone simulant plate backed by 10% ballistic gelatin blocks. Of the six brands tested, **all six of the ammunition types failed to expand** in the bone plate/gelatin target. The only hollowpoints that featured partial expansion was the Cor-Bon 110gr DPX, where on 2/3 of the shots segments of the cavity peeled backwards and the Hornady 110gr FTX where 1/3 bullets partially expanded.

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 .38 Special JHPs from a common CCW firearm – a Smith and Wesson 642 with 1 7/8" 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 816 kg/m³ and the failure mode for these was 'brittle' failure, similar to bone.

Six different brands of premium Defensive hollowpoints were evaluated in .38 Special. Tested ammunition was Winchester 130gr +P SXT, Speer 135gr Short Barrel Gold Dot, Hornady 110gr FTX, Federal 129gr +P Hydra-Shok, Cor-Bon 110gr DPX and Buffalo Bore 158gr LHP.

Figure 1. Bone simulant plate and ballistic gelatin block



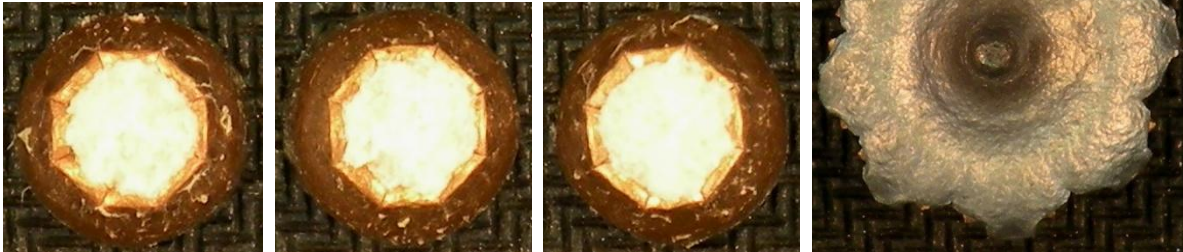
Figure 2. Bone simulant plate



Results

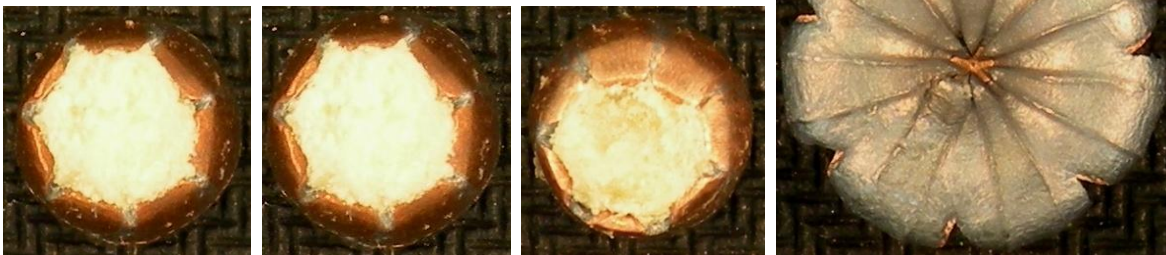
Winchester 130gr +P SXT

Figure 3-6. Winchester 130gr +P SXT recovered bullet (Shots 1-3 through bone; Shot 4 bare gelatin)



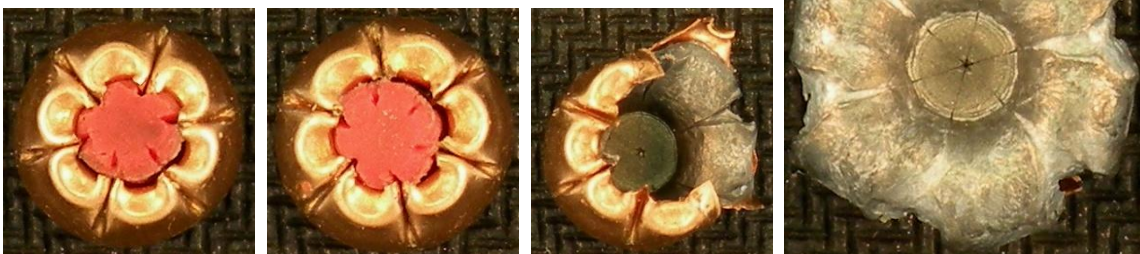
Speer 135gr Short Barrel Gold Dot

Figure 7-10. Speer 135gr Short Barrel Gold Dot recovered bullet (Shots 1-3 through bone; Shot 4 bare gelatin)



