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# Estimation of Time Since Death by using Algorithm in Early Postmortem Period

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*Received: 10 December 2012 Accepted: 5 January 2013 Published: 15 January 2013*

## Abstract

Estimation of the time since death in the early post mortem period is performed by analysis of the supravital signs and the early signs of death. Using several methods for determining the time since death increases significantly the preciseness and reliability upon estimation of the time since death.The objective of this paper is to find a way for faster and more simple estimation of the time since death by using several parameters.

***Index terms***— time of death, electric and chemical excitability, cooling of the body, postmortem lividity, rigor mortis.

At the Institute of Forensic Medicine and Criminology an analysis of five parameters for estimation of time since death was performed: supravital reactions (electrical excitability of muscles, chemical excitability of muscles) and early signs of death (cooling of the body, post mortem lividity and rigor mortis) at 120 cases with known time of death. Obtained results have been used for preparation of a special table-algorithm, which contains the limit minimum and maximum values of the post mortem period for each tested parameter.

## 1 Introduction

he estimate of the time since death, after the first 48 hours (the so called early postmortem period) is determined by routine appliance of conventional methods of corpse examination and detecting the development of postmortem changes. Due to the big variations in time of occurrence and duration of such corpse changes, influenced by many endogenous and exogenous factors, it allows only approximate determination of the time of death in a few hours interval after death.

Using several methods for estimation of time since death (the supravital signs and the early signs of death) has significantly increased the preciseness and certainty in estimation of the time of death.

Electric excitability and chemical excitability of muscles present highly important supravital reactions in achieving higher level of precision in estimating the time since death. Most appropriate and accessible muscles for testing by electric stimulation are the muscles around the eyes (m.orbicularis oculi) and the muscles around the mouth (m.orbicularis oris). While the flat muscles of the iris in the eye react to chemical stimulation in a longer post-mortem period. (4,6,7) The postmortem cooling of the body (algor mortis) is one of the significant parameters in estimating the time since death. After death the body temperature regulation is stopped, the corpse becomes poikilothermic resulting in drop of body temperature in order to adjust to the environmental temperature. (1,4) Postmortem lividity starts to manifest and develop immediately after cardiac arrest, i.e. stoppage of blood circulation; it can also start developing before death, during a long comatose period due to disrupted circulation. From the moment of death blood remains fluid and is liable to physical laws moving as influenced by gravity; thus the blood in the blood vessels flows passively towards the distal parts of the body (depending on its position). The time of appearing of postmortem lividity and manifestation extent depends on many reasons among which the most important are the cases of a long comatose agony and massive blood loss. (4,5) Rigor mortis is a specific type of muscle contraction which mainly does not decline from physiological contraction, appears within 1-3 hours after the moment of death. All body muscles contract and stay rigid,

without activity potential. This contraction is caused by loosing of the total ATP which is necessary for separation of cross bridges from the actin filaments in the process of relaxation. Muscle stays in rigor until muscle proteins disintegrate which usually occurs by autolysis with enzymes released from lysosomes, 15 to 24 hours after death, depending on external temperature. (4,5) Purpose of this paper is to find a way for faster and more simple determination of the time since death by using several parameters. reaction of any degree -post mortem period shorter than 8 hours.

uncertain reaction -post mortem period 8-15 hours no reaction at all -post mortem period of 16 and more hours. reaction of any degree -post mortem period up to 6 hours uncertain reaction -post mortem period 6 to 13 hours no reaction at all -post mortem period of 14 and more hours. The results obtained by analysis of the early signs of death and supravital reactions are marked and they point out to a post mortem period longer than 16-18 hours.

With the Henssge Nomogram the probable post mortem period is 20±2,8 hours. Possible time of death is the previous day at 17,30±2,8 hours.

Additional data have been obtained by investigation and enquiry of the witnesses, that the murdered person has been at work by 17,00 hours (video surveillance camera).

V.

# 2 Conclusion

The algorithm we prepared also contains the limit values, minimum and maximum values for the post mortem period for each of the tested parameters, allowing an easy and quick estimation of the possible post mortem period.

