

# POST-MORTEM MARKERS OF DIABETES AND THEIR USE IN FORENSIC PRACTICE

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## INTRODUCTION

Determining hyperglycemia post-mortem is challenging due to absence of any specific structural changes during the autopsy, and rapid breakdown of glucose after death. Instead, forensic pathologists rely on a combination of biochemical tests, medical history, and circumstantial evidence.

Beta-hydroxybutyrate (BHB) is considered a stable post-mortem marker, particularly in forensic pathology for investigating ketoacidosis (such as diabetic ketoacidosis, alcoholic ketoacidosis, and starvation ketoacidosis). Unlike other ketone bodies, such as acetone and acetoacetate, BHB is more chemically stable and less volatile, making it more reliable for post-mortem biochemical analysis.

Glycated hemoglobin (HbA1c) is considered a stable post-mortem marker as well, making it useful in forensic investigations, particularly for assessing long-term glycemic control in individuals with suspected diabetes mellitus (DM).

## AIM

The aim of the study is to establish a connection between chronic decompensated hyperglycemic state of diabetes mellitus, as evidenced by HbA1c, and acute hyperglycemia, marked by elevated levels of BHB, which were observed in blood taken during the clinical or forensic autopsies.

## METHODOLOGY

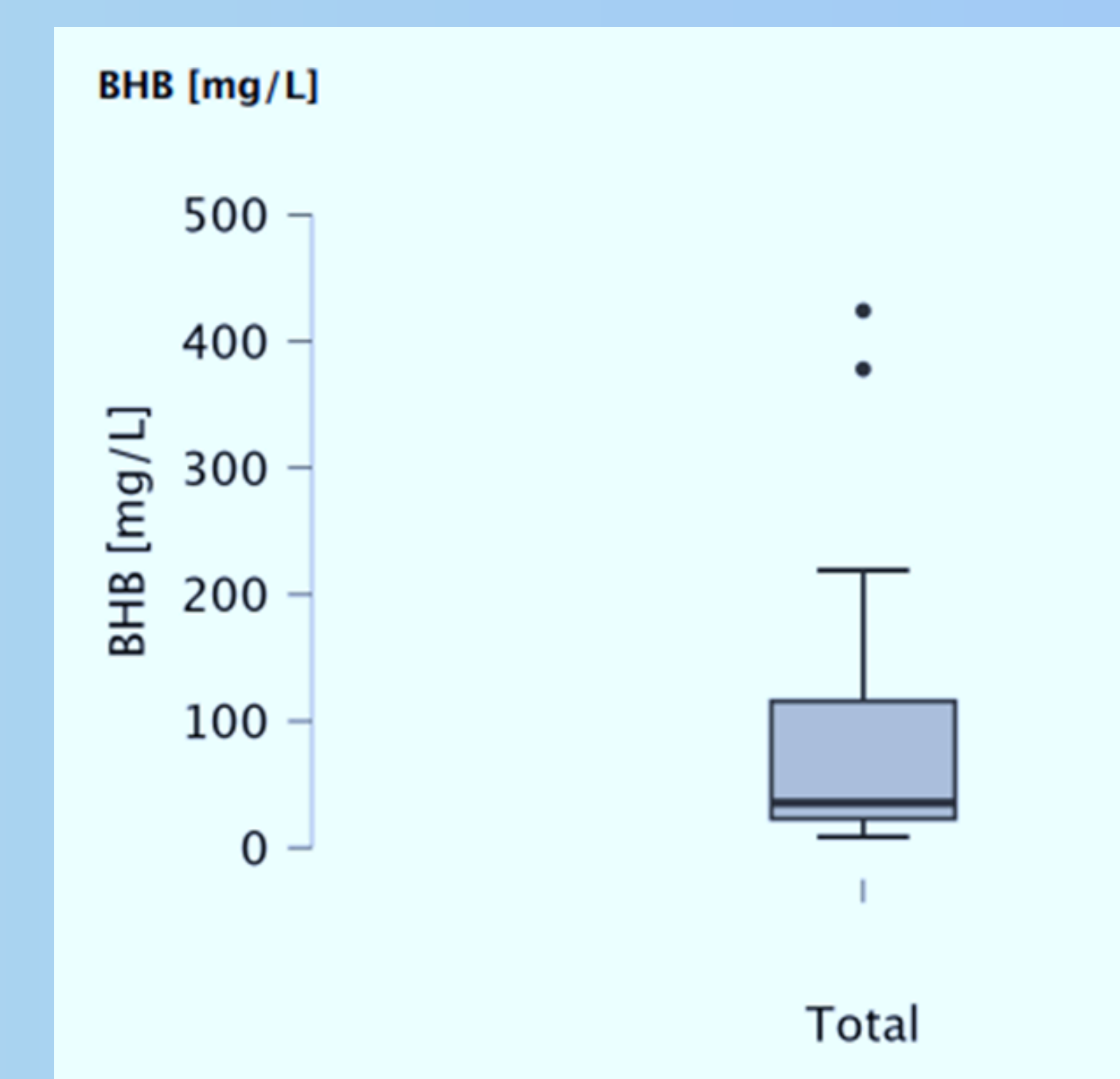
Compiling data history, autopsy and laboratory findings of deceased (n= 42), typified according to their medical history (known history of diabetes: type 1 DM n = 2; type 2 DM n = 15, not otherwise specified DM n = 24), or chosen according to the positivity of the volatile substances examinations post-mortem, after the autopsy (n = 1). The remaining blood samples from each of the chosen individuals were tested specifically for BHB and HbA1c presence.

