

## BLOODSPATTER CLASSIFICATION

by  
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A great deal of overlapping among stain patterns results from impacts of greatly differing forces. For this reason, the classification of spatter based on stain size as "high", "medium" and "low" velocity can be misleading. To illustrate this, the definitions of "high", "medium" and "low" velocity impact spatter are cited (IABPA News, Vol. 2, Issue 2, May 1985) and then discussed with respect to spatter patterns produced under known circumstances. Illustrations are included to demonstrate each point and objection.

The purpose of this paper is to recommend that the stain size be defined and examples be given of types of impacts that produce these stain sizes. These size classifications and their definitions are presented as alternatives to the use of "high", "medium" and "low" velocity impact spatter. While recognizing that the terms "high", "medium" and "low" velocity impact spatter are now in common usage, and that these terms will continue to be used when applied to specific stain patterns, attempting to classify all types of spatter in these categories will be shown to be inappropriate.

"HIGH VELOCITY IMPACT SPATTER (HVIS): BLOODSTAIN PATTERN CHARACTERIZED BY A MIST-LIKE APPEARANCE, THAT IS CAUSED BY A HIGH VELOCITY FORCE. THIS SPATTER TRAVELS ONLY A SHORT HORIZONTAL DISTANCE IN FLIGHT. A high velocity impact is considered to be 100 ft/sec or greater. All gunshot wounds are characterized as high velocity."

While it is true that spatter resulting from gunshot may exhibit a characteristic mist-like appearance, not all of the spatter produced by gunshot will exhibit this characteristic appearance. Figure 1 shows spatter from gunshot collected on white cardboard. Figures 2, 3, and 4 show the spatter resulting from a gunshot exit wound to the head of a victim. Figure 2 shows spatter that is very close to the exit wound. Figure 3 shows spatter approximately 100 cm from the exit wound and figure 4 shows spatter approximately 300 cm from the exit wound. All four spatter patterns were produced by a high velocity impact force. Only the spatter in figure 1 exhibits what may be considered a mist-like appearance, yet all four are the result of high velocity impact - a gunshot. In fact, according to the HVIS, MVIS, and LVIS definitions, the spatter patterns shown in figures 2, 3 and 4 are more typical of "medium" velocity impact spatter than of "high" velocity impact spatter.

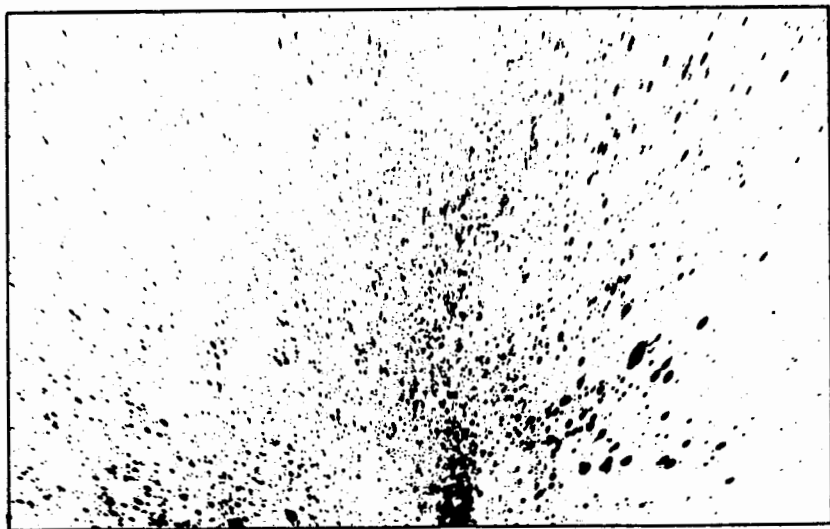


FIGURE 1 Spatter pattern on a cardboard target in close proximity to gunshot.

