

Brass Fetcher Ballistic Testing

Exterior Ballistics • Terminal Ballistics

www.BrassFetcher.com

**.45ACP JHP performance through Bone Simulant plates
With Ballistic Gelatin backing**

03 November 2011

Abstract

Six different brands of premium Defensive and Law Enforcement hollowpoints were evaluated in .45ACP. Tested ammunition was Cor-Bon 185gr +P DPX, Cor-Bon 165gr +P Pow'R Ball, Federal 165gr Expanding Full Metal Jacket, PMC 230gr Starfire, Speer 200gr +P Gold Dot and Winchester 230gr SXT.

The ammunition was fired from a Glock 36 handgun, through a bone simulant plate backed by 10% ballistic gelatin blocks. Of the six brands tested, **four of the six ammunition types failed to expand** in the bone plate/gelatin target. The Cor-Bon 185gr DPX and Federal 165gr EFMJ projectiles performed effectively, by functioning similarly through the bone plate as they did in bare 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 .45ACP JHPs from a common CCW firearm – a Glock 36 with 3.8” 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 815 kg/m³ and the failure mode for these was ‘brittle’ failure, similar to bone.

Six different brands of premium Law Enforcement and Defensive hollowpoints were evaluated in .45ACP. Tested ammunition was Cor-Bon 185gr +P DPX, Cor-Bon 165gr +P Pow’R Ball, Federal 165gr Expanding Full Metal Jacket, PMC 230gr Starfire, Speer 200gr +P Gold Dot and Winchester 230gr SXT.

