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Evaluating the sensitivity of Hexagon OBTI test and Kastel-Meyer test by detection of human blood

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Abstract: *The Hexagon OBTI test is a commercial kit made for the purpose of forensically identifying human blood. The test process is straightforward and does not need for a lab environment. To reduce between-sampling variation, all samples (blood) were taken from the researcher, a healthy male who was 33 at the time of collection. Blood thinners were created using liquid blood supplies and deionized water in the following dilutions: 1:10, 1:100, 1:1000, 1:100,000, 1:1,000,000, 1:10000000, and 1:100000000. The samples were analyzed by Hexagon OBTI and Kastel-Meyer, and the findings of both tests were positive up to a dilution of 1:1000 in the case of the former and 1:1000000 in the case of the latter. The result was a more sensitive OBTI test than Kastel-Meyer , the OBTI test is therefore suitable for identification of human blood at crime scenes*

.**Keywords: Hexagon OBTI. Kastel-Meyer. Detection of human blood**

1.Introduction

Body fluids are made up of biological and chemical elements that may be examined to offer information at various degrees of identification. Blood, saliva, semen, and vaginal fluids are all capable of undergoing a variety of tests. However, from a forensic standpoint, the primary analyses are hypothetical tests, which show the existence of certain fluids in the body, and DNA profiling, which verifies the identification of the person who deposited bodily fluids. in order to use suitable analytical methods(1).

In a crime scene, bodily fluid traces can be removed in a number of ways. The identification of certain bodily fluids can help with the criminal procedure investigation by giving the investigator contextual information. Analysis of body fluids has an impact. Characterization of individuals using deoxyribonucleic acid (DNA) has a significant impact on their identification However, forensic experts first need to be able to recognize and pinpoint the source of the biological evidence in order to identify the DNA. Blood is one of the most often extracted body fluids among all others. Body fluids are a good source of DNA at crime scenes (2,3).

Hochmeister et al. (4) validated the Hexagon OBTI test, a commercial kit designed for the detection of fecal occult blood. for the forensic identification of human blood. A test instrument and a collecting tube make up the kit. The test process is straightforward and does not need for a laboratory setup. Thus, the OBTI test is appropriate for identifying human blood at crime scenes (5).

We picked the Kastle-Meyer hypothetical test and the confirmatory test (HEXAGON OBTI, subsequently referred to as OBTI) by human blood test (Wiesbaden, Germany) with the intention of examining the sensitivity of the test to identify blood spots. This test, which targets human hemoglobin, has a spike allergy has been used for years in the medical field and forensic fields

2- **Material and methods**

2.1. **Sample collection**

All blood samples were taken from the researcher, a 33-year-old healthy male at the time of collection.

2.2. Serial dilutions

To lessen between-sample variation, all samples were collected from a single male, and dilutions were created using deionized water. The following dilutions of blood thinners were made from liquid blood stocks in EDTA and were 1:10, 1:100, 1:1,000, 1:10,000, 1:100,000, 1:1,000,000, 1:10000000, 1:100000000.

2.3. Kastel-Meyer test

The test was carried out as stated by Cox [6] with a little modification: phenolphthalein (Sigma P-89031) was used in place of phenolphthalein, and the reduction with zinc powder was skipped. Positive results included the quick emergence of pink.

2.4. Hexagon OBTI Test

The test was mainly carried out according to the manufacturer's instructions (7) which are all of the following:

1- the cap of red collecting tube was opened when the tube is upright to prevent spills during transit.

2- Gently immerse and shake samples of suspected blood taken with a suitable assembly tool inside the transport medium housed in the collection tube.

3- To prevent erroneous negative results, the transport medium was left in for 5 to 20 minutes.

4- Fill the round well sample (S) at the lower end of the test with precisely 3 full drops (120 l).

5- The outcome was read in accordance with the drop-in time. Between 3 and 10 minutes, the appearance of the control line (C) and the line under test (T) was examined.

3- Results and discussion

The published results demonstrate a large degree of variability in rate the sensitivities of such tests, despite the analysis of typical bodily fluid screening tests showing a rise in sensitivity of hypothetical testing compared to confirmatory tests [8]. Previously raised by [9], he thought that variations in detector concentrations, sample

preparation techniques and reagents, and variations in the sort of substance the samples contain were to blame for the tests' varying sensitivity. The most recent studies also state that many of the observed disparities were likely caused by the testing procedures; for instance, in one test, the reagents were introduced directly to the diluted body fluid solution rather than to a material that already contained diluted body fluid [10].

The test results in Kastel-Meyer test were a positive result until dilution 1:1000, and this is almost identical to the results with (11) Hexagon OBTI test results were a positive result until dilution 1:1000000 . The result was a more sensitive OBTI test than Kastel-Meyer , and this corresponds with (11), the results were shown in table (1) .

Table (1): Sensitivity of Kastel-Meyer and Hexagon OBTI test

No.	Dilution	Kastel-Meyer	Hexagon OBTI
1	1:10	+	+
2	1:100	+	+
3	1:1000	+	+
4	1:10000	-	+
5	1:100000	-	+
6	1:1000000	-	+
7	1:10000000	-	-
8	1:100000000	-	-

+ indicates a positive result
- Indicates a negative result

4- Conclusion

The results that appeared in the experiment confirm the very high sensitivity of the Hexagon OBTI test in detecting human blood from very small concentrations like dirt or pieces of cloth, and this reduces their concentrations. The results of the Kastel-Meyer test were less good. The sensitivity of the Hexagon OBTI test in detecting human blood is very high, so it is better to rely on the Hexagon OBTI test in forensic examinations instead of the Kastel-Meyer test .

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