

Blood Sample Transfer Conditions and Results

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ABSTRACT: After traffic accidents, using of inappropriate blood sample tube is one of the technical mistakes that affects result of toxicological analysis for detection of alcohol and drug abuse. Our case presented because of the legal consequences of blood analysis that detected volatile organic compound at blood sample in erroneous blood sample tube. After motorcycle accident, blood was taken from the patient into yellow headed, gel tube. Alcohol and drugs weren't detected in blood but toluene. Upon this, the person was prosecuted even toxicology report stated that the toluene can be derived from the blood tube. In his medical record after the accident and our evaluation in Istanbul Faculty of Medicine, Forensic Medicine Department, showed no medical symptom that supports the person's drug use. Before transferring the blood which toxicological analysis will be performed, the information that sample tube must be specific or gray headed tube that contains NaF and KOx should be provided. Also obligation of additional explanation about technical mistakes that affects analysis results and causes to legal sanctions arises.

Key words: Blood, toluene, toxicology, volatile organic compound.

I.INTRODUCTION

In our country, blood samples are taken from people after traffic accidents in order to determine alcohol, narcotics and drugs. These samples are analyzed directly in the related laboratories of the Forensic Medicine Institute but if the units of the Forensic Medicine Institute is not located in that area, the samples are analyzed in the laboratories of other public institutions and evaluated whether the person uses any substance. One of the technical errors during this application (taking the blood sample) which directly affects the result is due to the fact that the blood sample is taken into the appropriate tubes and not transferred appropriately (1). In order not to affect the results of the laboratory, it should be ensured that the blood taken in special tubes with gray cap, containing preservative NaF, should be examined by transferring them under these conditions. If these conditions are not provided, false positive or false negative results may occur (2). In this context, one of the wrong applications affecting the result is due to the fact that these samples are taken into tubes containing gel inside. According to the results of scientific research, it is known that these blood tubes cause false results due to the substances they contain, and positive results are obtained in the blood sample even if there is no toluene.

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According to the results of a study conducted at the Forensic Medicine Institute in which the examination was conducted, it was reported that a very high level of toluene could be detected incorrectly and the results obtained from the blood samples taken from such tubes should be considered carefully (3).

The case was presented because of the possible legal implications of the volatile substance detected in the analysis of the blood sample which is sent to the laboratory in the wrong tube.

II. CASE

46-year-old male interview; On 03.01.2015, he stated that he looked around to find his way while he was in traffic with his motorcycle to go to his residence in Halkalı. In the meantime he stated that he had not noticed the minibus in the fault lane and that he had hit the parked car from behind. He stated that his helmet was smashed and there was a short-term loss of consciousness after the accident, and, he woke up and when the personnel coming out of the van tried to lift him up and was brought to the university hospital.

Examination of medical documents; In this case, it was determined that his nose and left eyelid were injured, his nose was adhered to his face, his eyebrow was opened, his left eye was closed and he was examined in the emergency room, he had stitched, his left wrist was broken and it was taken to the plaster. Later, it was understood that the doctor in the emergency room changed and all procedures were resumed and a fracture was detected in both hands. It was determined that the surgery was decided, the blood samples were taken by the nurse, and the day after the accident he was operated and awakened very easily. In the interview, the patient stated that he did not use alcohol and drugs before his accident and that alcohol use in his daily life was very rare. The blood sample taken in the hospital after the accident was analyzed by the Chemical Specialization Department of the Ministry of Justice and Forensic Medicine Institute and according to this report, there was no alcohol (ethanol, methanol) in the blood but toluene was found.

Psychological assessment of the individual done by a psychiatrist. In this psychological assessment; he stated that he could enjoy his life, there was no reluctance in his own care, and he had no problem facing the society. He also stated that he was very good with his wife and relatives, and that he was interested in photography, painting, record collection, cinema and philosophy as a hobby. He stated that he had no reluctance for these hobbies, when he was asked about his plans for the future, he thought about changing his job, he could improve his English and he could go back to university. When asked what jobs he had worked before; while he was a student, he stated that he was a computer operator, had entered data, worked in a canteen, and was researcher and a graphic designer. He stated that his professional life did not satisfy him, his friendship was good and he had close friends, he was an outgoing person, he did not have any problem with self-confidence and he thought that there was no work he couldn't do.

