

## PCR based analyses of epidermal cells found on adhesive tape

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### Introduction

Adhesive tapes are commonly used by Police Forces to collect Gun Shot Residues (GSR). In a previous experiment (Torre C. and Gino S., submitted to J. Forensic Sci.) it was observed that enough DNA can be extracted, amplified and typed for the HLA-DQ $\alpha$  locus (Saiki et al., 1986), in order to attribute with certainty a GSR stub and/or to obtain samples for DNA analyses.

Adhesive tapes are often used in kidnapping cases or to wrap packages, and can represent important evidence related to crimes. For this reason, we investigated whether the cellular material stuck on different adhesive tapes could be employed for genetic analyses.

### Materials and methods

We used common available tapes (plastic packing tape, Comet<sup>TM</sup>, strapping tape, Asirom90<sup>TM</sup>; transparent tape, Syrom<sup>TM</sup>; stub). The samples (54) from 6 individuals were collected from various skin areas as perioral region, wrist, back of hand and fingers.

All samples were obtained pressing many times the adhesive tapes on the collecting surface until the adhesive power was lost. From the same individuals blood samples were also taken for a comparative study.

For each specimen, a fragment of about 1.5 cm<sup>2</sup> was cut and then placed into 1.5 ml Eppendorf tube adding 300  $\mu$ l of lysis buffer (Tris 0.01 M pH 8.0, EDTA 0.01 M, NaCl 0.1 M, DTT 0.06 g/ml, SDS 2%). After 1-hour incubation at 37°C, the evidence was digested with 10  $\mu$ l of proteinase K (20 mg/ml) at 37°C overnight. Then we carried out three different extraction procedures: phenol-chloroform (Sambrook et al., 1989); Chelex<sup>R</sup> method (Walsh et al., 1991) and the "salting-out" protocol (Miller et al., 1988). All extracts were purified using Centricon<sup>R</sup>-100.

The extracted DNA was then quantified by means of both agarose gel electrophoresis (0.8%) stained with ethidium bromide and UV Spectrophotometry (Beckman DU 650).

DNA was amplified (Erlich H.A., 1989; Innis M.A. et al., 1990) to investigate some STRs (Edwards et al., 1991) and a AMP-FLP commonly used in our laboratory: HUMTH01 (Polymeropoulos M.H. et al., 1991), HUMVWFA31 (Kimpton C. et al., 1992), HUMBFXIII (Nishimura D.Y. et al., 1992), D1S80 (Budowle B.J. et al., 1991); as well as HLA-DQ $\alpha$  and Polymarker loci (Amplitype<sup>R</sup> PM user guide, 1994).

Amplifications were carried out in a Perkin-Elmer 9600 Thermal Cycler according to: literature for D1S80, Promega Technical guide (Geneprint™ STR System) for STRs, and Perkin-Elmer AmpliType<sup>R</sup> HLA-DQ $\alpha$  and AmpliType<sup>R</sup> PM.

Typing of PCR products was achieved by horizontal polyacrylamide gel electrophoresis followed by silver staining (D1S80 and STRs) and by means of reverse dot blot procedure (HLA-DQ $\alpha$  and Polymarker system loci).

From the same anatomic regions some samples were prepared in order to be studied, to check for presence of cells, by light microscope and Scanning Electron Microscope (SEM, Cambridge 110). The SEM specimens were gold coated, while the light microscope ones were stained with toluidine blue at 60°C .

## Results and discussion

Microscopical study of adhesive tapes showed the presence of cells coming from the stratum corneum in all the examined regions. There were few cells in the palm of hand, while in the other regions there was an almost continuous layer of cells. All samples showed some nucleated cells.

The DNA results (see tables) were quite homogeneous in the different collecting areas. The perioral surface proved to be the best source of sampling (31% successful typings); this is probably related to the contribution provided by the epithelial tissue cells coming from the oral cavity and a thinner stratum corneum layer in this region. Negative results came only from the fingers skin area, probably because this area is more exposed than others to mechanical and chemical stresses. We would like emphasize the effectiveness of the method on the perioral and the wrist regions for investigative purposes.

Till now we achieved the best results with the “salting-out” method.

As regards the plastic packing tape, the strapping one, and the stub, they showed good possibilities of success (20%, 14% and 33%, respectively). The reason could be the more powerful tackiness of these tapes compared to the conventional transparent one.

In conclusion, even tough, as a matter of fact, the present study had a generally low percentage of positive results (16% in 248 typings), we think the material stuck on the adhesive tapes can be considered an interesting source of DNA for investigation purposes.

### Successful typing rates

**Table 1**

Locus	samples typed: 248
HUMVWFA31	25 %
HUMBFXIII	5 %
HUMTH01	24 %
D1S80	14 %
HLA-DQ $\alpha$	19 %
Polymarker system	25 %

**Table 2**

Sample source	samples typed: 248
Mouth	31 %
Wrist	20 %
Back of Hand	15 %
Fingers	2 %

**Table 3**

Type of tape	samples typed: 248
Plastic Packing Tape	20 %
Strapping Tape	14 %
Transparent Tape	4 %
Stub	33 %

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