K15 Postmortem Production of Ethanol in Different Tissues Under Controlled Experimental Conditions

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After attending this presentation, attendees would be able to establish the level of postmortem ethanol (produced after death) under controlled experimental conditions within different time intervals and under different temperature.

The authors would like to see the results from this survey considered as a basis for further investigations with crucial aim that is very important in forensic practice - to distinguish postmortem (endogenous) production of ethanol versus ethanol ingestion before death (exogenous one).

There is the assumption that postmortem production of ethanol is in accordance with temperature increase, duration of time interval, and amount of carbohydrates in the tissue.

All the activities of this survey were performed at the Department of Forensic Medicine, Clinical Center Novi Sad, on the corpses of persons of both sexes, aged between 20 and 50 years, whose death occurred 6-12 hours before autopsy, i.e., taking the specimen. The death of the persons whose corpses were used for the analyses was of natural or violent origin and it excluded medical interventions (treatment and death in the hospital, or other medical institution), and the violent deaths caused by toxic substances. The specimen of blood, liver, skeletal muscle and kidney were taken from 30 corpses and were divided into 2 control and 3 experimental groups. The first control group of specimen was analyzed immediately after taking, and the second control group of specimen was stored at the temperature of – 20 ºC. The first experimental group of specimen was stored at the temperature of + 4 ºC, the second at +20 ºC, and the third one at +30 ºC. All experimental groups were divided into four subgroups, according to the duration of incubation at given temperature: the first subgroup was stored at appropriate temperature for 24 hours, the second for 48 hours, the third for 96 hours and fourth one, for 192 hours. Chemical ethanol analysis of the taken specimen was performed by standard gaschromatography method.

The results show that all of the control specimen stored at -20 ºC do not show any change in ethanol quantity, in all time intervals. There is no statistical significance of ethanol quantity change remarked in any tissue stored at +4 ºC at any time interval. At the temperature of +20 ºC, all tissues, except blood, show statistically significant ethanol quantity change referring to time intervals, comparing with controls. The postmortem production of ethanol at +30 ºC is increased due to the course of time, in all tissues. Statistically significant ethanol quantity change appears on the 1st day (kidney, muscle and liver tissue) and 2nd day (blood) at +30 ºC, while at +20 ºC it appears predominantly on the 2nd day (kidney, liver and muscle tissue). Significant increase of produced ethanol in liver, kidney and muscle tissue at +30 ºC is noted up to particular time interval (liver – 4th, kidney and blood – 2nd, muscle 1st day), after which these levels are mildly decreased without statistical significance, except in blood tissue, where the significant decrease was found. The absolute range of produced ethanol reaches the highest level in liver tissue.

On the basis of the results gained during this survey, we can confirm the assumptions as follows: 1. the postmortem production of ethanol occurs and it varies in different tissues; 2. postmortem production of ethanol is increased by rise in temperature; 3. postmortem production of ethanol depends on the tissue amount of carbohydrates (liver – glycogen); 4. postmortem production of ethanol is increased, in general, in accordance with the course of time. It is observed, too, that postmortem production of ethanol is increased up to particular time interval at +30 ºC, after which the values of measured ethanol are mildly decreased.

Postmortem Production, Ethanol, Experimental Conditions

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