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IDENTIFICATION OF DRIVERS IN TRAFFIC ACCIDENTS AND DETERMINATION OF PASSENGER POSITION IN A VEHICLE BY FINGER MARKS

ABSTRACT

The following paper aims to illustrate certain investigative activities in the forensic analysis and examination of the scene of traffic accidents. When a traffic accident occurs, the scene must be secured as soon as possible to enable professional and proper forensic investigation. Failure to secure the accident scene might result in losing or contaminating the traces, which makes it more difficult to prove or explain trace evidence in further procedure or even makes such evidence inadmissible. The topic is discussed from the viewpoint of crime scene examination, since analysing and investigating traffic accidents requires a great deal of expertise and attention of the investigators. Complex traffic accidents include feigned accidents, hit-and-run accidents as well as accidents in which the driver and passengers, dead or alive, need to be identified. In identifying the passengers, standard criminal investigation methods as well as police forensic and forensic medicine methods are followed. Such methods include confirming the identities with identity documents, other documents and vehicle ownership, fingerprints, biological traces, fibre traces, contact traces, traces of physical injuries on the driver and passengers, etc. According to the results obtained in fingerprint detection on human skin surfaces, this method can also be applied in confirming physical contact between the driver and the passengers in the accident, e.g. in the event of moving the victims and changing the scene of the accident.

KEY WORDS

traffic accidents, accident analysis, driver's identity, passengers' position, finger marks, human skin

1. INTRODUCTION

Apart from forensic medicine experts and road traffic experts or traffic scientists [1], police investigators, including police forensic officers play a very important role in the investigation of traffic accidents. Police forensic science, which is part of criminal investigation, studies, advances and seeks the most adequate methods and means of technical and natural sciences with the purpose of their practical application in investigating criminal offence and minor offences, including traffic accidents. This field of expertise involves examination of the scene of the accident, criminal offence or event, looking for, securing and examining traces and items found at the scene, the identification of perpetrators and their registration and the identification of unidentified corpses [2, 3]. Police forensic examination is thus very important, as successful investigation of criminal offences and traffic accidents relies on quality crime or accident scene examination by the investigators [4]. Police forensic examination of the crime or accident scene represents the starting point for effective use of physical or material evidence provided by the forensic laboratory and police forensic investigators [5]. Very important is an accident video and photo-documentation. It is possible to use software technology for extracting maximum information from the accident to support accident reconstruction [6, 7].

Given that in judicial proceedings the counsels for the defence will act exclusively in defendant's benefit, great emphasis is placed on the correct management

and investigation. Every scene examination is unique. Experienced and well-trained investigators coupled with a logical and systematic approach facilitate the investigation of the most serious incidents, bringing them to successful completion. Every effort must be directed towards tracing the perpetrator of a criminal offence and preventing them from hiding or escaping. Traces and evidence from the crime or accident scene must be detected and secured.

2. FEIGNING AN ACCIDENT AND FLEEING FROM THE ACCIDENT SCENE

Situations requiring special attention by investigators in investigating and analysing traffic accidents are feigned road traffic accidents, fleeing from the scene of an accident and identification of participants, both the driver and third parties. Normally, the investigators dealing with such matters are police officers, forensic medicine experts and road traffic experts. The need for such investigations is on the increase and not only related to traffic accidents but also to other criminal offences and minor offences. Moreover, in order to answer the question as to who was driving and to make a quality analysis of a traffic accident, investigators must be familiar not only with general rules of investigation but also with the basic [8] collision mechanics, territorial/spatial and weather issues, injury-related mechanics and biomechanics, driver psychology, motor vehicle techniques, especially those related to the operation of the vehicle, braking, and vehicle stability, simulation techniques, digital photographs and photo processing techniques and traffic route infrastructure. In practice, disagreement sometimes occurs in answers pertaining to individual fields of expertise, e.g. forensic medicine or road traffic expertise, resulting, among others, in the obstruction of and delays in judicial proceedings. The latter might also occur due to lack of cooperation between the experts of both fields of expertise [9]. Solnick and Hemenway [10] carried out a three-year statistical analysis of 18,000 recorded instances of fleeing from the scene of a traffic accident resulting in pedestrian fatalities. Data to be analysed had been obtained from the system FARS (Fatal Accident Recording System). The system includes data on the victim characteristics, accident circumstances and driver characteristics. They established that as many as 20% of the drivers involved in traffic accidents fled from the scene of accident. The drivers mostly fled to urban areas, notably at weekends and at night. Furthermore, the study reveals that driver identification is more probable if the victims are women and children. The drivers were identified 2.5 times more often in the event of the accident happening during daytime. The authors concluded that the drivers flee from the scene of an accident when they had caused it and are likely to receive severe punishment (especially when drunk or intoxicated) and when they believe they can avoid being traced and investigated (e.g. at night).

