

Department of Clinical Laboratory Sciences

Graduate Masters Theses

Effect Of The Decomposition Process On Muscle Alcohol Concentrations

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ABSTRACT:

In the forensic toxicology laboratory, antemortem blood, postmortem blood and vitreous humor samples are typically used for alcohol analysis. It has been proposed that when no blood or vitreous humor specimens are available for analysis, skeletal muscle tissues may be used. However, caution must be exercised when interpreting postmortem skeletal muscle tissue alcohol concentrations because it may be affected by an enzymatic degradation of alcohol or synthesis by microbial action. The primary objective of this study was to determine how muscle alcohol concentrations would be affected during the decomposition process. Skeletal muscle tissues were collected at autopsy from 32 decedents (for which blood alcohol concentrations were determined) and subsequently frozen. For this study each sample was divided into three portions: one portion was assayed for alcohol content at the start of the experiment (day 0) representing alcohol concentrations most likely to be present at the time of collection at autopsy. The remaining two portions were incubated at 25°C in a humidified chamber for 7 and 14 days respectively, before measuring the alcohol content. After incubation, the day 7 moderately decomposed muscle tissues appeared brown whereas the day 14 severely decomposed muscle tissues were brown to black in color. No apparent odor was observed in the day 7 and day 14 muscle tissues after incubation. The alcohol content was measured in tissue homogenates (25%, weight/volume) and performed by capillary gas chromatography with flame ionization detection. There was a strong direct relationship between blood alcohol and day 0 muscle alcohol levels ($r=.985$). Incubation significantly increased the alcohol content in all tissues, including the four specimens that did not contain any alcohol on day 0, concurrently with muscle decomposition. There was an average of 166% increase in alcohol concentration seen after 7 days and 316% increase seen after 14 days of incubation. The additional alcohol produced in all tissues possibly came from microbes fermenting substrates such as glycogen and glucose during the putrefaction process. In conclusion, while it is possible to measure muscle alcohol, a good correlation may be found between blood and muscle alcohol only in non-decomposed tissue. Endogenous alcohol production must be seriously considered, especially in cases of decomposition. Based on the data presented in this study, decomposed skeletal muscle tissue is not a valuable source for alcohol determinations.