Accident or Arson: Is CO-Oximetry Reliable for Carboxyhemoglobin Measurement Postmortem?

Kalen N. Olson,[1] Melissa A. Hillyer,[1] Julie S. Kloss,[1] Roberta J. Geiselhart,[2] and Fred S. Apple[1,3*]

[1] Hennepin County Medical Center and [2] Medical Examiner's Office, Minneapolis, MN; [3] Department of Laboratory Medicine and Pathology, University of Minnesota, Minneapolis, MN.
* Address correspondence to this author at: Hennepin County Medical Center, 701 Park Ave., Clinical Labs P4, Minneapolis, MN 55415. Fax 612-904-4229; e-mail apple004@umn.edu.

CASE DESCRIPTION

CASE

A 46-year-old woman was found dead in the basement of her home after a fire. External examination of the body showed a wound to the head and soot in the nose and mouth, with soot also found internally in the trachea and bronchi upon autopsy. On questioning by the police, the woman's husband admitted that he and his wife were having an argument that led to him accidentally knocking her unconscious by pushing her and causing her head to strike an object. The husband, believing her dead, then set fire to the house to hide his wife's death. Police charged the husband with first-degree intentional felony murder (intentionally causing death while committing or attempting to commit arson) and second-degree unintentional felony murder (unintentionally causing death while committing a felony). The prosecuting lawyers' case hinged on the measured carboxyhemoglobin (COHb)[4] concentration to prove that the wife was indeed alive when the fire was started and therefore the husband was also guilty of murder by committing arson. The blood COHb concentration measured by a 6-wavelength CO-oximeter was 61.4%. Defense lawyers argued that CO-oximetry was an unreliable method for postmortem COHb measurement, compared with other methods, and therefore the result obtained was not valid proof "beyond a reasonable doubt" that arson was the cause of the wife's death.

Questions to Consider
• Was the victim's COHb concentration at autopsy lethal?
• Is CO-oximetry a reliable method for postmortem COHb measurement compared with gas chromatography (GC) and UV spectrophotometry?
• What mechanisms are responsible for increases in methemoglobin (MetHb), and do increased concentrations interfere with CO-oximetry measurements of COHb?

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Final Publication and Comments

The final published version with discussion and comments from the experts will appear in the April 2010 issue of *Clinical Chemistry*. To view the case and comments online, go to http://www.clinchem.org/content/vol56/issue4 and follow the link to the Clinical Case Study and Commentaries.

Educational Centers

If you are associated with an educational center and would like to receive the cases and questions 2-3 weeks in advance of publication, please email clinchem@aacc.org.

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