

Blood Spatter Analysis




A. There are six patterns into which blood spatters can be classified

1. Blood falling directly to the floor at a 90-degree angle will produce circular drops, with secondary satellites being more produced if the surface hit is textured. This is known as a _____ fall.
2. _____ spurts or gushes typically found on walls or ceilings are caused by the pumping action of the heart.
3. _____ are shaped like exclamation points. The shape and position of the spatter pattern can help locate the position of the victim at the time of the attack.
4. _____ are left by a bleeding victim depositing blood as he or she touches or brushes against a wall or furniture.
5. _____ of blood can be left by a bleeding victim as he or she moves from one location to another. The droplets could be round or smeared or even appear as spurts.
6. _____ of blood form around a victim who is bleeding heavily and remains in one place. If the bleeding victim moves to another location, there may appear to be droplets or smearing connecting the first location with a second.

The _____ and _____ of blood droplets help identify the direction from which the blood originated. Round droplets, for example, are caused by blood dripping downward at a 90-degree angle. Blood droplets with tails or satellite droplets help us determine the direction from which the blood originated.

Spatter patterns can help the investigator determine the type of wound. A _____ spatter pattern is produced by a high-velocity impact, such as a gunshot wound. A beating with a pipe will produce blood _____ with a lower-velocity pattern. Voids (empty spaces) in the spatter pattern could help determine the presence of a person or object _____ after the attack.

By using the spatter pattern to determine the angle of impact of various blood droplets, the examiner can determine the point of impact or convergence, a two-dimensional representation of the location of the victim at the time of the injury.

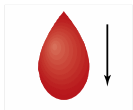
Velocity	Size of Droplets (mm)	Visual Image	Velocity of Blood	Examples of Injuries
High	Less than 1		100 ft/sec.	Gunshot wounds
Medium	1-4		25 ft/sec.	Beating, stabbing
Low	4-6		5 ft/sec.	Blunt object impact

B. Blood Spatter Analysis

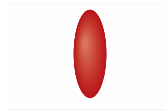
Recall that blood is a thick mixture of blood cells and plasma. When a person is injured and is bleeding, _____ acts on blood, pulling it downward toward the ground. The blood droplet has a tendency to become _____ than it is wide as a result of gravity. Blood is _____. This means that the blood mixture is attracted to similar blood mixtures and tends to stick together and not separate as it falls.

The effect of the downward force of gravity combined with the cohesive force of the blood results in a net effect on the blood droplet as it falls. Thus, the blood maintains a _____ appearance. When a drop of blood falls on a flat surface, the blood drop will have a _____ surface. The blood drop does not totally flatten out. The reason for this shape is the cohesive nature of blood causing the blood to pull together and resist flattening out on a surface.