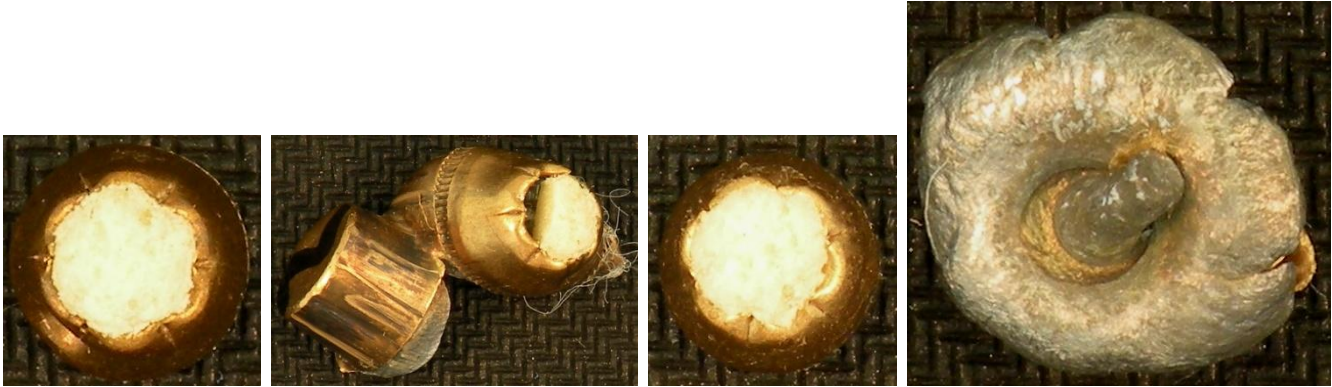
Hornady 110gr FTX

Figure 11-14. Hornady 110gr FTX recovered bullet (Shots 1-3 through bone; Shot 4 bare gelatin)



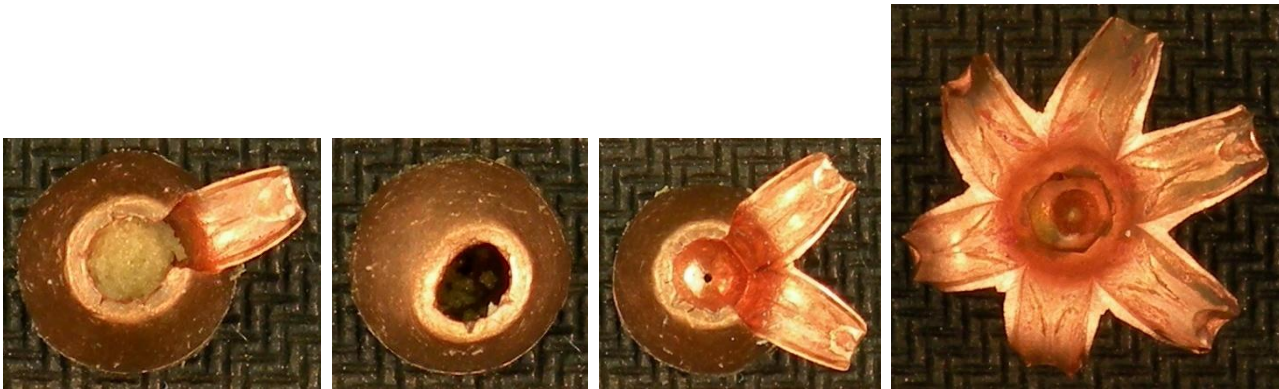
Federal 129gr +P Hydra-Shok

Figure 15-18. Federal 129gr +P Hydra-Shok recovered bullet (Shots 1-3 through bone; Shot 4 bare gelatin)