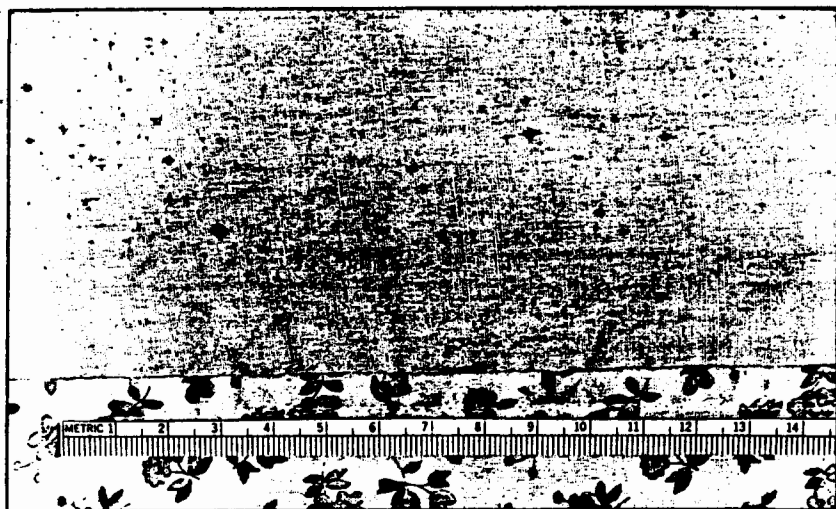


FIGURE 2 Bloodstain pattern on a pillow case located 30 cm from a gunshot exit wound of a victim's head.

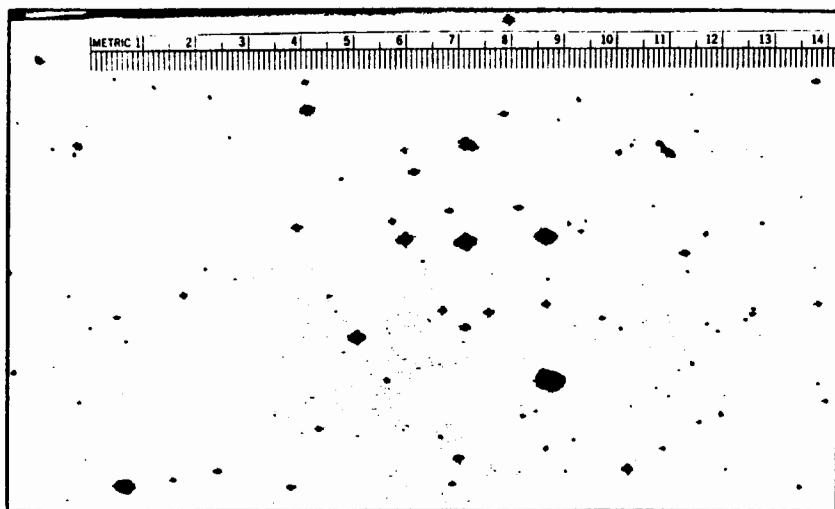


FIGURE 3 Bloodstain pattern on a pillow case located 100 cm from a gunshot exit wound of a victim's head.

