

K18 Transforming Toxicology in South Africa—Illustrating Proof of Concept Using Data From Routine Carboxyhemoglobin (COHb) Analysis

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Learning Overview: After attending this presentation, attendees will have gained knowledge on the use of a Radiometer ABL825 FLEX analyzer for the analysis of COHb content in postmortem blood, as well as the relevance of COHb determination in postmortem investigations.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing insight into South Africa's unnatural death case profile and the associated challenges relating to forensic investigations in a developing country.

Introduction: Forensic toxicology has historically been an underdeveloped field in South Africa. This has resulted in several challenges in the medicolegal investigation of unnatural deaths such as: excessive backlogs, poor infrastructure, and lack of expertise. The Forensic Toxicology Unit (FTU) was established in Cape Town in 2016 to support and grow forensic toxicology services in South Africa. In July 2020, the FTU launched a routine service for the analysis of COHb, with the aim of providing an efficient and quality-driven toxicological service to support the death investigation process.

Methods: All case samples were received, accessioned, and analyzed in accordance with newly developed laboratory standard operating procedures. Postmortem blood samples were analyzed for COHb content using an ABL825 FLEX analyzer. The analytical method was fully validated according to international guidelines. Duplicate analyses were performed for each case, and the average was reported.

Results: A total of 98 cases were analyzed over a three-month period. The manner of death was considered to be an accident in 57.1% of cases, followed by homicide in 14.3%, and suicide in 4.1% of cases. Smoke inhalation and injuries due to burns were frequently listed as the cause of death in accidental cases, whereas blunt force trauma or multiple injuries were most frequently listed in homicide cases. Of the 98 cases, 14.3% were children or infants (<18 years). COHb concentrations were above the reporting limit of 5% in 69.1% of cases (mean COHb concentration = 25.3%), with the highest concentration reported being 69.4%. The average turnaround time for reporting of results from specimen receipt was 9.5 days.

Conclusion: Fire-related deaths are a common occurrence in South Africa, particularly in vulnerable populations, and reliable COHb results are imperative for accurate cause of death determination. The successful implementation of routine COHb analysis has allowed forensic medical practitioners to conclude their postmortem investigations in record timeframes, the benefits of which are far reaching, not only for stakeholders involved, but also the community it serves. The FTU strives to continue developing its service capacity in order to transform toxicology in South Africa from its historical state into a new era.

Carboxyhemoglobin, Toxicology, South Africa