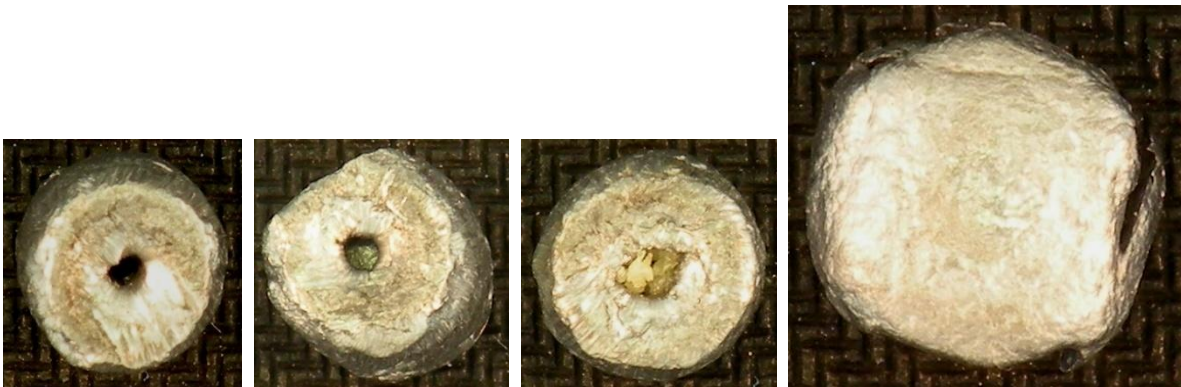
Cor-Bon 110gr DPX

Figure 19-22. Cor-Bon 110gr DPX recovered bullet (Shots 1-3 through bone; Shot 4 bare gelatin)



Buffalo Bore 158gr LHP

Figure 23-26. Buffalo Bore 158gr LHP recovered bullet (Shots 1-3 through bone; Shot 4 bare gelatin)



Relevance to the Tactical Situation

Figure 21. Adult Male rib cage with circulatory system visible (0 degree obliquity)

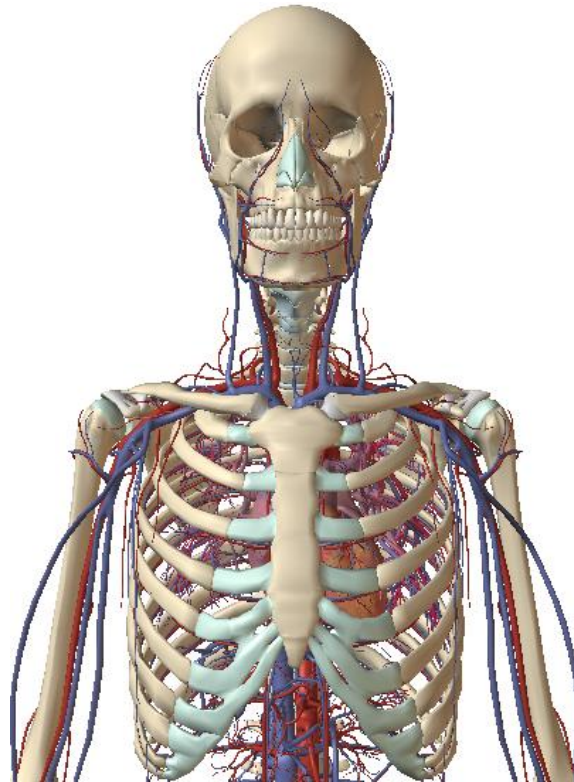


Figure 21 shows a 'head-on' view of the human weapon system. Note the size of heart relative to the rib cage and sternum.