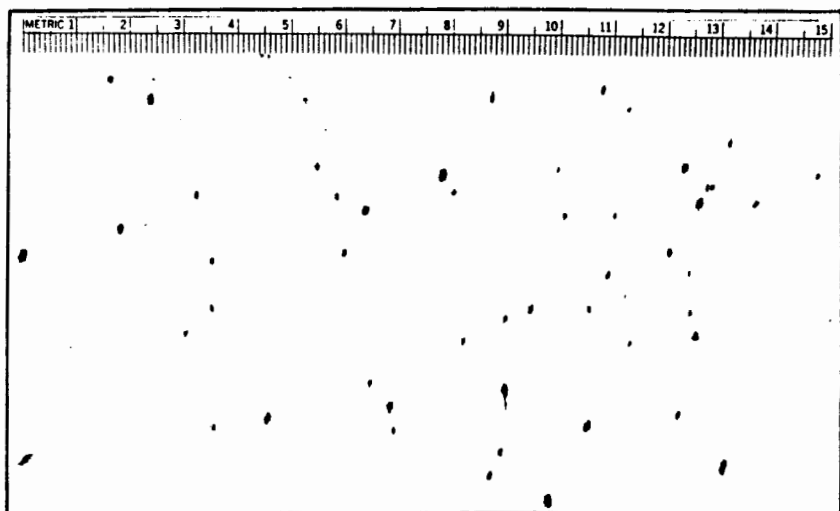


FIGURE 4 Bloodstain pattern on a curtain 300 cm from a gunshot exit wound of a victim's head.

The spatter illustrated in Figure 4 traveled 300 cm from the exit wound and was deposited on a curtain. This shows that spatter from a high velocity impact can travel a considerable distance from the impact site. It is true that mist travels only a short distance, however, mist is only a small fraction of the total spatter produced by a high velocity impact source.

The HVIS definition is misleading because it implies that mist-like spatter is the only type of spatter produced by a high velocity impact source. While mist is a characteristic used to identify a high velocity impact source, it does not define all spatter resulting from this type of force.

"MEDIUM VELOCITY IMPACT SPATTER (MVIS): BLOODSTAIN PATTERN, CHARACTERIZED BY INDIVIDUAL STAIN SIZES OF APPROXIMATELY 2 mm OR LESS DIAMETERS, THAT IS CAUSED BY A MEDIUM VELOCITY IMPACT. A medium velocity force travels at approximately 25 ft/sec. A beating typically causes this type of spatter."

Bloodstain patterns consisting of individual stain sizes of approximately 2 mm or less in diameter are commonly caused by high, medium and low velocity impact sources. Figures 5, 6, and 7 show bloodstain patterns produced by high, medium, and low velocity impacts, respectively. According to the "medium" velocity impact spatter definition, all three patterns are characteristic of "medium" velocity impact spatter even though only the spatter shown in figure 6 was produced by a medium velocity impact source.

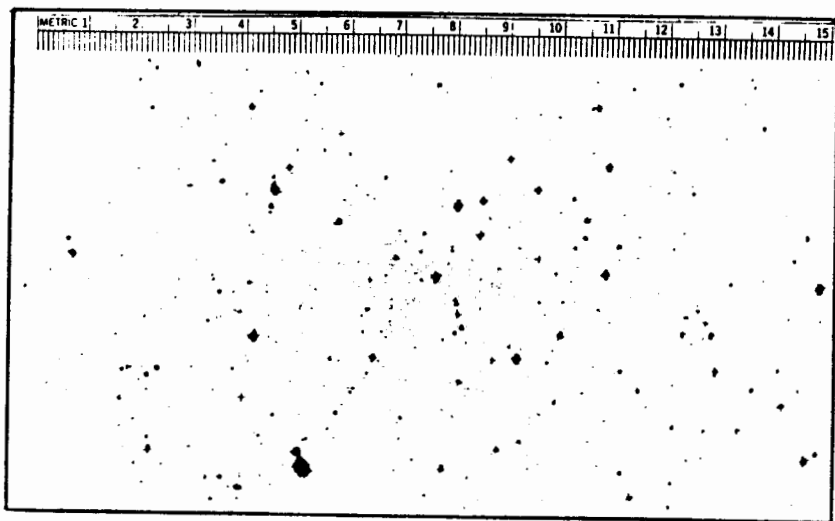


FIGURE 5 Bloodstain pattern on a pillow case located 100 cm from a gunshot exit wound of a victim's head.