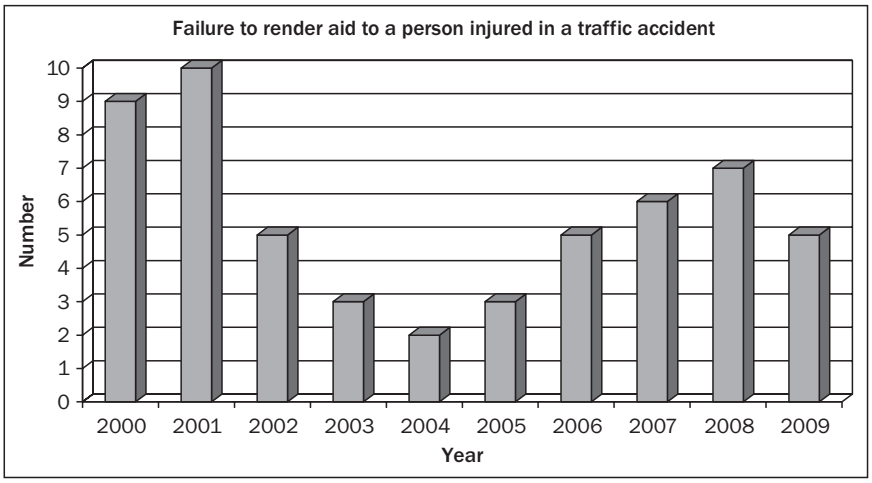
2.1 Statistical survey

Failure to render aid to a person injured in a traffic accident, hit-and-run traffic accidents, identification of participants and feigned road traffic accidents are situations requiring special attention by investigators in investigating and analysing traffic accidents. Below, statistical data for Slovenia are shown (*Table 1*, Graphs 1-3) [11], comprising all aforementioned cases. The survey covers traffic accidents with suspicion of various criminal offences under local legislation. In the

Table 1 - Hit-and-run traffic accidents in the last decade

Offence	Total				Cleared up				Not cleared up			
	Total	Fatality	Physical injury	Material damage	Total	Fatality	Physical injury	Material damage	Total	Fatality	Physical injury	Material damage
Total	38,286	67	4,380	33,821	28,434	60	2,643	25,731	9,834	7	1737	8,090
2000	3,949	10	361	3,578	3,143	6	261	2,876	806	4	100	702
2001	4,020	5	375	3,640	3,093	4	252	2,837	927	1	123	803
2002	4,510	6	468	4,036	3,458	6	317	3,135	1,052	-	151	901
2003	4,691	8	502	4,181	3,518	7	347	3,164	1,173	1	155	101
2004	4,978	10	507	4,461	3,678	10	341	3,327	1,300	-	166	1,134
2005	4,149	6	411	3,732	2,864	6	235	2,623	1,285	-	176	1,109
2006	3,716	6	491	3,219	2,676	5	297	2,374	1,040	1	194	845
2007	3,068	7	484	2,577	2,191	7	233	1,951	877	-	251	626
2008	2,723	6	415	2,302	2,039	6	211	1,822	684	-	204	480
2009	2,464	3	366	2,095	1,774	3	149	1,622	690	-	217	473

Source: Ministry of the Interior, Police: Statistics, Annual Reports on the Work of the Police [11]