Figure 1. Bone simulant plate and ballistic gelatin block

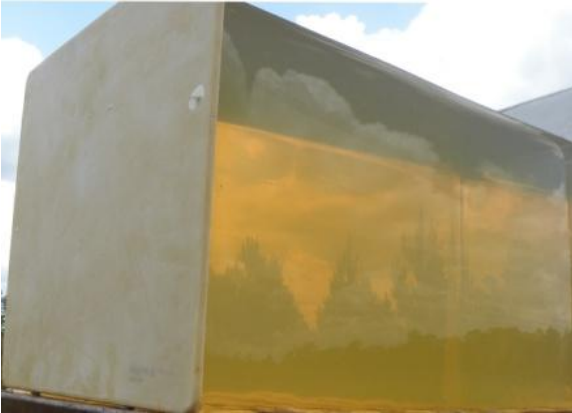


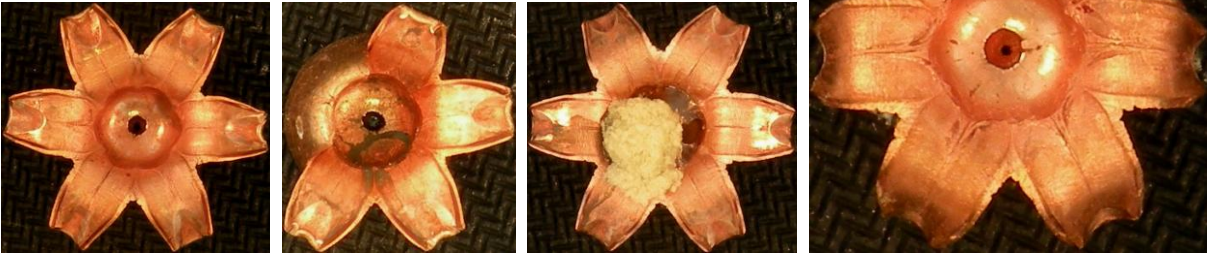
Figure 2. Bone simulant plate



Results

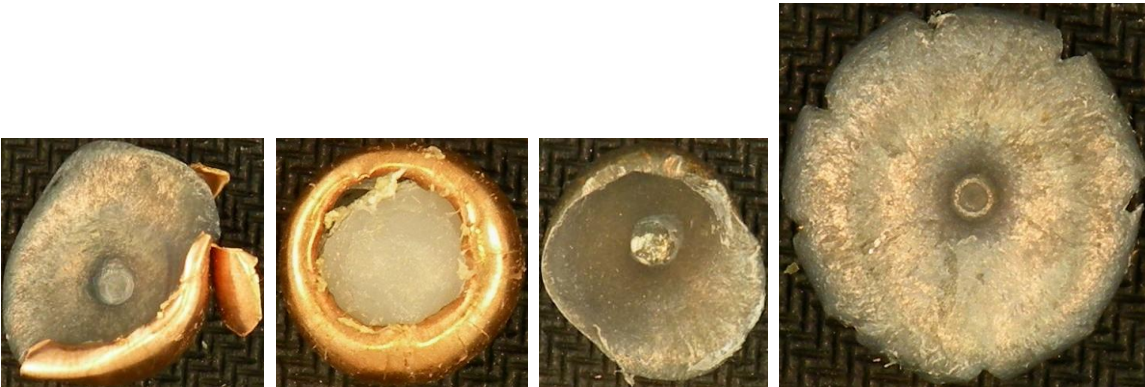
Cor-Bon 185gr +P DPX

Figure 3-6. Cor-Bon 185gr +P DPX recovered bullets (Shots 1-3 through bone; Shot 4 bare gelatin)



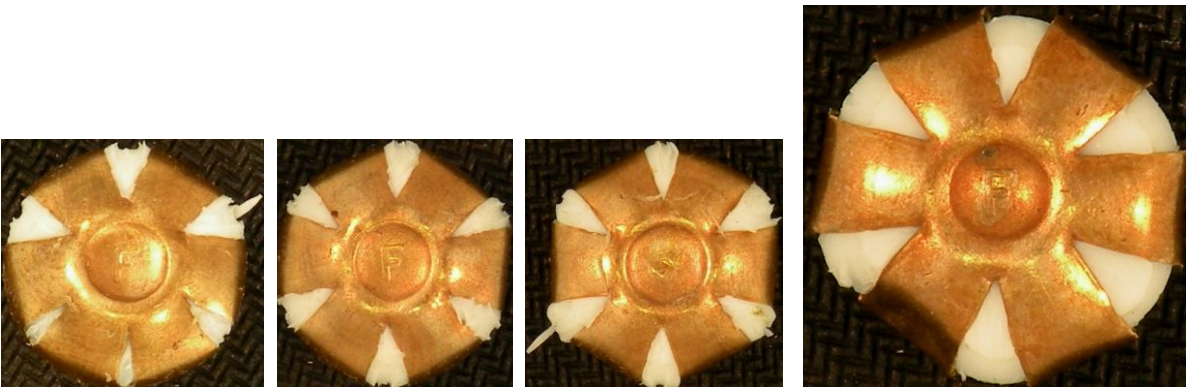
Cor-Bon 165gr +P Pow'R Ball

Figure 7-10. Cor-Bon 165gr +P Pow'R Ball recovered bullets (Shots 1-3 through bone; Shot 4 bare gelatin)



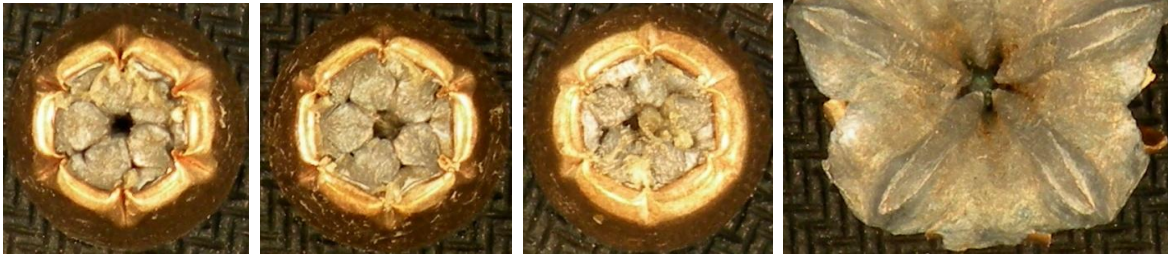
Federal 165gr Expanding Full Metal Jacket

Figure 11-14. Federal 165gr Expanding Full Metal Jacket recovered bullets (Shots 1-3 through bone; Shot 4 bare gelatin)



