Efficiency of Determination of Elemental Composition of Metals and their Topography in Objects of Biological Origin Using Spectrometers

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Abstract

Bodily injuries, caused by firearms and special non-lethal means, which are provided for law enforcement agencies and special services and they are available to the civilian population as well (pistols for firing ammunition equipped with elastic bullets, stun guns, etc.,) and the consequences of torture using various methods and the traumatic factors that caused by them have to get expert objective assessment. Among other laboratory studies, it is important to determine the characteristics of the composition of chemical elements in objects of biological and non-biological origin by performing X-ray fluorescence spectral analysis using modern spectrometers. The object: to determine the characteristics of the elemental composition of metals and their topography in injuries caused by gunshots and stun gun by conducting X-ray fluorescence spectral analysis using spectrometers "ElvaX CEP-01" and "M4 TORNADO". Conclusions: the use of spectrometers increases the accuracy and objectivity of expert examinations of injuries caused by firearms and electric shock device as they have a wide range of chemical elements detection in the composition of the products of the shot and the electro tag from sodium to uranium. Using X-ray fluorescence spectral analysis, it is possible not only to detect metals in the layers of soot on injuries, but also to conduct a targeted "microscopic" study of their topography for partial group identification of firearms and the installation of electrode metal, which acted as a contact body conductor. X-ray fluorescence spectral analysis is a non-destructive research method.

Key words: *gunshot wound, electric trauma, X-ray fluorescence spectral analysis.*

Introduction

Terrorism, local wars and internal conflicts, in which law enforcement officers act as one of the parties, are becoming more and more serious problems for all countries of the world. [4, 11, 16] This leads to a wide range of damages caused by the action of weapons on the standard equipment of certain law enforcement agencies, including an action of so-called "non-lethal weapons", such as means of shock and trauma, equipped with elastic bullets, electric shock devices and more. Situations of excessive use of force and torture, in which firearms and electrical devices can act as a traumatic factor have a special significance in these conditions. [2, 15]

Therefore, due to consistently significant number of injuries caused by firearms, special non-lethal means, which are provided for law enforcement agencies and special services and they are used in torture and they are available for locals, it is important to make assessment of the damage of objects of biological origin objectively with the use of highly efficient laboratory equipment, in particular, modern spectrometers.

Many countries around the world use highly sensitive spectrometers based on the use of physicochemical methods of analysis to determine the factors that accompany a shot from a firearm or the consequences of an electric shock device: atomic absorption