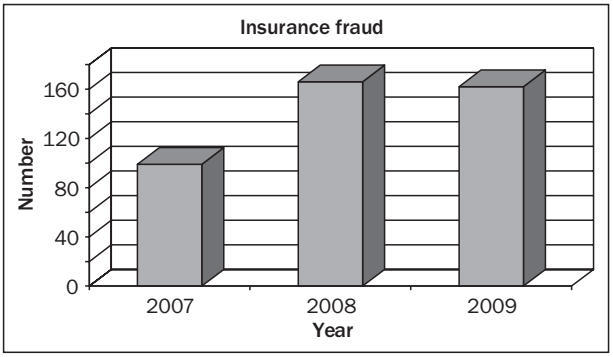
Graph 1 - Failure to render aid to a person injured in a traffic accident

Source: Ministry of the Interior, Police: Statistics, Annual Reports on the Work of the Police [11]

last decade, there have been 38,286 hit-and-run traffic accidents (*Table 1*). In 2004, there were nearly 5,000 hit-and-run traffic accidents, making this year the most prominent one. In this decade, there have been 67 traffic accidents resulting in fatalities, sixty of which were cleared up.

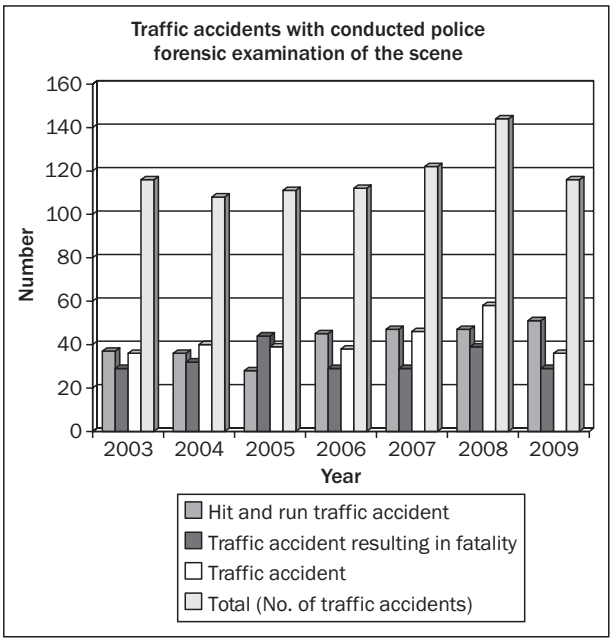
Graph 1 shows the failure to render aid to a person injured in a traffic accident. The number of such incidents was between 2 (in 2004) and 10 (in 2001) [11].

Another aspect to be considered is the insurance aspect. In the recent years, the percentage of reported and cleared up cases of fraud has been very low, which means that the problem is present and not negligible. Concerning the insurance aspect, the European Commission estimates that the value of insurance fraud in the EU (European Union) Member States amounts to at least 8 billion a year, representing about 2% of annual insurance premium [8]. A traffic accident is dealt with by an insurance company subject to three conditions [12]: concluded insurance contract, occurrence of an insurance case and a claim or report filed by a participant of the accident concerning the occurrence of the insurance case. Normally, the insurance company gets involved in the damage procedure upon the completion of the medical treatment of the injured persons or participants, as it is at that time when it receives various claims for compensation of non-material damage and payment of insurance indemnity. In the procedure, the insurance companies establish the extent of and cause for damage and injuries sustained by the participants. In doing so, they must consult different experts. Standard issues dealt with by the latter include: fear, disfigurement, physical pain, discomfort, mental suffering, as well as, more importantly: the use of safety belt (to establish co-responsibility), helmet (to establish co-responsibility), a succession of collisions (to establish co-responsibility), driving under the influence of alcohol or drugs, change of position between



Graph 2 - Insurance fraud

Source: Ministry of Interior, Police: Statistics, Annual Reports on the Work of the Police [11]



Graph 3 - Traffic accidents with conducted police forensic examination of the scene

Source: Ministry of the Interior, Police: Statistics, Annual Reports on the Work of the Police [11]

driver and passenger (loss of right to insurance), annuity claims (whether the injuries result from another accident, the extent of actual damage), date of completed medical treatment (the issue of limitation of claim) and prior illnesses and injuries (the actual extent of damage resulting from the traffic accident). In 2007, the police officers detected insurance fraud in 99 investigated traffic accidents. In 2008 and 2009, the number increased to over 160 (*Graph 2*).

