CBJ Tech AB

Reduced effectiveness of the 5.56 NATO due to shorter barrels

Purpose: The purpose of this report is to demonstrate the reduced wounding effect in short-barreled weapons chambered for the 5.56x45 NATO round.

Methods: The effect in tissue simulant produced by a short-barreled 5.56 NATO assault rifle will be compared to that of an assault rifle with a full length barrel.
The target consists of a block of 10% ordnance gelatin, shot at 4°C. The dimensions of the block are: Length (Firing direction): 340mm, Height: 200mm, Width: 250mm.
The range is 8m.
The ammunition used is the 5.56x45 SK5 cartridge, which is the official Swedish Ball service cartridge for the armed forces, which has a bullet consisting of a lead core and a steel penetrator enclosed by a full metal jacket, and is equivalent to the US M855 cartridge.

The weapon used for the first shot is an FN FNC with a 449mm barrel (figure 1).

Figure 1: The FN FNC assault rifle used in the test.

The weapon used for the second shot is an HK 53 with a 210mm barrel (figure 2).

Figure 2: The HK 53 short-barreled assault rifle used in the test.

Results:

Shot 1: V_0: 926m/s. The bullet shows the typical behavior of a high velocity impact of the 5.56x45 NATO cartridge. The bullet starts to yaw after ca 5-6cm in the gelatin and immediately breaks up. The fragmentation in conjunction with the temporary cavity results in a massive permanent cavity at a depth between ca 10-25cm. The effect can be studied in figures 3 and 4.
The tip of the bullet exited the block, but a third of the bullet´s weight was left in the form of fragments in and around the wound track. The recovered fragments can be seen in figure 5.

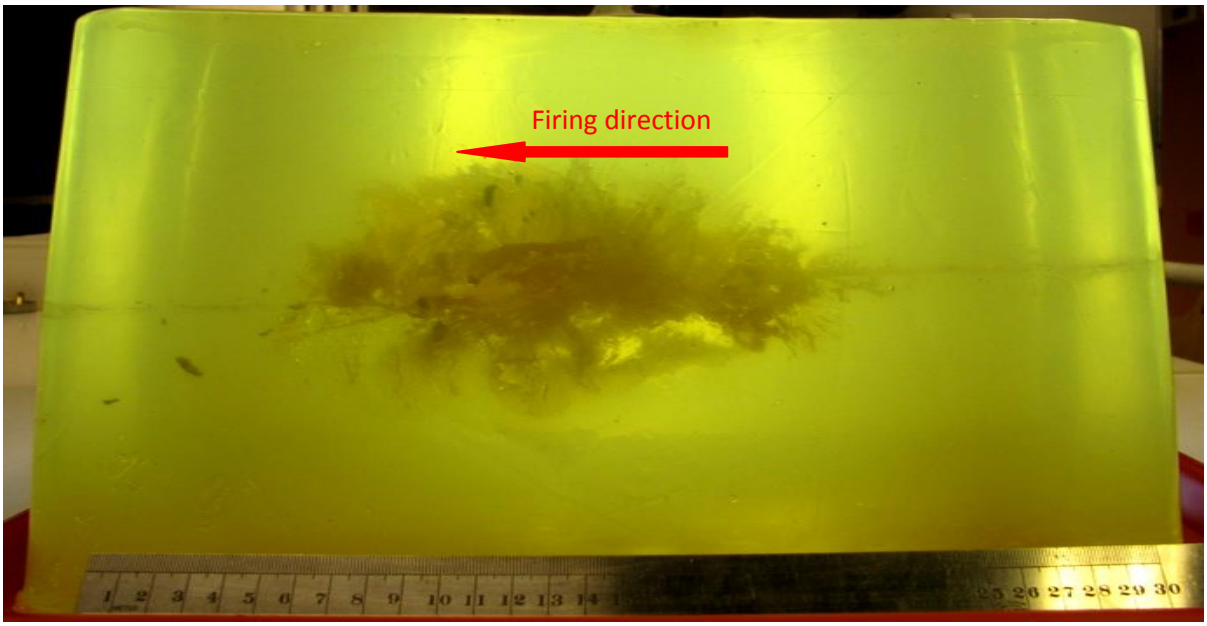

Figure 3: Gelatin block after shot 1; 5.56x45 NATO when shot from a full length barrel. Observe the fragmentation of the bullet.