He stated that he is the person in the organization but not the leader or the one who organize the business. He reported that his appetite and sleeping pattern were good. He stated that he could be a perfectionist, he was not a meticulous person, and he had no habits like the extreme hand washing. When he got very angry, he walked out and said that he had been cycling when he had a bike. He stated that he was not afraid of being open, being connected, and being friendly. He reported there was no suicide attempt and no self-harm and no psychiatric treatment before. When he was asked about substance abuse; He stated that he did not use toluene or thinner throughout his life, he was very uncomfortable with the smell of paint shops, he once smelt of thinner while he was having oil paint and he had very bad headache. He stated that he had quit smoking in 2006 and that he had smoked one or two in a day for 20 years. He also stated that he had never been addicted to cigarettes, that he consumed alcohol in social environments once every 3-4 months, he never consumed on his own.

In his mental examination it was determined that he was conscious, open to interview, cooperative and his appearance and care for him well, psychomotor activity was normal and there was no pathology in his memory. In addition, attention concentration was normal, speech tone, amount, speed was normal, thought rate was normal in thought process. In his thought content delusions, obsessions and suicidal thoughts were not detected. It was found that there was no pathology in its perception, mood was euthymic, and its affect was appropriate, impulse control

frustration tolerance was normal, internal view, judgment were present. No psychiatric diagnosis or substance use findings were found in the patient. In his physical examination no change was detected in the person's body due to substance use. No information or findings related to substance use were found in the forensic and medical documents of the person after the accident.

III.DISCUSSION

Toluene is produced from crude oil, used in the construction of gasoline and other fuels, coke and plastics. There are many applications in commercial and industrial areas. Exposure to toluene may occur in business life, but toluene intoxication is often seen in substance abuse. The main method of abuse is inhalation. It is rapidly absorbed and appears in the blood within 10 seconds of ingestion. Characteristic symptoms of inhaled substances such as toluene are that; the smell of a strong chemical or volatile substance in the person's breath and clothing, residues of the substance used in his mouth, nose and hands (4,5).

Intoxication of substances taken by inhalation such as toluene, butane and propane produces a central nervous system depression similar to alcohol intoxication. Various symptoms can be seen; nausea, vomiting, sneezing and coughing, probable dilated pupils, dizziness, red eye, lachrymation, intense headache, difficulty in concentration, speech disorder, confusion, disorientation, sedation, lethargy, memory loss. Possible physiological effects are irritation, sweating, increased pulse and tension in the nose, eyes and throat. In more severe cases, arrhythmia, respiratory failure, convulsion, serious organ damage, coma and death can be caused. Long-term exposure to toluene may result in paranoid psychosis, temporal lobe epilepsy, attention deficit, visual damage, brain, liver and kidney damage. Toluene also has the potential for physical and psychological dependence, and withdrawal symptoms can be seen when one cannot reach toluene (4,5). In the incident in question, in the report of the Chemistry Specialization Department of the Forensic Medicine Institute, it was reported that the blood sample taken in the hospital had toluene. However, since the sample was not sent in the NaF tube containing preservative (in the gel tube), it was stated that the toluene detected by the examination may be caused by the tube and must be met with caution. The use of toluene as described in detail above also has physical and mental effects. There were no findings suggesting the use of toluene in the physical examinations performed in the hospital after the accident. In our physical and detailed physical examination, no evidence of substance use (toluene, sleep, drugs) was found.

In studies performed in the samples taken from yellow cap tubes used for different parameters, it was reported that high levels of toluene could be detected and the results should be interpreted with caution. In a case presented in the literature, a 31-year-old woman with diabetes mellitus applied to the hospital with symptoms of hyperglycemia. Toluene was detected in the blood tests on suspicion of poisoning but it was revealed that toluene was caused by gel in the advanced tests and cocaine was the cause of worsening of the patient's condition (6). In another patient, a 15-year-old girl was found to have toluene in her blood sample collected for the purpose of investigating sexual abuse narcotic-drug use. When the case is evaluated, the effect of toluene on the attack is not expected. As the blood sample was taken improperly into the gel tube, further investigations were performed for the tube and toluene was found to be caused by gel tubes (7). In another case, two workers working with adhesive containing toluene in the closed environment were hospitalized upon deterioration. Toluene was found in the study of the tubes after the increase in the amount of toluene in the blood samples, although there was no toluene exposure during the hospitalization period (8).

In this study, sample intake, transfer and alcohol level detection are frequently discussed. In the presented case, there was a risk of evaluating as "volatile substance use" in terms of the results the toluene detected in the sample. Moreover, it is clear that in the person who has been decided to postpone of his sentence as a result of his previous trial, this laboratory result will lead to different legal consequences (9). Therefore, in order not to cause a false or negative result of the blood sample to be used in toxicological analyzes, information should be given about the blood sample to be transferred to specially prepared tubes for toxicological analyzes or to special tubes with gray lids (containing KOx and NaF) when not available. There is also the necessity to make additional statements outside of the routine in the report writing about the technical inaccuracies that affect the result of the analysis and which may therefore have severe legal implications.

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