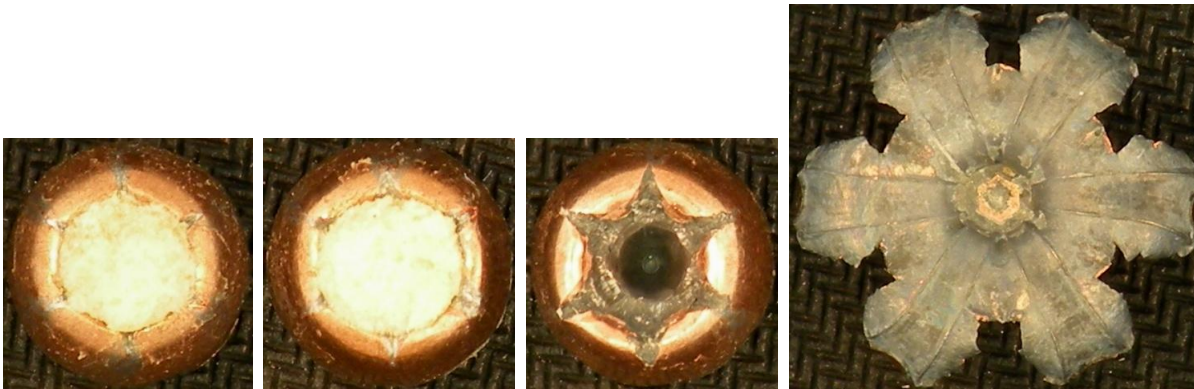
PMC 230gr Starfire

Figure 15-18. PMC 230gr Starfire recovered bullets (Shots 1-3 through bone; Shot 4 bare gelatin)



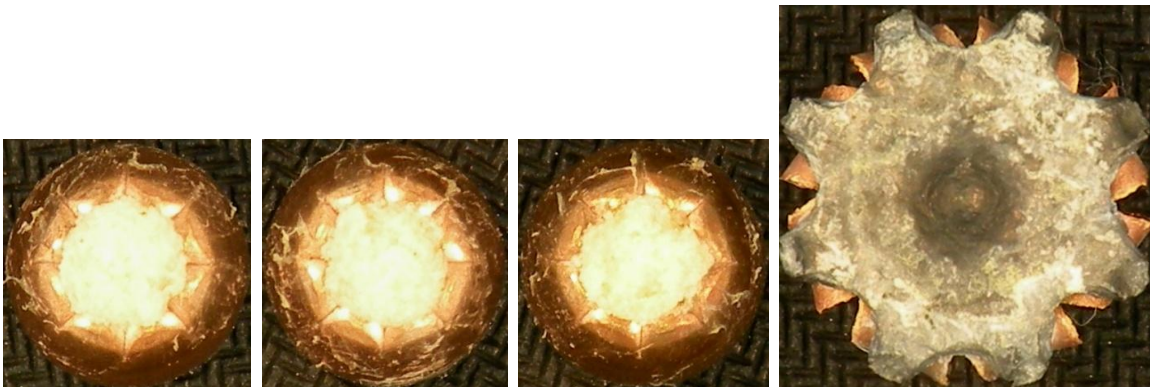
Speer 200gr +P Gold Dot

Figure 19-22. Speer 200gr +P Gold Dot recovered bullets (Shots 1-3 through bone; Shot 4 bare gelatin)



Winchester 230gr SXT

Figure 23-26. Winchester 230gr SXT recovered bullets (Shots 1-3 through bone; Shot 4 bare gelatin)



Relevance to the Tactical Situation

Figure 27. Adult Male rib cage with circulatory system visible (0 degree obliquity)

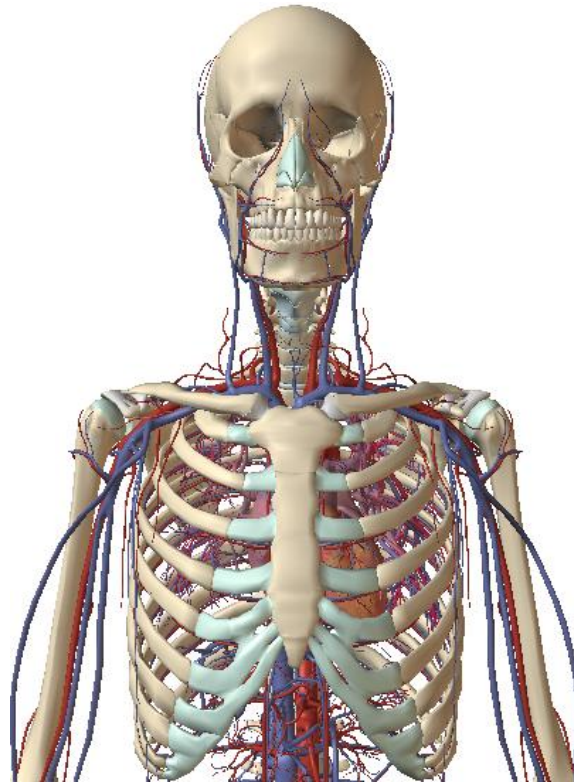


Figure 27 shows a 'head-on' view of the human weapon system. Note the size of heart relative to the rib cage and sternum.