## RESULTS

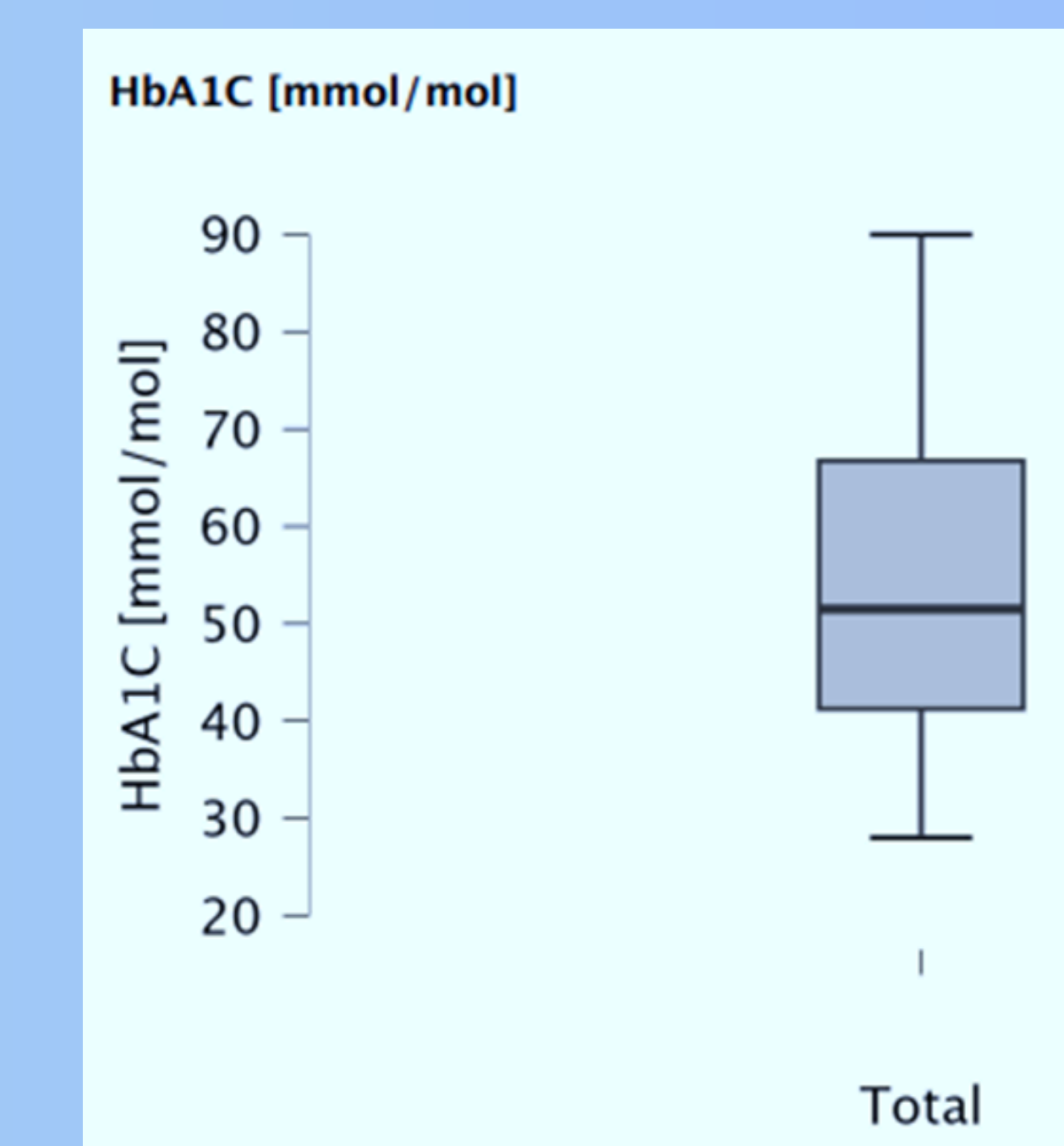
The results in our cohort show the box plots (graph 1, graph 2), which count with statistic deviations and show the median of investigated markers.