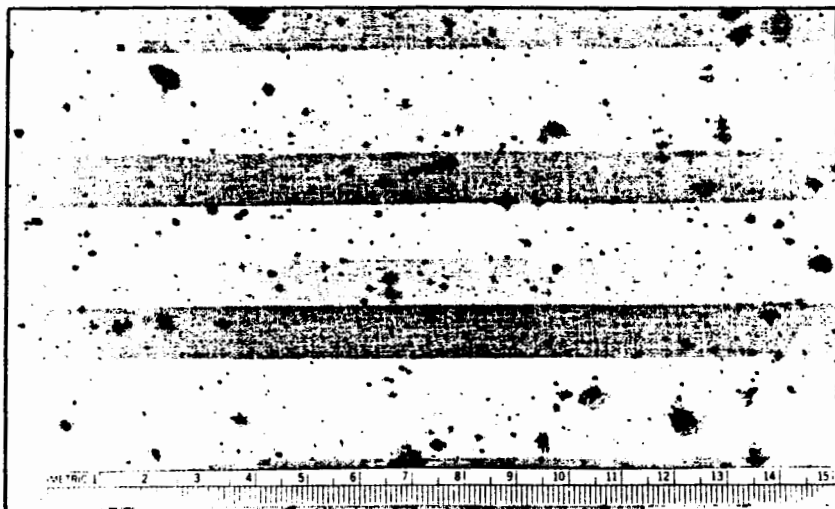


FIGURE 6 Bloodstain pattern on a striped bedsheet in close proximity to a victim beaten with an iron bar.

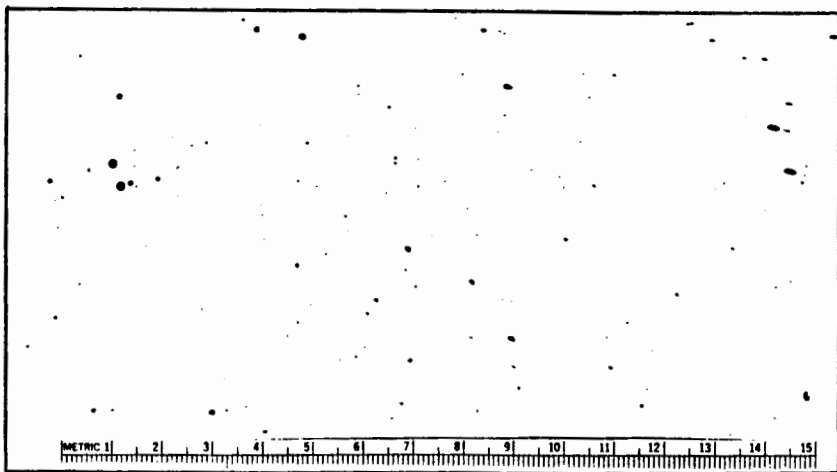


FIGURE 7 Bloodstain pattern resulting when a person stepped in a pool of blood. The pattern was collected on a white cardboard target 10 cm from impact.

Bloodstain patterns consisting of stain sizes of 2 mm or less in diameter may also be encountered that are not the result of impact. Figure 8 shows a blood stain pattern which was the result of blood being expelled through the mouth by coughing. This type of pattern has been observed at several crime scenes and care must be taken not to confuse it with impact spatter.