Accident scene is normally examined by traffic police officers. In the event of a more serious traffic accident, expert assistance of police forensic officers is required. Between 2003 and 2009 there were 810 traffic accidents where a police forensic officer was involved (*Graph 3*). In such cases, traffic accidents were categorised as hit-and-run traffic accidents, accidents resulting in fatality or as traffic accidents.

3. IDENTIFICATION

Identification of persons: the idea of identifying and the wish to identify an object that is different from other objects is a very old and respected idea: according to Aristotle, the essence is a feature that is distinct from other subjects. Linnaeus composed a plant and animal classification system that was based on diversity, while Shannon's information theory is based on a numerical measure of information messages in their uniqueness. In the past, the following identification tools were used: branding, identification parade, mutilation and anthropometry. Criminals were punished by cutting off fingers, hands etc. depending on the degree of criminal offence. Branding was replaced by branding with hot iron, which in Europe was used until the 19th century. Identification parade was introduced in France after the revolution. It was done by experienced police officers who identified repeat criminals in prisons. The officers were usually rewarded with a packet of tobacco. In 1882 Alfonz Bertillon was the first to systematically tackle the identification issue. He devised a system of measuring individual parts of human body called anthropometry or bertillonage. Bertillonage involved taking various body measurements: height, span of extended arms, height in seating position, shape of the head, length of the right auricle and of the left foot. Anthropometry development was based on the idea published in 1840 according to which no two persons had the same bone dimensions, considering that adult bones did not change after the age of 20 [2]. However, errors that were due to inaccurate measurements and the fact that the method could not be used with minors reduced the usefulness of this method. Still, as a result of this method, a new method started to be developed, called biometry [13]. Nowadays, identity is established and confirmed by personal identity documents, vehicle documents and vehicle ownership, fingerprints and finger traces, biological materials: blood, saliva, semen, bones, hair, discharge,... – DNA (Deoxyribonucleic Acid), fibre traces, traces of physical injuries on the driver and participants etc. [3, 14].

Identification of corpses represents one of the basic investigators' tasks. In conducting identification, investigators deal with decomposing corpses. According to the rules, the procedure of identifying a corpse at the scene of examination involves taking numerous photographs and elaborating a sketch. Clothes, personal items and luggage are all subject to examination. A forensic medicine expert performs post-mortem treatment, which is followed by corpse description, fingerprint taking, securing material for DNA, and identification through witnesses. The procedure is completed with the dissection of the body, attempting to establish the cause and time of death. In addition, investigators secure and examine other materials such as hair, nail tips, dental status.

In identification of victims of mass traffic accidents, special instructions apply. Normally, special identification teams are set up that are composed of police forensic officers, criminal investigators, medical staff, record takers and others. The procedure consists of an accurate description and collection of data on the victim on the one hand, and on the missing person on the other. Data collection on the victim also includes post-mortem treatment, followed by taking detailed photographs of the victim and fingerprints, securing clothes, personal items and biologic material in order to determine the DNA profile. The procedure is completed by comparing data of the victim with the data of the missing person to find a possible match resulting in identification.

4. ANALYSING TRAFFIC ACCIDENTS AND DETERMINING THE POSITION OF DRIVERS AND PARTICIPANTS

Traffic accidents are not regular events; they are extraordinary events. Determining the cause of an accident and how it occurred requires advanced expert knowledge; it relies on special experience and expertise regarding the characteristics and appearance of skid marks, the visible damage, the state and construction of the vehicle, etc., based on which the elements and causes of the traffic accident as well as the possibility of its prevention must be established [8]. In some traffic accidents, additional forensic expertise and skills are required of investigators. Of course, such accidents represent a special challenge, requiring additional effort, additional testing, additional expert reports, additional verifications, as well as the involvement of additional teams, team work, etc. Those are the traffic accidents where one of the participants