Figure 22. Adult Male rib cage with circulatory system visible (30 degree obliquity)

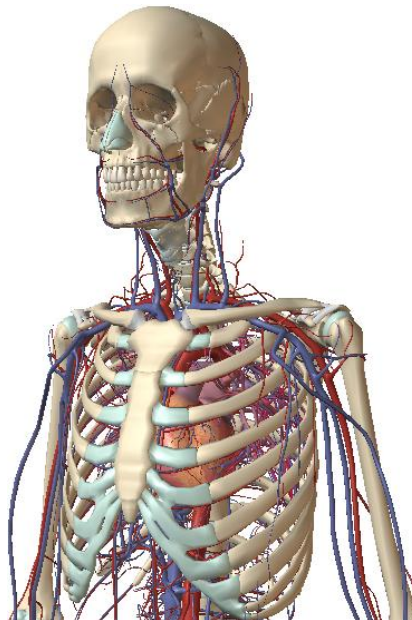


Figure 22 shows the adversary turned at a 30 degree angle to represent the Weaver shooting stance.

Figure 23. Percentage of Circulatory System shielded by rib cage (Adult Male, 0 degree obliquity)

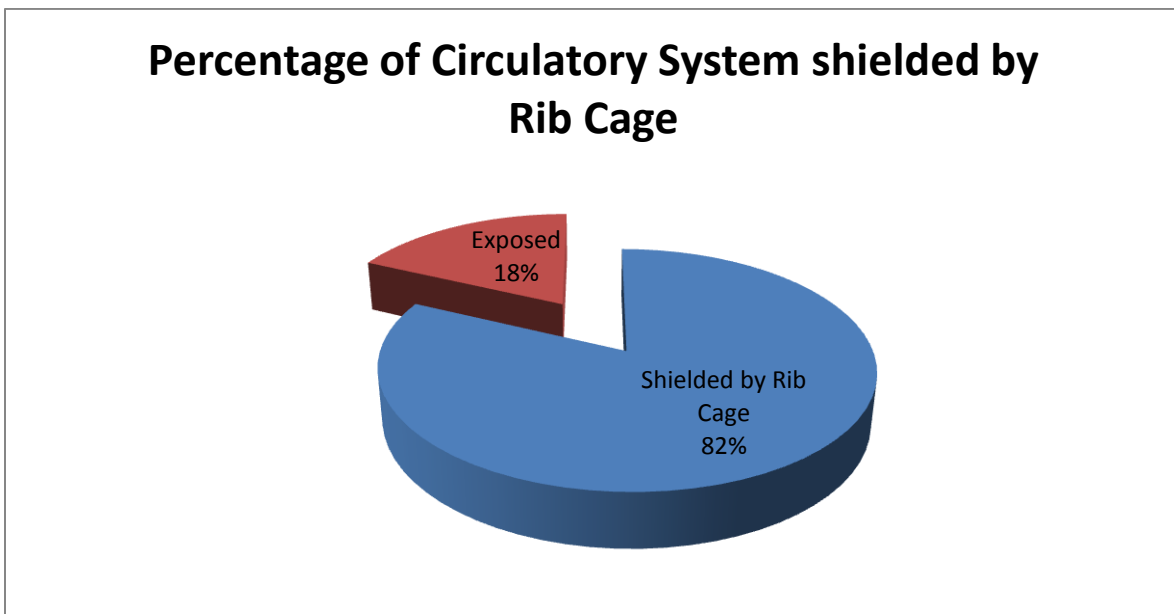
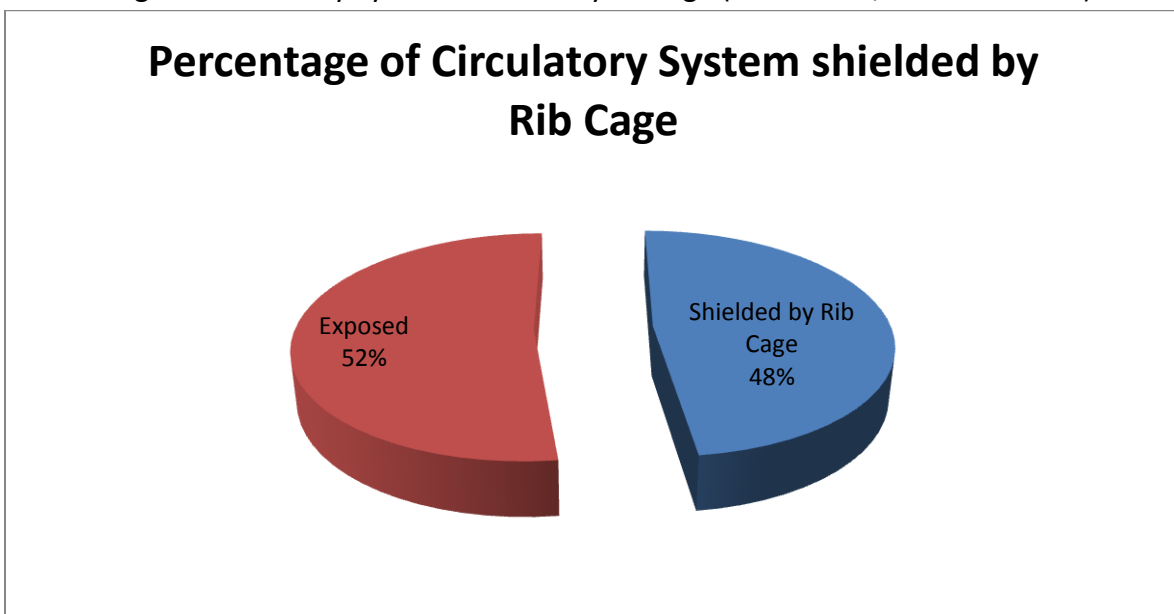


