IDENTIFICATION OF ABH BLOOD GROUP SPECIFIC SUBSTANCES FROM LATENT FINGERPRINTS

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SUMMARY:

Serological sensitivity of the modified mixed cell agglutination reaction on adhesive cellophane tape has proved to be a very useful method for typing ABH isoantigens from latent fingerprints. Its sensitivity is found to be several thousand times higher than that of absorption elution reaction, when the isoantigens are localized on the surface of latent fingerprints. Besides analysing fresh samples, effect of age and temperature conditions which are found to effect the isoantigenic activity has been discussed.

Introduction:

Latent fingerprints are, potentially, one of the most valuable source of trace evidence in crime cases. Recently progress has been made to detect latent fingerprints by biological techniques and the most useful technique for this is mixed cell agglutination. The mixed cell agglutination technique is especially recommended by many workers when blood group specific substances, which are localized on the surface of microscopic objects including fingerprints hair, skin, epidermal tissues, biological stains and histological sections, have to be determined (Ishiyama,1975; Ishiyama and Okada,1975; Okada and Ohrui,1978; Lincoln and Dodd,1960; Swinburne,1962; Poon and Dodd,1964; Coombs and Dodd,1961; Pereira et al.1969; Nickolis and Pereira,1962; Ishiyama,1979; Davidsohn,1972; Kouvarik et al. 1968 and Toender et al.1964). The present investigation has been done from view point of detecting ABH isoantigens from latent fingerprints.

Material and Method:

A total of 407 individuals of unknown ABO blood group and secretor status were asked to leave their fingerprints (both finger and palmar parts) on various surfaces viz., adhesive tape, glass, certain plastics, aluminium foil, and steel. While taking prints, each individual was asked to exert some pressure so that a good quality dermal ridge impression left at the surface.

The study was divided into stages: one to see the effect of age(255 prints) and second to see the effect of temperature conditions (152 prints) on the ABH antigenic activity. The prints were kept at room temperature.

Mixed cell agglutination reaction described by Ishiyama (1975) with some modifications was applied for analysis. To confirm the experimental results, individual's blood group and secretor status was tested later on.

The study was extended to analyse latent prints upto

Advances in Forensic Haemogenetics 1
Edited by B. Brinkmann and K. Henningsen

six months of age.

Results

To see the effect of age, latent prints were divided into 15 batches (of 17 prints each) and analysed after different intervals of time period viz.fresh, 6 hours, 12 hours, 24 hours, 48 hours, 72 hours, 96 hours, 7 days, 15 days, 30 days, 60 days, 90 days, 120 days, 150 days and 180 days. It was observed that with increase in age of the latent print, the agglutination reaction became weak. There was a clear cut distinction between the results shown by fresher slides and the older one(Plates 1-3).

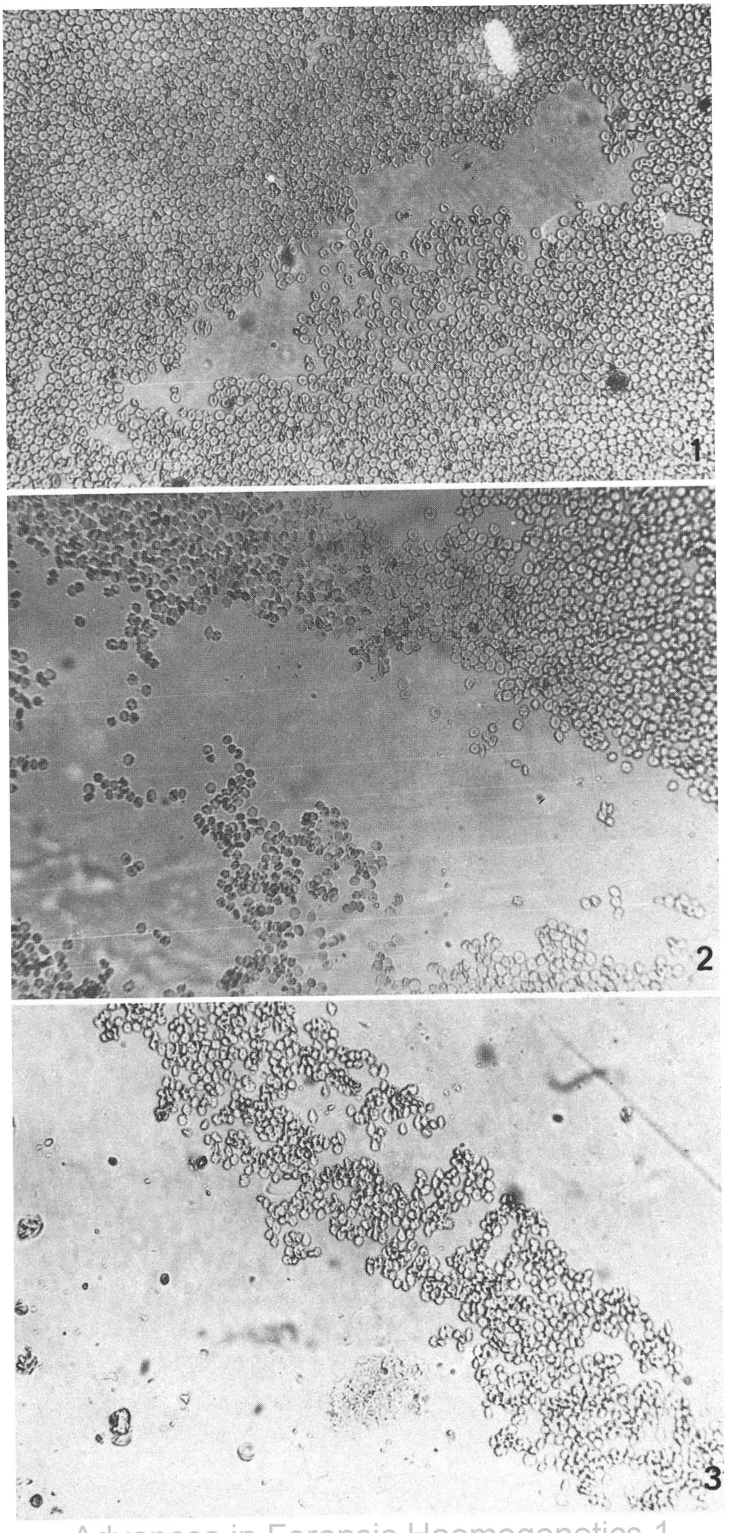
Effect of temperature was seen by putting the objects bearing latent prints in thermostat at varying constant temperature viz. 30°C, 35°C, 37°C, 40°C, 44°C, 47°C, 50°C and 52°C usually did not affect much the antigenic activity but high temperature exposure to the latent prints effected the ABH antigenic activity. Fresh prints exposed above 52°C even for one hour did not give any agglutination (plate 4).