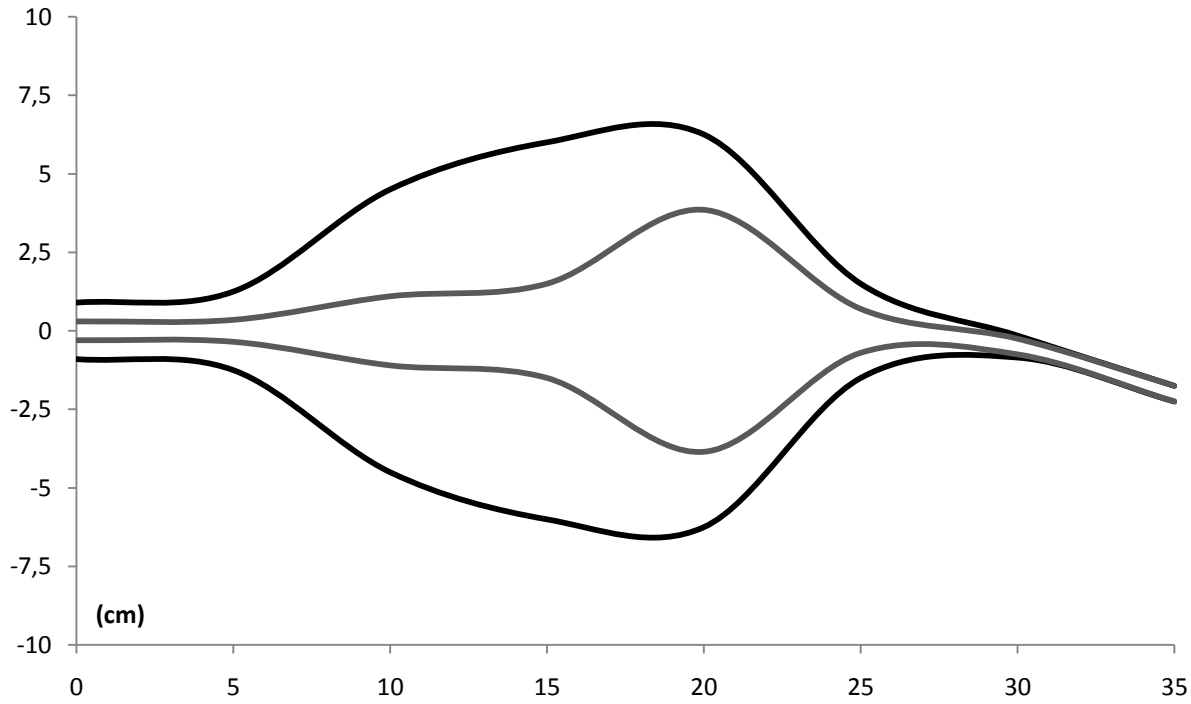

Figure 4: The Wound Profile of shot 1. Observe the large permanent cavity. Also note the limited tissue disruption in the first and last 10cm of the bullet path.

Figure 5: Fragments recovered from the gelatin block after shot 1. Weight: 20,5gr.

Shot 2: V_0: 708m/s. The effect of this shot is very different from that of shot 1, which is apparent even at a brief examination, see figure 6. The Wound Profile, figure 7, shows that the bullet remained stable for the first 20cm in the gelatin block, during which the tissue disruption was minimal. Upon tumbling, the bullet was slightly deformed, but did not fragment as can be seen in figure 8.

Figure 6: Gelatin block after shot 2. Note the minimal tissue disruption of the first two thirds of the bullet path.

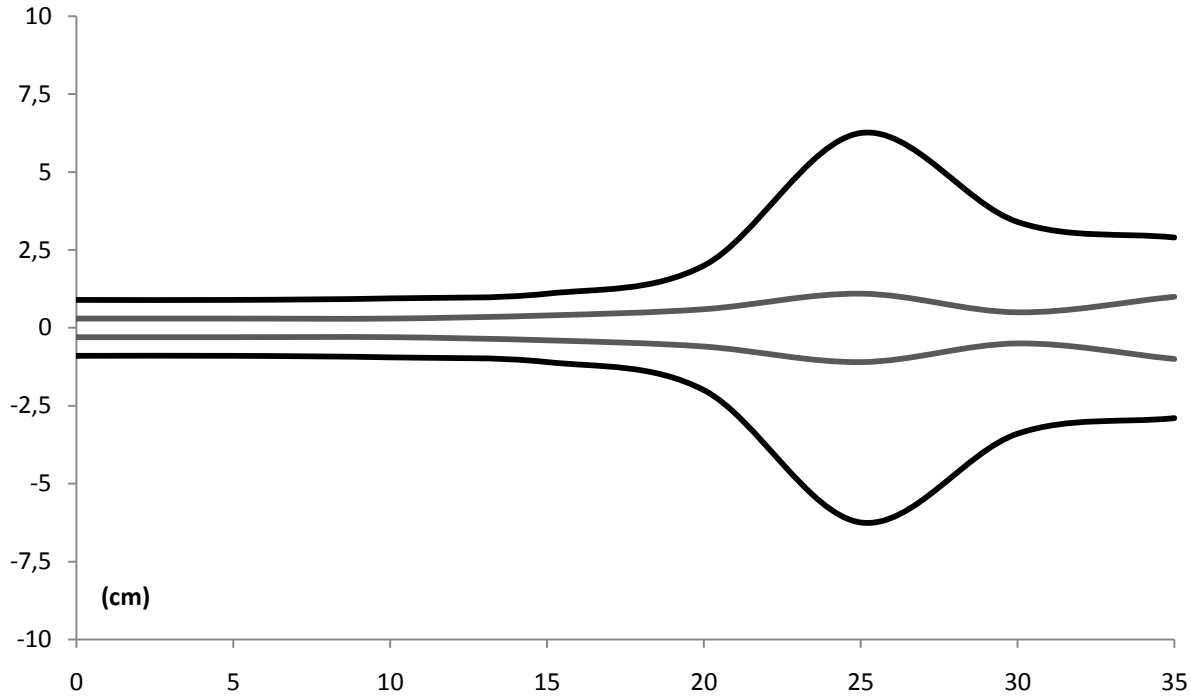

Figure 7: The Wound Profile of shot 2. Important to note is the long distance the bullet travels before it yaws.

Figure 8: The projectile of shot 2. The bullet is slightly deformed, but has not fragmented.

Conclusion:

This report has shown the problems with terminal effectiveness associated with short-barreled 5.56x45 NATO assault rifles. The bullet travels too far before yawing, producing only minimal tissue disruption with a resulting low chance of rapid incapacitation of the target. Considering the generally short combat ranges when this weapon type is used, this is a serious deficiency.
An important note is that the bullet in question is in no way “weak”; it certainly has the energy to produce a massive wound, which it very well may if it is caused to tumble earlier. This can be the case when the bullet passes intermediate obstacles, gear, bone etc.
Still, the tendency of the 5.56x45 NATO cartridge to fail in terminal effect at lower velocities is important, when considering replacing standard length assault rifles with more compact weapons.