

Measurement of Cortisol and Testosterone in Athletes: Accuracy of LC-MS/MS Assays for Cortisol and Testosterone Measurement in Whole-blood Microspecimens

Background

- Hormone levels can be used as biomarkers for training tolerance in athletes.¹ In particular, cortisol and testosterone levels can be used to gauge overtraining and a decline in performance.²
- Routine assessment of blood levels of these hormones during training may be useful for athletes and coaches.
- However, the need for blood samples to be collected by a medical professional can limit the usefulness of such an approach.
- **Objective:** The investigators of this study developed and validated a finger stick microspecimen test that could be self-collected to detect cortisol and testosterone levels in athletes.

Methods

- The study population included 46 Division I collegiate athletes: 16 men and 30 women, with ages ranging from 18 to 22 years.
- Finger stick microspecimens (~ 20 µL) and venous blood samples (~5 mL) were collected and analyzed.
 - Finger stick specimens were analyzed for total cortisol and testosterone using a newly developed microspecimen liquid chromatography-tandem mass spectrometry (LC-MS/MS) assay optimized for small specimen volumes.
 - Venous blood specimens were analyzed using both the microspecimen LC-MS/MS assay and a standard-volume LC-MS/MS assay.
- Agreement between the results of the microspecimen and standard-volume LC-MS/MS assay was evaluated using Deming regression and Pearson correlation analyses.

Results

- **Microspecimen vs standard-volume assays:** Results from the finger stick microspecimen LC-MS/MS assay correlated well with those from the venipuncture standard-volume LC-MS/MS assay for both total cortisol ($r=0.92$; $P<0.0001$) and testosterone ($r=0.99$; $P<0.0001$).
- **Finger stick vs venipuncture specimens:** The microspecimen LC-MS/MS assay was used to measure hormone levels from finger stick specimens and from venipuncture specimens. Results from the 2 specimen types correlated well for both total cortisol ($r=0.96$; $P<0.0001$) and testosterone ($r=0.99$; $P<0.0001$).

Conclusions

- Cortisol and testosterone levels determined by a microspecimen LC-MS/MS assay were in good agreement with levels determined by a standard-volume LC-MS/MS assay.
- These results suggest that finger stick collection of blood microspecimens may be a viable method for monitoring hormone levels in athletes.

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Authors

Maren S Fragala,¹ Scott M Goldman,¹ Mildred M Goldman,¹ Caixia Bi,¹ Julia D Colletti,¹ Shawn M Arent,² Alan J Walker,² Nigel J Clarke¹

Affiliations

¹ Quest Diagnostics, Secaucus, NJ
² IFNH Center for Health & Human Performance, Rutgers, The State University of New Jersey, New Brunswick, NJ

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Webpage

<https://www.ncbi.nlm.nih.gov/pubmed/29985225>

References

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