Discussion:

Complete latent fingerprint is rarely found at the crime scene and for inconvenience, it has to be analysed. The modified mixed cell agglutination reaction technique on adhesive cellophane tape makes it possible to determine ABH isoantigens from latent fingerprints residue. It is not only the fingerball impressions, but any ridge portion from the palm made part of the present study. Adhesive cellophane tape material did not find to interfere the antigen-antibody reaction performed on its surface as far detection of antigens A and B in secretors is concerned. Anti-H(lectin) prepared from ulex europeus, gave non-specific reactions, and is believed to be due to the absorption of lectin onto the substrate resulting in background adhesion of cells, thus obscuring the results. This difficulty was removed to some extent by treating the adhesive tape surface with a .01% solution of tween-80 in saline, before sensitization with antibody. But even then it was only possible to detect antigen H on fresh samples,taken directly on cellophane tape.

Half life period of the ABH antigens is of the order of few months only. This phenomenon also proved true in the present study as with age the antigenic activity of the latent prints weaken and high temperature exposure seems to hasten this phenomenon.

It is extremely possible that a fingerprint impression may last for weeks at rather extreme storage conditions and still be easily detectable(Barneth and Berger,1977). This fact was confirmed, as the prints were stored at room temperature for six months and storage conditions do not found to effect much the original print quality. It is the antigenic activity which become weak with the passage of time.



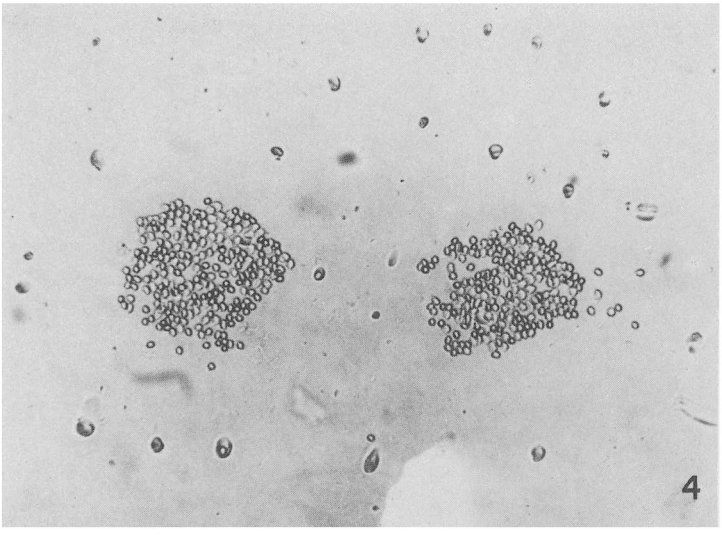


Plate 1 : Fresh latent print lifted from the glass surface; +ve agglutination, blood type A.

Plate 2 : Latent print a month old, lifted from plastic surface, +ve agglutination, Blood type A.

Plate 3 : Latent print 3½ months old, lifted from glass bottle, +ve agglutination, Blood type A.

Plate 4 : Fresh latent print subjected to constant temperature (47°C) for about 6 hours, +ve agglutination, Blood type B.

This study is of some relevance, as a large percentage of the Indian population are of group B(approx.40%) and the percentage of non-secretors is approximately 18-20%. So this can be of some use as a fingerprint detection system.

Acknowledgements:

The senior author is highly thankful to the Bureau of Police Research and Development, Ministry of Home Affairs, Govt. of India, for awarding him a research fellowship to prepare this manuscript.

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