has fled the scene, in a vehicle or on foot, accidents where, for any reason, the identity of the driver and the position of passengers in the vehicle have to be confirmed and feigned traffic accidents. The circumstances of a traffic accident are most often determined through its consequences (traces). Not securing the accident scene might result in losing or contaminating the traces, which leads to problems in proving or illustrating pieces of evidence or even to their complete inadmissibility. Traces of traffic accidents may be visible or invisible (latent), they may be found on the ground, on people's or animals' bodies, in vehicles or on other objects. The absence of traces that could be seen with naked eye does not mean that there are no traces. The basic requirement in the phase of securing the accident scene is that the accident traces remain unchanged until the arrival of the examination commission. Should changes in the scene be necessary, e.g. in order to provide first aid, secure the traces and prevent any danger, the scene must be photographed or recorded prior to any changes. Each person entering the accident scene, such as medical staff, fire brigade, police officers, must be careful not to destroy any traces and objects. According to Kokot [8], the identity of drivers might be concealed for various reasons, such as the avoidance of criminal and civil liability, compensation for damages to which a person is not entitled under their insurance, unwillingness to disclose personal data and protection of another person.

4.1 Traces on drivers and passengers and on the accident scene

Grubwieser et al. [15] investigated 20 vehicles that had been involved in head-on collisions. During the accidents, 34 driver and passenger airbags were deployed. In 80% of cases, biological traces were found on the airbags. The traces were located with an optical method, i.e. ALS (Alternative Light Source), Polilight, at a wavelength of between 450 and 470nm. The investigators swabbed the found traces and subjected them to DNA analysis. In the cases where no biological traces were located on airbags with the alternative light source (20%), the whole airbag surfaces were swabbed. In these cases, no positive results were obtained. Other results and conclusions from DNA analyses and the statements by the involved passengers were always concordant. It was thus established that the molecular biological analysis of deployed airbags can help to determine the participants' positions within a vehicle (driver or passenger status) at the time of impact. In a car accident, the inertia of the body resists the stopping motion of the car and continues to move in a straight line at the same speed until it clashes with something that completely stops the motion – vehicle parts or other passengers. The construction of the car and the direction of the force determine which part of the vehicle interior the body will clash into, which again depends on the characteristics of the elements of passive safety. In such cases, criminal investigation and forensic medicine offer objective possibilities to resolve the disputed issue. The traffic accident reconstruction is then pieced together based on the position of the driver and passengers, type of injuries, damage to the vehicle, found traces, etc.

Mechanical injuries of the passengers: after a medical expert had confirmed the injuries sustained by the participants, the movement of their bodies is reconstructed in their examination. Injuries sustained in car accidents are specific and arise with regard to the position in the time of the accident [16]. Passengers may sustain minor or serious injuries or the injuries may have been fatal. In order to establish who caused the accident, the court appoints forensic medicine and road traffic experts. In addition, the driver and passengers at the moment of the accident need to be identified. Most often, the driver's death is caused by serious mechanical injury. The second most frequent reason are head and brain injuries (approximately 20%), with ruptured aorta resulting in bleeding to death as the third most frequent reason for fatality (approximately 15%). Damage to the aorta typically appears in drivers who did not wear a safety belt and gripped the steering wheel during the accident. However, since during the autopsy such injury is often determined in both passengers and pedestrians, it is not sufficient to define the participants at the moment of the accident. Furthermore, on account of different vehicle types and marks, mechanical injuries on the bodies are very different, given that there are different three-point safety belts, airbags, reinforced sides and roof, etc. After the legislation came into force according to which every passenger in a vehicle must wear a safety belt, determining the persons' positions has been facilitated. To drivers who wear safety belts, abrasion/injury in shoulder area and upper thorax may be sustained. When impact occurs at a high speed, the driver also sustains injuries of the ribs and breastbone, lungs, heart and aorta. All of the said injuries occur on the left side in the driver and on the right side of the body.

