Comparison of seven LC-MS/MS methods for the simultaneous measurement of testosterone, androstenedione and DHEA in serum

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Background

Recently, liquid-chromatography tandem mass spectrometry (LC-MS/MS) was stated to be the method of choice to measure sex steroids. Information on the agreement among LC-MS/MS methods, however, is scarce. Therefore, we compared seven published LC-MS/MS methods for the simultaneous measurement of testosterone, androstenedione and DHEA.

Methods

Fifty-five random serum samples obtained from volunteers were analyzed in duplicate by seven published LC-MS/MS methods. We calculated the mean concentration of all investigated methods per sample and used these values to calculate the coefficient of variation (CV) per sample. Pearson's correlation coefficient was calculated between the median concentration and the concentration measured by the respective method. Moreover, we calculated the intra-assay CV of each method using the duplicate results.

Results

Bias-plots and CVs for each of the 55 analyzed are shown in Fig. 1 and 2, respectively. The correlation coefficients ranged from 0.990 – 0.999, 0.942 – 0.999, 0.359 – 0,999 and 0.946 – 0.999 for all testosterone values, testosterone concentrations below 2 nmol/L, androstenedione and DHEA, respectively. The coefficient of variation between the methods was calculated per sample and shown in Fig. 2. The intra-assay CVs were 2.9-10%, 1.2-8.8%, 2.7-13% and 4.3-16% for testosterone concentrations below and higher than 2 nmol/L, androstenedione and DHEA, respectively.

Conclusion

In general the investigated LC-MS/MS methods for simultaneous measurement of testosterone, androstenedione and DHEA, showed a good agreement. However, there appear to be differences in standardization between some of the assays and a high imprecision in some of the assays.
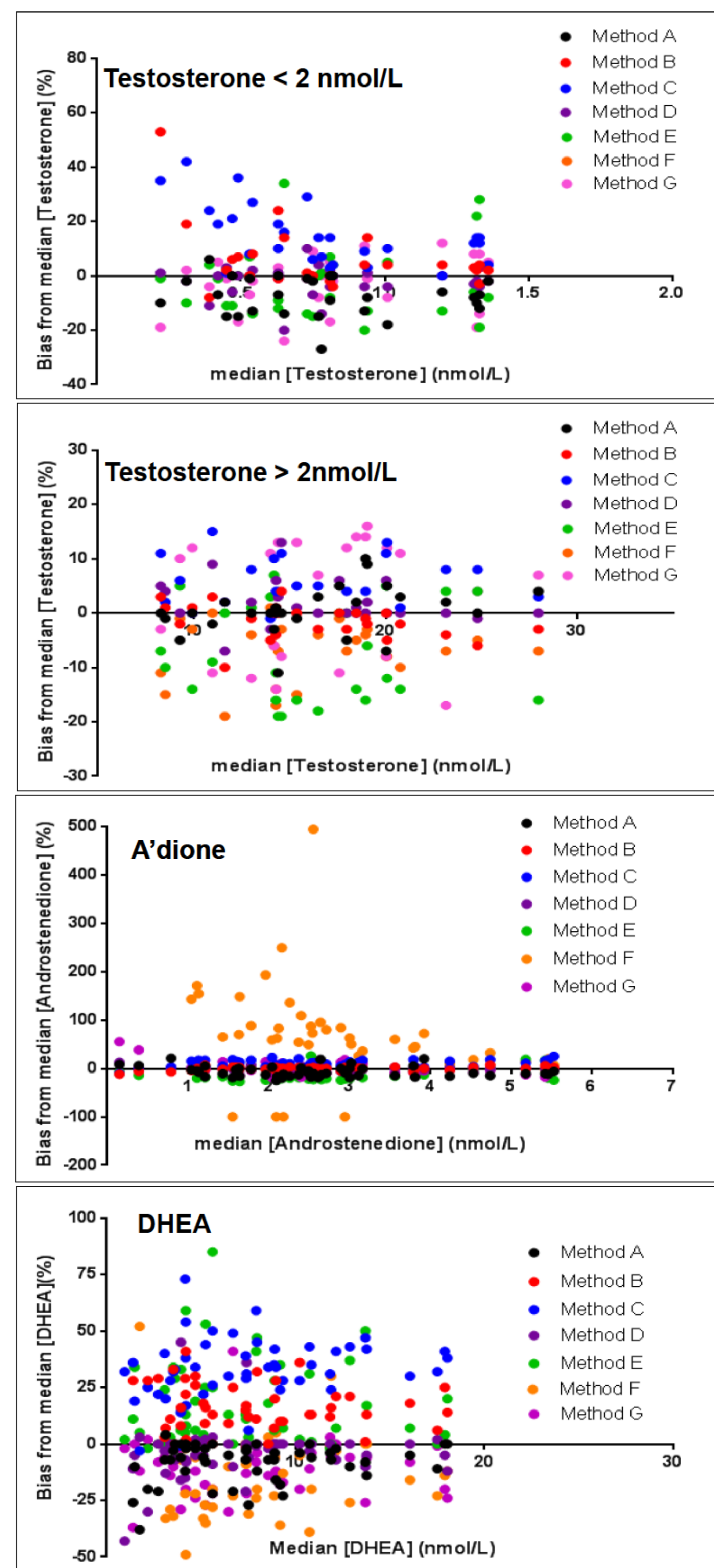

Fig. 1: Bias-plots for testosterone values below 2 nmol/L, testosterone concentrations higher than 2 nmol/L, androstenedione and DHEA
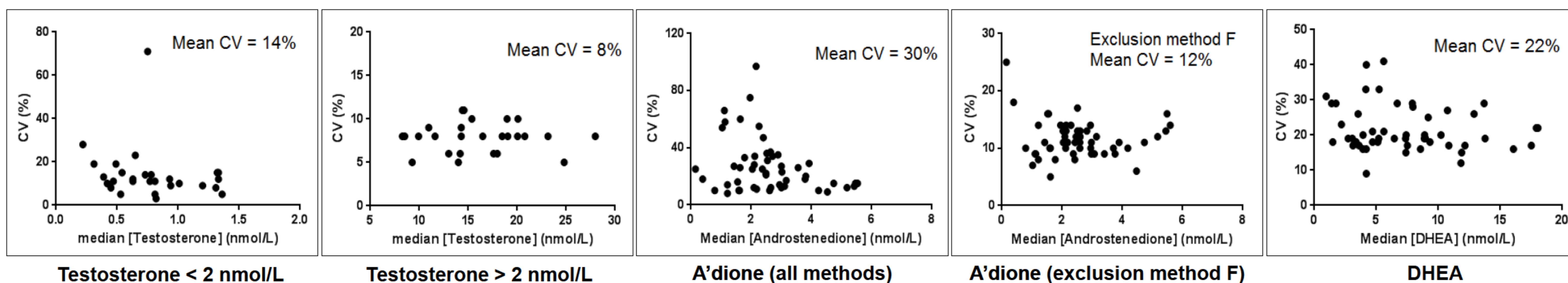

Fig. 2: CV between the methods per sample.

References:

Büttler et al. Clin Chim Acta 2014; Fanelli et al. Steroids 2011; Koal et al. J Steroid Biochem Mol Biol 2011; Kushnir et al. Clin Chem 2010; O'Reilly et al. JCEM 2014; Soeborg et al. Clin Chim Acta 2013

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