Biotin interference with cardiac biomarkers: 
Impact, detection and prevention

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Introduction

- Biotin (vitamin B7, B8 or H) is easily accessible at high doses.
- Cardiac biomarker assays available for Troponin T (TnT), N-terminal pro-B-type Natriuretic Peptide (NT-proBNP) and Procalcitonin (PCT) are based on biotin-streptavidin interaction.
- The ingestion of supplements containing biotin may interfere with this immunosassay format, leading to misdiagnosis.
- The aim of our study is to assess biotin interference and laboratory solutions to overcome this emerging issue.

Methods

- Plasma TnT, NT-proBNP and PCT levels were measured in 10 patients with severe cardiac disease, on a Cobas 8000 e602 module (Roche Diagnostics, Basel, Switzerland).
- After obtaining initial biomarkers values, we first evaluated the impact of a biotin depleting device VeraPrep (Veravas, Charleston, USA) on the immunoassays' reactivity.
- Then, plasmas were enriched with biotin solution to simulate supplementation at the concentration of 3 600 ng/mL (FDA recommendation).
- Plasma biotin-spiked specimens were treated with the depleting device before measuring final values.

Results

<table>
<thead>
<tr>
<th>Patient</th>
<th>Initial value (pg/mL)</th>
<th>After biotin depletion</th>
<th>Post-Treatment</th>
<th>PCT depletion</th>
<th>Post spiking</th>
<th>Final value (pg/mL)</th>
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<td>4.68</td>
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- TnT, NT-proBNP and PCT values were not significantly different before and after biotin depleting treatment (coefficient of variation of 3%, 2% and 5% respectively).
- Biotin enrichment resulted in significant interference for TnT, NT-proBNP and PCT, with falsely low results for all three parameters. We observed a negative bias of 96%, 99% and 78% respectively.
- The use of the depleting device demonstrated a mean recovery of 96% in comparison with baseline levels, neutralizing the interference with biotin.

Conclusion

- High dose biotin leads to false negative results for cardiac biomarkers such as TnT, NT-proBNP and PCT with immunoassay using biotin-streptavidin format.
- Plasma treatment by a depleting device allows clinical biologists to consistently overcome biotin interference, without dilution effect and independently from initial values of studied parameters.
- Physicians and clinical laboratories should be alert to interference from biotin, as streptavidin-biotin based immunoassays will remain an indispensable analytical tool.

References

- Veravas, Charleston, USA https://www.veravas.com/