Furthermore, investigators look for biological and textile traces. Upon finding a trace of hair, blood, skin, tissue or textile fibres, the latter are secured and sent to analysis for comparison of questionable and comparative samples. Textile patterns of external parts of the victims' clothes are examined, as well as traces of clothes found on car seats and seat backs and contact traces of footwear on the clutch, brake and gas pedal. Blood and tissue traces also represent important evidence in trying to solve the question of the persons' positions in the vehicle, although it must be taken into account that they might originate from the movement of the injured person during the accident or during

their rescue. In addition, traces of hair found on the head restraint and on the objects that have been impacted by the head are analysed as well. Seat height adjustment plays a role as well, as persons of different height cannot operate a vehicle from the same seat height. Work at the accident scene is of utmost importance, being unique and non-repeatable. The scene changes with time, traces get destroyed, lost, contaminated, feigned, etc. It is for this reason that it is of key importance that traffic experts, forensic medicine experts and other experts are included in the examination.

4.2 Finger marks

Investigators look for finger and palm traces on all smooth surfaces, such as the steering wheel, gear change handle, hand brake, external and internal rear-view mirror, door handles, which the driver must or may have touched. In addition, other participants might have been moved by the driver or passengers. In such movements, physical contact may occur, e.g. in the area of the arms and wrists or legs. This results in traces on human skin. These are traces of biological origin, which can also be detected in terms of looking for finger traces. In this context, a number of examinations and successful identifications have been carried out [17]. The first practical case goes back to 1978 in Florida. This is probably the first documented case where a trace of papillary lines was lifted on the victim's skin and matched with the perpetrator to be forwarded to the court as evidence. A naked young woman was found on the grounds of a health resort. On the skin, in the area of her left ankle, three traces of papillary lines were lifted with black magnetic powder. One of the traces was determined as usable for further comparison and subsequently matched with the perpetrator's finger traces. The perpetrator was found guilty by the court. In Japan, in 1981, a man suspected of murder had strangled a woman with both hands. Nine hours later, the investigators found traces of papillary lines on the left side of the neck with a magnifying glass and oblique light illumination. The traces of papillary lines were secured with the photographic method, silicone and security tape. The investigation ended with a positive identification. In Canada, in 1982, by using magnetic powder and the photographic method, the investigators found a usable trace of papillary lines on a perpetrator's palm. Furthermore, in the USA, there have been a number of practical cases: in 1976, using the magnetic powder procedure and the Kromekote method, traces of papillary lines were found on the right calf of a victim, although no identification was made with the perpetrator. Furthermore, in 1976, traces of papillary lines were found and secured on the thigh of a victim. In 1978, three traces of papillary lines were lifted on a victim's leg using magnetic powder and secured with adhesive tape – one of them matched the perpetrator's finger prints. In 1985, usable traces of papillary lines were secured on a victim's body with cyanocrilate and magnetic powder, although it did not lead to the perpetrator's identification. In 1993, a body was found at a graveyard. After cooling the corpse, a trace of papillary lines was secured with transfer to photographic paper. A more significant number of records and positive results regarding the lifting of traces of papillary lines may be found in laboratory research environment. Such research consisted in volunteers impressing their fingerprints on the skin of dead bodies, after which traces of papillary lines were lifted, using different procedures and methods, in different time intervals and under different working conditions. In the EU the project AGIS [18], which was carried out with the participation of experts from Austria, Denmark, United Kingdom and Germany, 1,000 fingerprints were deposed on the legs, i.e. skin surface of 40 corpses with the assistance of 26 donors. Magnetic powder and black powder were used to lift the traces of papillary lines and isomark and white dactyloscopic foil were used to secure them. Biological material was secured as well. The corpses were kept in laboratory conditions, at normal room temperature. The time interval between the impressing and lifting of the traces was between 30 and 60 minutes. A 9.1% identification usability of the lifted traces of papillary lines on the skin and a 6.8% identification usability of papillary lines on lifters was established. The study was concluded with the finding that in the case at hand, the magnetic powder proved to be more suitable to lift the traces of papillary lines, while isomark proved to be more suitable as a securing device (lifter).