Figure 24. Percentage of Circulatory System shielded by rib cage (Adult Male, Weaver stance)



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 ²)	Penetration Depth in 10% gelatin (inch)
Winchester 130gr +P SXT	831	0.096	20.0 +
Winchester 130gr +P SXT	878	0.096	20.0 +
Winchester 130gr +P SXT	842	0.096	20.0 +
Winchester 130gr +P SXT (bare gel)	852	0.233	10.4
Speer 135gr Short Barrel Gold Dot	909	0.098	20.0 +
Speer 135gr Short Barrel Gold Dot	883	0.098	20.0 +
Speer 135gr Short Barrel Gold Dot	883	0.098	20.0 +
Speer 135gr Short Barrel Gold Dot (bare gel)	896	0.220	9.8
Hornady 110gr FTX	912	0.097	20.0 +
Hornady 110gr FTX	889	0.097	20.0 +
Hornady 110gr FTX	903	0.120	20.0 +
Hornady 110gr FTX (bare gel)	917	0.191	9.5
Federal 129gr +P Hydra-Shok	882	0.098	20.0 +
Federal 129gr +P Hydra-Shok	900	0.098	20.0 +
Federal 129gr +P Hydra-Shok	905	0.098	20.0 +
Federal 129gr +P Hydra-Shok (bare gel)	907	0.255	8.3
Cor-Bon 110gr DPX	1000	0.125	18.8
Cor-Bon 110gr DPX	1008	0.099	20.0 +
Cor-Bon 110gr DPX	1020	0.162	17.3
Cor-Bon 110gr DPX (bare gel)	1055	0.215	12.6
Buffalo Bore 158gr LHP	923	0.097	20.0 +
Buffalo Bore 158gr LHP	877	0.110	20.0 +
Buffalo Bore 158gr LHP	901	0.093	20.0 +
Buffalo Bore 158gr LHP (bare gel)	890	0.183	14.7

Summary

Of the six cartridge types tested, only the Cor-Bon 110gr DPX and Hornady 110gr FTX expanded partially after impacting the bone simulant and 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 all six bullets tested was unreliable and inadequate after impact with the bone simulant plate and gelatin. It is notable that the cavity depth of the conventional hollowpoints appears to play a role in the initiation of the expansion and that the impact velocity would exaggerate the effects of partial expansion. The Cor-Bon DPX featured the deepest cavity (before any taper is encountered) of the tested ammunition and was thus the most likely to expand after impact with the bone plate.