A falling drop of blood



The effect of gravity



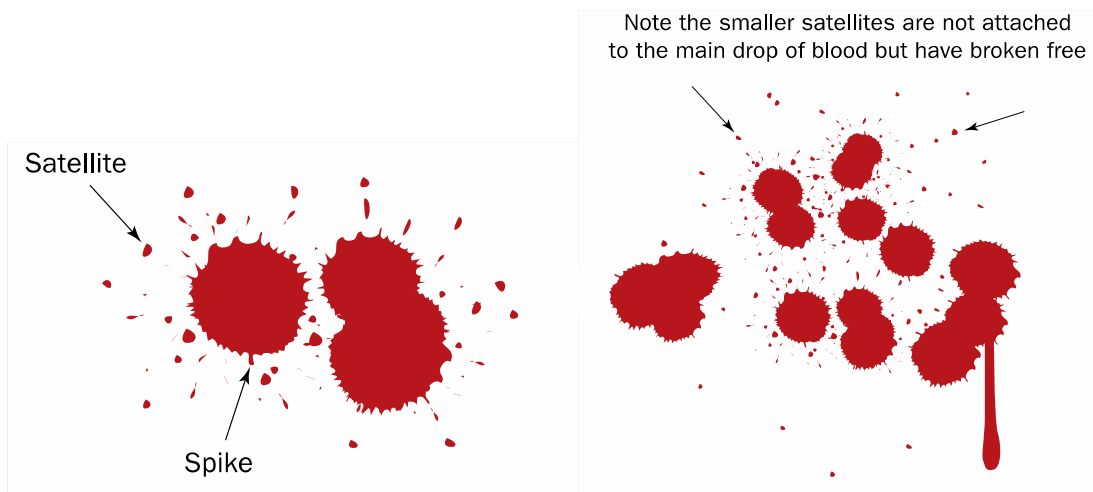
Cohesive forces



Cohesive forces resist flattening



If any of the blood does overcome cohesion and separate from the main droplet of blood, it will form small secondary droplets known as _____.



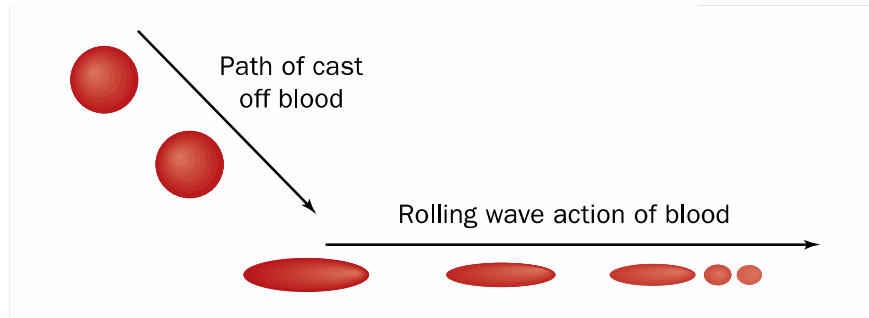
If blood is dropped onto a smooth surface, such as glass or marble, the edge of the blood drop appears _____ and _____. However, if the blood lands on a porous surface, such as wood or ceiling tile, then the edge of the drop of blood may form small _____ or _____. Notice in the figure above that spikes are still connected to the main droplet of blood, whereas satellites are totally separated.

C. Examination of Directionality of Blood

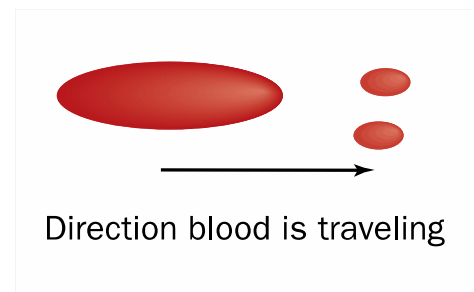
The shape of an individual drop of blood provides clues to the direction from where the blood originated. A circular drop of blood indicates that the blood fell straight down. When a blood drop is _____ (longer than it is wide), it is possible to determine the direction the blood was traveling when it struck a surface.

As moving blood strikes a surface, several forces affect the droplet of blood. These forces are cohesion, adhesion, and surface tension. _____ is a force between two similar substances. _____ is a force between two unlike surfaces, such as blood and the surface of a wall. _____ is an elastic characteristic along the outer edge of a liquid caused by the attraction of like molecules.

When blood comes into contact with another surface, the blood tends to adhere or stick to it. As a result, the point of impact may appear to be darker and wider than the rest of the drop of blood spatter.



Momentum tends to keep the blood moving in the direction it was traveling. As blood droplets move away from their source, the blood droplet elongates and may produce a thinner tail-like appearance. The tail points in the direction of blood's movement. Smaller satellite or secondary droplets may break away from the main drop of blood. These satellites will appear in front of the moving droplet of blood. Note that satellites are not connected to the main drop of blood.



D. Lines of Convergence

The _____ of the source of blood can be determined if there are at least _____ drops of blood spatter. By drawing straight lines down the long _____ of the blood spatter and noting where the lines _____, this will indicate the lines of convergence. When there are numerous blood spatters, the area where the lines of convergence meet is where the source of blood _____ . One can draw a small _____ around this intersecting area to note the area of convergence.

The circle locates the area of convergence and identifies in a two-dimensional view the location of the source of the blood.