In our lab we investigated whether certain dactyloscopic powders and reagents can recover latent fingerprints on human skin surfaces [19]. Four fingerprint powders, Magnetic Jet Black, Magnetic Silver, Silver Special, Swedish Black, and two other methods, cyanoacrylate fuming (CA) and Ruthenium tetroxide (RTX), were used. The fingerprints were intentionally deposited on the skin surface of 15 living persons and on 5 dead bodies separately. Fingerprints were deposited on the wrist area and neck skin surfaces. Finger marks were then processed within 15 to 180min. *Fingerprints on skin surface of living subjects*: fifteen participants impressed fingerprints on each other's wrists. Finger mark depositions were carried out within the forensic laboratory under controlled conditions. *Fingerprints on skin surface of dead bodies*: prints were deposited by eight separate volunteers onto five dead bodies. Examinations were conducted within the forensic medicine laboratory. At the time of fingerprint deposition the skin temperature of the bodies was between 6 °C and 7 °C.

Finger marks were recovered and positive results were achieved with Magnetic Black and Swedish Black powder on the living subjects. On dead bodies finger marks treated with cyanoacrylate were visible but those treated with RTX, Swedish Black and Magnetic Jet Black powder were useful for potential comparison. On dead bodies the best results were obtained by RTX method.

The other examination was done to investigate whether certain lifting techniques can lift recovered latent fingerprints on human skin surfaces of living subjects [20]. For recovery the Swedish Soot powder mixture was used. Four participants (donors) two male, two female (all 35–40) deposited their fingerprints on the wrist area. During the deposition of finger marks the contact time was between 3s and 5s. The finger marks were recovered immediately after the impression had been deposited and then 1 and 4h post deposition. Each set of conditions was repeated in duplicate and examined with enhancement technique Swedish Black. In the majority of cases the four individuals deposited between three and five sample finger marks on human skin surfaces. There were about 79 samples available for Swedish Black. The total number of all samples for all procedures carried out at different times was 183. Five different lifting techniques were used to lift secured and preserved treated finger marks from skin surfaces as latent fingerprint evidence — white instant lifter, white fingerprint gelatine, black fingerprint gelatine, silicone, and transparent adhesive tape. All solvents, chemicals and lifters were purchased from the BVDA company (Bureau voor Dactyloscopische Artikelen) [21].

Immediate lifting and transfer of finger marks: by means of Swedish Black, the donors lifted 79 samples of finger marks usable for further examination. Out of these 18 were secured with white instant lifter and 50% were usable for further examination. With the white fingerprint gelatine techniques 20 marks were secured, and 75% were usable for further examination. Only 17% of marks were not usable for further examination with black fingerprint gelatine, but 83% of marks were examined by means of slanted light. Due to a need for additional optical method, we stopped using this securing technique in further examinations. By using Silicone 18 marks were transferred and only 6 were unfit for further use. As the last transfer transparent adhesive tape was used for 11 lifted prints. The results show that 55% were usable. The most suitable transfers were proved to be silicone, white fingerprint gelatine and black fingerprint gelatine, the latter assisted by light. *Lifting and transfer of finger marks after 1h*: donors secured 53 samples of usable finger marks for further examination. Of these 15 were secured with white instant lifter and 50% were unfit to be used for further examination. With the white fingerprint gelatine techniques 12 marks were secured, and 59% were usable for further examination. By using Silicone 16 marks were transferred and 75% were usable. Transparent adhesive tape was used for 10 lifted prints. The results show that 40% were usable. The most suitable transfers were proved to be Silicone with only 25% marks unfit for further use, and white fingerprint gelatine with 7 usable marks. *Lifting and transfer of finger marks after 4h*: the donors secured 51 samples of usable finger marks. Of these 15 were secured with white instant lifter and 60% were unfit to be used for further examination. With the white fingerprint gelatine techniques 12 marks were secured, and 42% were usable for further examination. By using Silicone 14 marks were transferred and 22% were unfit to be used for further examination. Transparent adhesive tape was used for 10 lifted prints. The results show that 40% were usable. The most suitable transfers were again proved to be Silicone with only 22% marks unfit for further use, and white fingerprint gelatine with 57% results unfit for further examination.

