PROLONGED FLUID SHEAR STRESS INDUCE PARTIAL GENETIC PROFILE DURING FORENSIC DNA ANALYSIS

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The purpose of this study is to evaluate and compare the cause and effect of the cell shearing phenomenon on DNA typing. Reference samples are received in our Forensic DNA-Serology Laboratory for comparison with evidentiary samples from crime scenes. In some of our cases, we have observed more partial profile from reference samples than from evidentiary samples. This phenomenon was seen in some reference blood samples received from Pathology Division after autopsy could be induced by cell shearing.

The cell shearing phenomenon is a cellular hemolysis of nucleated and red blood cells. This is caused when blood samples are drawn during the phlebotomy procedure. It has been documented that hemolysis increases with an augmentation in pressure difference and cannula diameter (needle gauge size) at the venipuncture site. This procedure could induce a partial genetic profile during DNA typing. A full DNA profile is very important for inclusion and exclusion purposes for DNA typing.

This study was performed in two phases: Phase I- compare and evaluate blood samples for DNA analysis obtained in different venipuncture sites such as central (aortic), femoral, and peripheral sites. Phase II- evaluate the use of different substrates for the collection of reference samples: buccal collectors, central whole blood (with EDTA), and whole blood transferred to FTA cards.

This study was designed to compare and select the best method for the collection of reference samples by the Pathology Division to be used routinely for DNA cases in order to minimize the detection of partial genetic profiles.