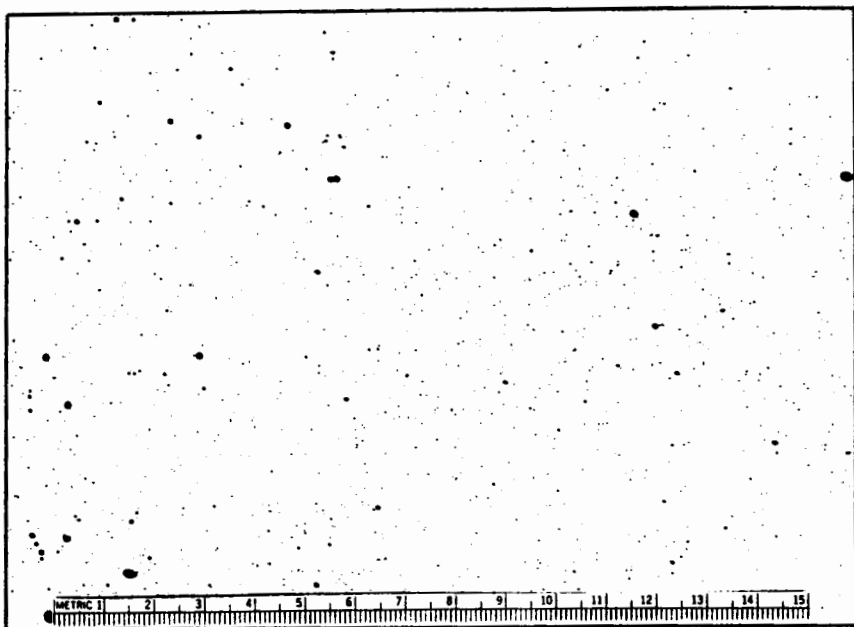


FIGURE 8 Bloodstain pattern resulting from blood being expelled through the mouth by coughing. The bloodstain pattern was collected on white cardboard.

Since high, medium and low velocity impacts as well as other sources can produce spatter patterns with individual stain sizes of 2 mm or less, it is misleading to single out MVIS as being characterized by spatter of this size.

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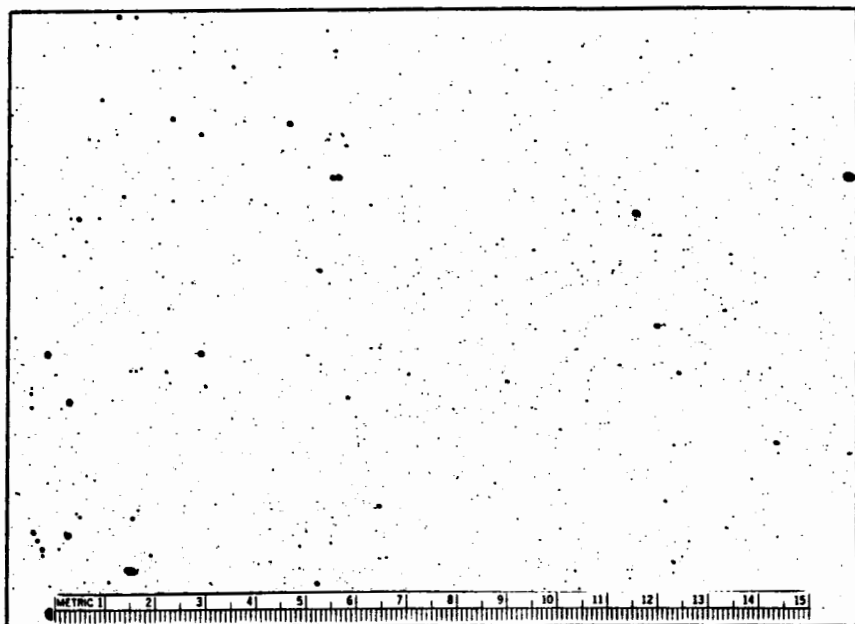


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"LOW VELOCITY IMPACT SPATTER: BLOODSTAIN PATTERN, CHARACTERIZED BY SIZE, THAT IS CAUSED BY A LOW VELOCITY FORCE. Splashing is an example of this force."

In this definition "characterized by size" does not give a size range by which to distinguish "low velocity impact spatter". Possibly the reason that a size range is not given is that "low" velocity impact spatter can range from several millimeters to less than a millimeter in size.

Figures 9 and 10 show examples of bloodstain patterns produced by low velocity impact forces. Figure 9 shows spatter collected on a vertical target placed 10 cm from blood drops falling 50 cm and striking a pool of blood. The resulting stain pattern consists of bloodstains with diameters of approximately 2 mm or less, which according to the HVIS, MVIS and LVIS definitions is characteristic of medium velocity impact spatter. Figure 10 is an area of spatter approximately 10 cm from a 5 ml volume of blood striking a cardboard target. Again, this spatter is characteristic of medium velocity impact spatter as it is defined. In contrast, figures 11 and 12 were produced by a hammer blow and gunshot backspatter. In both instances the bloodstain diameters within each pattern are greater than those produced by impacts of less force.