The best results as regards the enhancement of the treated finger marks on human skin were achieved using silicone and white fingerprint gelatine. In both cases friction ridges were almost invariably easily identified and characterised regardless of the surface. Less convincing results were obtained using transparent adhesive tape and white instant lifter on these surfaces.

Under certain conditions and in individual cases, the traces of papillary lines on human skin surfaces can be recovered, lifted or secured. This mainly depends on the composition of papillary lines, the time elapsed between the deposing of traces, i.e. the perpetration of a criminal offence and the lifting of fingerprints, environmental conditions (humidity, cold, heat), location where the victim is discovered (outside or inside the premises), temperature of the victim's skin, method applied.

5. CONCLUSION

Although traffic accidents with concealed or feigned driver identities do occur, the types of such accidents and the reasons for concealing or feigning driver identity have not been systematically processed in the Republic of Slovenia. They may merely be partly summarised based on statistical data indicated in the paper. Traffic accidents thus most often constitute a minor offence or a criminal offence. With a view to concealing evidence, especially traces, the perpetrator might move the victims or participants, which results in a changed scene of accident and driver identity (e.g. the perpetrator drives a vehicle, causes an accident, then changes the location of victims or other passengers), misleading the investigators in their analysis of the driver and other circumstances. Furthermore, such

an act might be carried out with a view to insurance fraud. There is a number of road traffic, criminal investigation and forensic medicine methods that can be used to establish the position of the driver and other participants. However, they need to be upgraded and joined by the new ones. Methods that are often used involve the security belt (injuries on the body) and the securing of micro traces on seats and biological traces resulting from contact between the body and the vehicle or the airbag. In addition, the perpetrator (driver) might have been in physical contact with other participants (passengers) during the accident. It is therefore possible that traces, e.g. biological traces or fingerprints might have been left on the victim's skin by the driver. Apart from the established and conventional methods of determining the identity and position of drivers and participants (passengers) in traffic accidents, this paper proposed the detection of finger marks on human skin surfaces.

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POVZETEK

IDENTIFIKACIJA VOZNIKOV V PROMETNIH NESREČAH IN DOLOČANJE POZICIJ UDELEŽENCEV V VOZILU PO PRSTNIH SLEDEH

Namen prispevka je pojasniti določena preiskovalna dejanja pri analizi t.j. pri kriminalistično tehničnem oz. forenzičnem ogledu kraja prometne nesreče. V primeru prometne nesreče je treba za strokovno in pravilno forenzično preiskovanje čim hitreje zavarovati kraj. Če se kraj dejanja ne zavaruje, se sledi izgube ali kontaminirajo, kar vodi do težjega dokazovanja ali pojasnjevanja dokazov v postopku ali celo do njihove popolne nezmožnosti. Vidik obravnavanja je usmerjen v izhodišča ogledne dejavnosti, saj analiza prometnih nesreč v cestnem prometu in preiskovanje zahtevajo od preiskovalcev veliko znanja in pozornosti. Zelo zahtevni so primeri fingiranih prometnih nesreč, prometnih nesreč ko vozniki ali udeleženci zapustijo kraj dogodka ter nesreče, kjer je treba ugotoviti identiteto voznika in udeležencev, živih ali mrtvih. Ugotavljanje istovetnosti udeležencev poteka po ustaljenih kriminalističnih oz. forenzičnih ter sodnomedicinskih metodah. Mednje se prišteva tudi potrditev identitete po osebnih dokumentih, dokumentih in lastništvu vozil, prstnih sledeh, bioloških sledeh, sledeh vlaken in kontaktnih sledeh, sledeh telesnih poškodb voznika in udeležencev ip. Rezultati preiskave detektiranja prstnih sledi na površini človeške kože so pokazali, da je tudi tovrstno metodo možno uporabiti pri potrditvi fizičnega kontakta voznika z udeleženci v prometni nesreči, npr. pri premikanju žrtev in fingiranju kraja dejanja.

KLJUČNE BESEDE

prometne nesreče, analiza nesreč, identiteta voznikov, lociranje potnikov, prstne sledi, človeška koža

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