Supravital reactions and the early signs of death are important parameters in estimating the time since death in the early post mortem period, especially during the first 24 hours after death, but only in case they have been analyzed together as a whole and provided that the influence of endogenous and exogenous factors has been taken into consideration. [1] [2] [3]


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Figure 1: Fig. 1 :Fig. 3 :

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Figure 2: Fig. 4 :Fig. 5 :Fig. 6 :Fig. 7 :Fig. 8 :


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Figure 3: Fig. 9 :

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Figure 4: Chart 2 :

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Figure 5: b) Chemical Excitability Chart 3 :Chart 4 :

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Figure 6: 8 :?

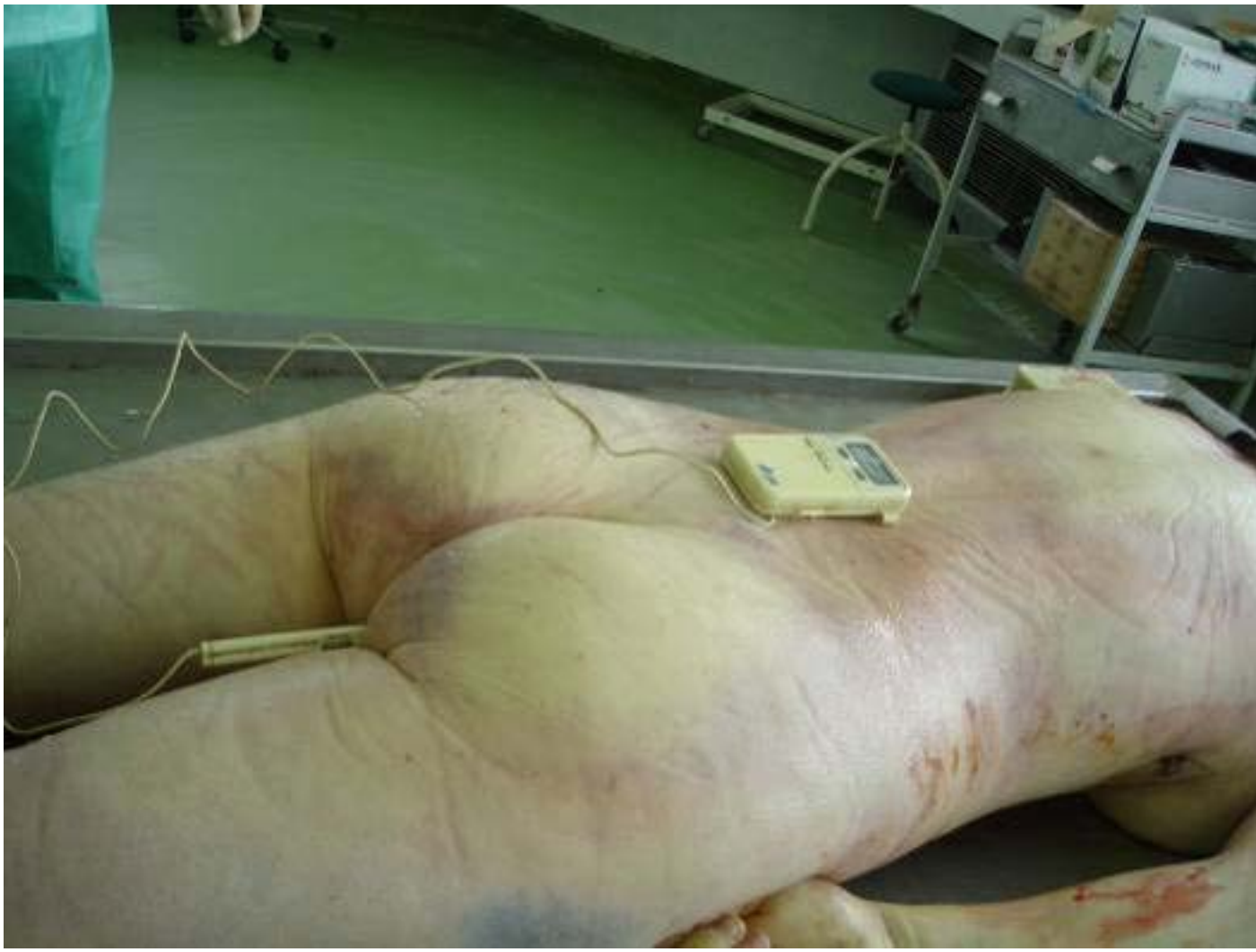

Figure 7:

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