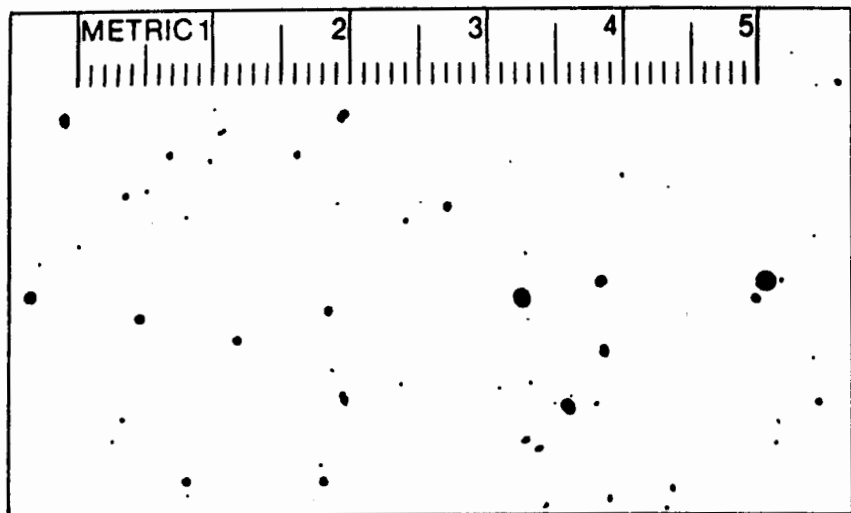


FIGURE 9 Bloodstain pattern resulting from blood drops falling 50 cm into a pool of blood. The pattern was collected on cardboard placed 10 cm from impact.

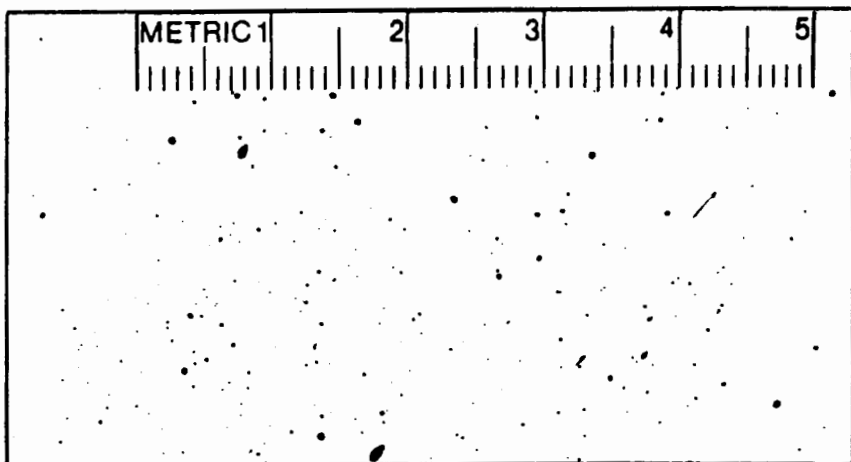


FIGURE 10 Bloodstain pattern that resulted when 5 ml of blood struck a cardboard target. The pattern is 10 cm from the impact site.