Figure 28. Adult Male rib cage with circulatory system visible (30 degree obliquity)

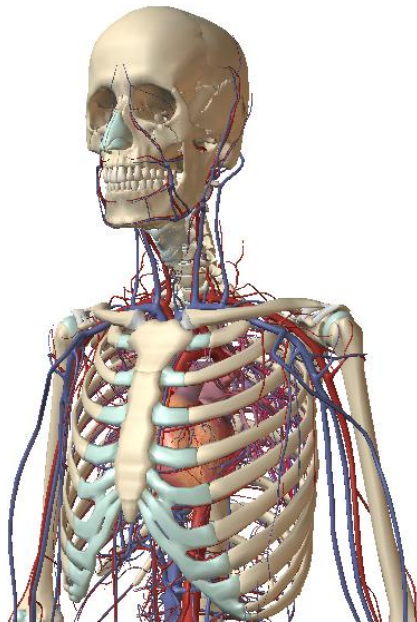


Figure 28 shows the adversary turned at a 30 degree angle to represent the Weaver shooting stance.

Figure 29. Percentage of Circulatory System shielded by rib cage (Adult Male, 0 degree obliquity)

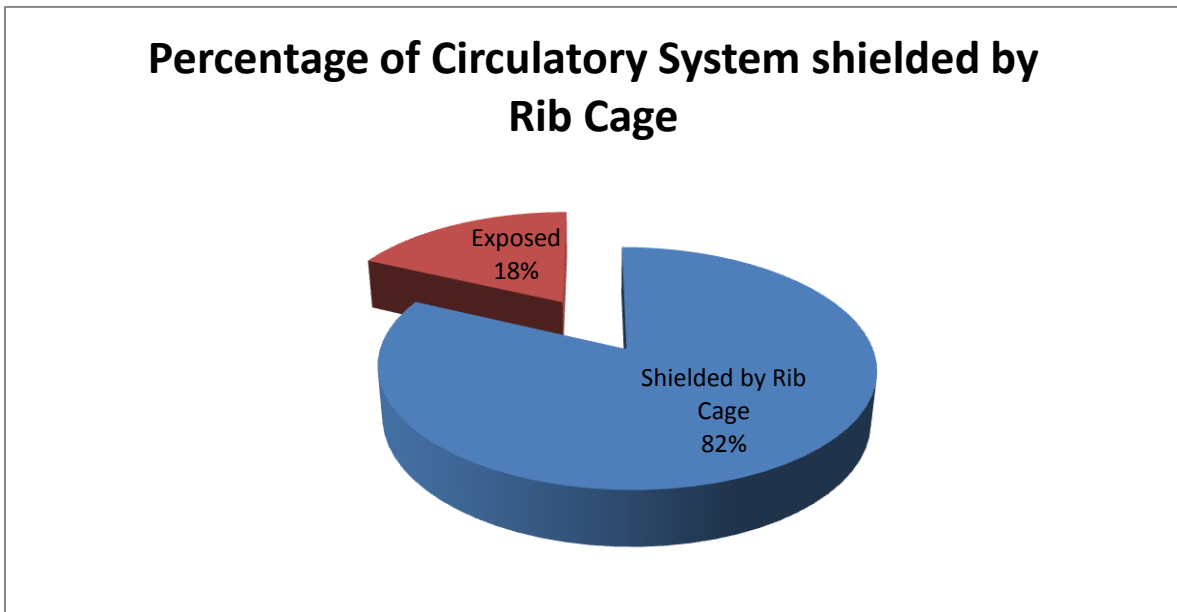
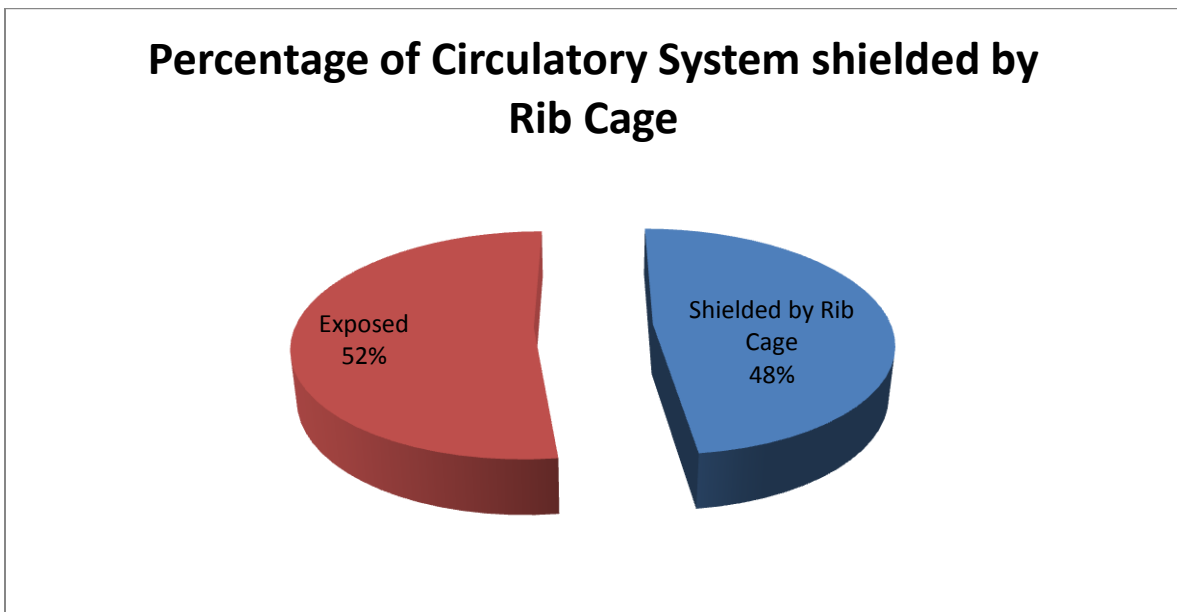