The significant correlation between BHB and HbA1c was not proved, as shown in scatter plot (graph 3). The quantities are dispersed and do not form a clear pattern.

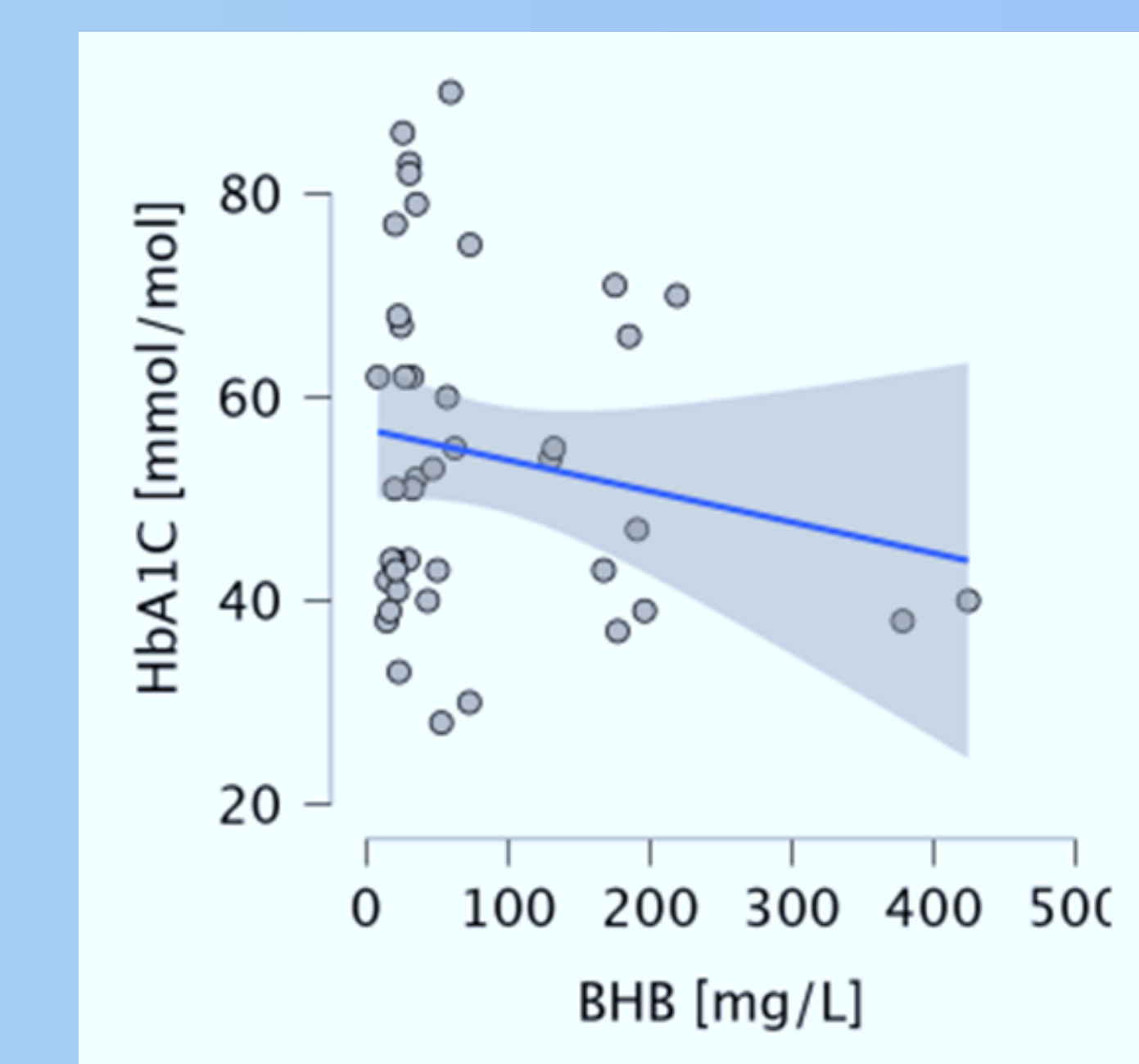
The significant correlation between BHB and HbA1c was not expected to be found.



Graph 1: BHB (mg/L)



Graph 2: HbA1C (mmol/mol)



Graph 3: BHB [mg/L] - HbA1C [mmol/mol]

## CONCLUSION

Evaluating of the glycated hemoglobin is not relevant for stating of an acute influence of ketoacidosis on an individual's organism, since the connection between BHB and HbA1c was not proved.

A larger cohort with a comparative group is needed to be tested for future studies.