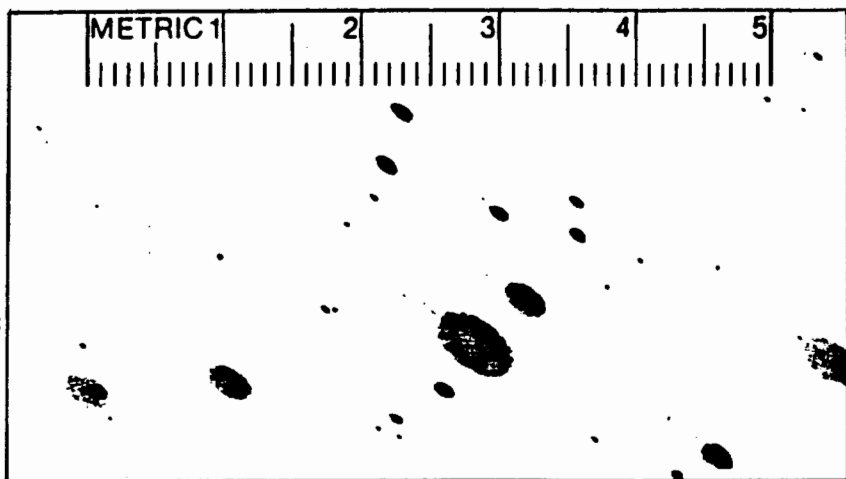


FIGURE 11 Bloodstain pattern resulting from a beating with a hammer. The pattern is 35 cm from the impact site.

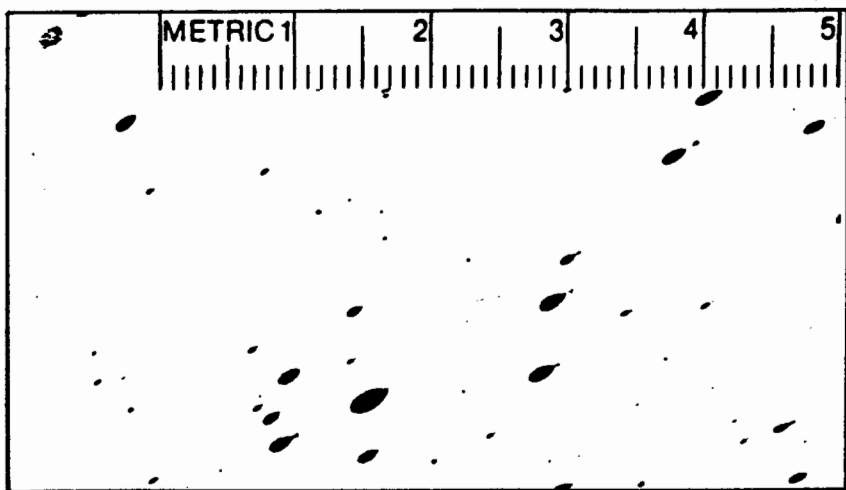


FIGURE 12 Bloodstain pattern resulting from gunshot backscatter. The pattern is 15 cm from the impact site.

As a result of these observations and the difficulties encountered in relating spatter size to velocity of impact, the following classification of bloodspatters is proposed.

#### Size of Spatter

Mist - A bloodstain pattern consisting of finely divided individual stains that are predominately smaller than 0.1 mm in diameter. Spatter in close proximity to a high velocity impact such as from a gunshot is characteristic of this type of spatter. Due to the small size of this spatter, it will travel only a short horizontal distance in flight.

Fine - A bloodstain pattern consisting of individual stains that are predominately 2 mm or smaller in diameter. Spatter resulting from a medium velocity impact such as a beating or spatter which is found a short distance from a high velocity impact such as gunshot is characteristic of spatter of this type.

Medium - A bloodstain pattern consisting of individual stains that are predominately 2 mm to 6 mm in diameter. Cast-off bloodstaining is characteristic of spatter of this type.

Large - A bloodstain pattern consisting of individual stains that are predominately 6 mm or larger. Blood dripping from objects typically shows spatter in this size range.

In this classification system, the size is defined and then is characterized by the type of impact, "high", "medium" or "low" velocity that can produce the type of spatter. This classification system allows for the use of the terms "high", "medium", and "low" velocity impact spatter where appropriate, and eliminates the problems that result from bloodstain pattern overlap encountered when attempting to classify all spatter according to impact force.