Figure 30. Percentage of Circulatory System shielded by rib cage (Adult Male, Weaver stance)



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)
Cor-Bon 185gr +P DPX	1032	0.357	12.1
Cor-Bon 185gr +P DPX	995	0.233	16.0
Cor-Bon 185gr +P DPX	1007	0.360	12.2
Cor-Bon 185gr +P DPX Bare Gelatin	1032	0.315	18.1
Cor-Bon 165gr +P Pow'R Ball	1104	0.342	16.0 +
Cor-Bon 165gr +P Pow'R Ball	1139	0.185	11.8
Cor-Bon 165gr +P Pow'R Ball	1122	0.209	15.8
Cor-Bon 165gr +P Pow'R Ball Bare Gelatin	1132	0.390	11.8
Federal 165gr Expanding Full Metal Jacket	1008	0.376	9.8
Federal 165gr Expanding Full Metal Jacket	1042	0.390	9.7
Federal 165gr Expanding Full Metal Jacket	1020	0.365	12.3
Federal 165gr Expanding Full Metal Jacket Bare Gelatin	1054	0.464	8.8
PMC 230gr Starfire	763	0.160	16.0 +
PMC 230gr Starfire	769	0.160	16.0 +
PMC 230gr Starfire	771	0.160	16.0 +
PMC 230gr Starfire Bare Gelatin	755	0.351	12.9
Speer 200gr +P Gold Dot	919	0.160	16.0 +
Speer 200gr +P Gold Dot	942	0.160	16.0 +
Speer 200gr +P Gold Dot	923	0.160	16.0 +
Speer 200gr +P Gold Dot Bare Gelatin	930	0.381	12.0
Winchester 230gr SXT	820	0.160	16.0 +
Winchester 230gr SXT	813	0.160	16.0 +
Winchester 230gr SXT	830	0.160	16.0 +
Winchester 230gr SXT Bare Gelatin	823	0.317	13.4

Summary

Of the six brands tested, **four of the six ammunition types failed to expand** in the bone plate/gelatin target. The Cor-Bon 185gr +P DPX and Federal 165gr EFMJ projectiles performed effectively, by functioning similarly through the bone plate as they did in bare 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.

We recommend using the Cor-Bon 185gr +P DPX and Federal 165gr EFMJ if bullet expansion after a bone hit is a priority. It should be said that the human body consists of many different bones, with shapes other than flat, so these results should be considered as generally indicative of the performance that you can expect in an actual target. In any event, the bullets that failed in these tests will not perform better against living bone.