SEXUAL ASSAULT: Can Differences in Blood Components Prove Differently?

By: Craig M. Pradarelli

One of the most heinous crimes is that of sexual assault. These crimes are especially devastating to the victim if this sexual assault is her first sexual experience. Equally, to be accused of such a crime is devastating to a person who did not commit such a crime. A person accused of this type crime may be proven innocent in court, but may never have the tarnish removed from his name.

Sexual assault is unique among crimes as it leaves distinct physical evidence. On occasion there will be blood left on the underclothing of the victim. The victim will claim that this blood came as a result of a rupture to the hymen. The defendant will make an assertion that this blood is a result of menstruation.

While it is not common knowledge there are chemical and histological differences between the blood of a ruptured hymen and that of normal menstruation. Knowledge of these differences can assist in the acquittal of a defendant-client or in resolution before trial.

In looking at the stained clothing of the victim it would be almost impossible to distinguish if the stain was caused by a hymen rupture or menstrual fluid without the aid of a microscope. Some gynecologists have maintained that the amount of blood produced by a ruptured hymen would, in fact, be much less than that produced by the initial phases of menstruation. A normal menstruation will produce about 35 milliliters of fluid loss, the majority of this will occur in the first 3 days. Therefore, a large stain would be indicative of menstrual fluid produced in the beginning of menses where as a smaller stain would indicate a hymen rupture or fluid produced during the later portion of menses. The size of the stain should be used only as a guide and not be used definitively due to the fact that there is no experimental data as to how much blood a ruptured hymen produces. Additionally, SANE nurses indicate that the amount of blood produced by a ruptured hymen is variable. The variability of the amount blood loss prevents it use as a reliable indicator as to the source of that blood.

While it may be impossible to distinguish the source of the blood by visual inspection only, the use of an electron microscope will provide abundant information as to the source of this stain. Differences will be found in the ratio of certain blood cells and the presence of tissue parts that are not normally found in peripheral blood, as well as other cellular differences.

The differences between peripheral blood and menstrual fluid seem to center around an enzyme named plasminogen. Should plasminogen be found in the presented evidence it is suggestive that the stain is from menstrual fluid rather than from normal blood. Plasminogen has potent actions that break up the fibers of the lining of the uterus, help to prevent clotting of the menstrual fluid and facilitate the expulsion of degenerated tissue.
As such, the stain left from menstrual effluent will have a greater amount of dead cells and cellular particles than that from a source of peripheral blood. Additionally, the lack of plasminogen in the blood from a ruptured hymen will clot much faster and stronger than the blood found in menstrual effluent.

The number and quantity of different blood cell types will also differ. There will be less red blood cells

and platelets in the menstrual fluid than in the peripheral blood. The red blood cells give blood its red color and the platelets aid in the clotting of the blood.

Someone qualified at the use of a microscope will also notice some other interesting differences in the cells that are found in the stain. The cells which would be found in the sample of blood from a sexual assault will be from the wall of the vagina whereas the cells found in the menstrual fluid will be from the uterus. These cells are easily distinguished by microscopic examination. Another important difference between these cells is the manner in which these cells die. The cells which are found in the blood of a sexual assault victim will have been produced from friction and have died due to trauma of the cell, in fact, if the examination of the stain is done soon enough some of the cells may still be alive. The cells that are found in the menstrual fluid have died due to a process known as apoptosis. This is a natural cellular death that can be distinguished from a traumatic death via many differences, the most prevalent being the lack of a nucleus in the apoptotic cell.

In most cases the stained clothing will be placed in an evidence bag and kept in the evidence locker until it is needed for trial. The investigator who in charge of the investigation must be the one to inform the attorney involved in the case that there are significant differences between menstrual fluid and blood which comes from another source. The investigator must also be the one who insists that the laboratory which is examining the stain clothing check for plasminogen, inflammatory exudates, and cellular debris as well as determining the part of the body that those cells came from. The results of the laboratory examination will yield conclusive evidence which will aid in rapid resolution of the case.

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