First generation testosterone assays are influenced by sex hormone binding globulin concentrations as evidenced during oral contraceptive use and pregnancy

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Introduction

The quality of testosterone assays has been a matter of debate for several years. Known limitations of testosterone immunoassays are the cross-reactivity with other steroids and a high variation in the low concentration range. We hypothesized that one of the additional limitations of testosterone immunoassays is an ineffective displacement of testosterone from its binding protein..

Methods

Thirty serum samples from women not using oral contraceptives (OAC), 30 serum samples from women using oral contraceptives, and 30 serum samples from pregnant women were used to measure testosterone by an ID-LC-MS/MS method and by 6 commercially available testosterone immunoassays (1st generation: Unicel, Centaur, Immulite and Liaison; 2nd generation: Architect and Cobas). In addition, SHBG was measured by immunoassay (Architect).

Results

Table 1: *The LLOQ; the slope and intercept derived from Passing & Bablok regression analysis, the correlation coefficient (R), all compared with the ID-LC-MS/MS method, based on N samples per method. To convert testosterone concentrations to ng/mL, multiply by 0.3.*

Method	LLOQ (nmol/L)	N	Slope	Intercept	R
1st generation assays					
Unicel*	0.35	62	0.59	0.33	0.81
Centaur*	0.35	78	1.05	0.41	0.83
Immulite	0.69	46	1.08	-0.08	0.86
Liaison*	0.17	78	0.67	0.16	0.61
2nd generation assays					
Architect	0.45	85	0.99	0.27	0.95
Cobas*	0.087	77	1.01	-0.09	0.93

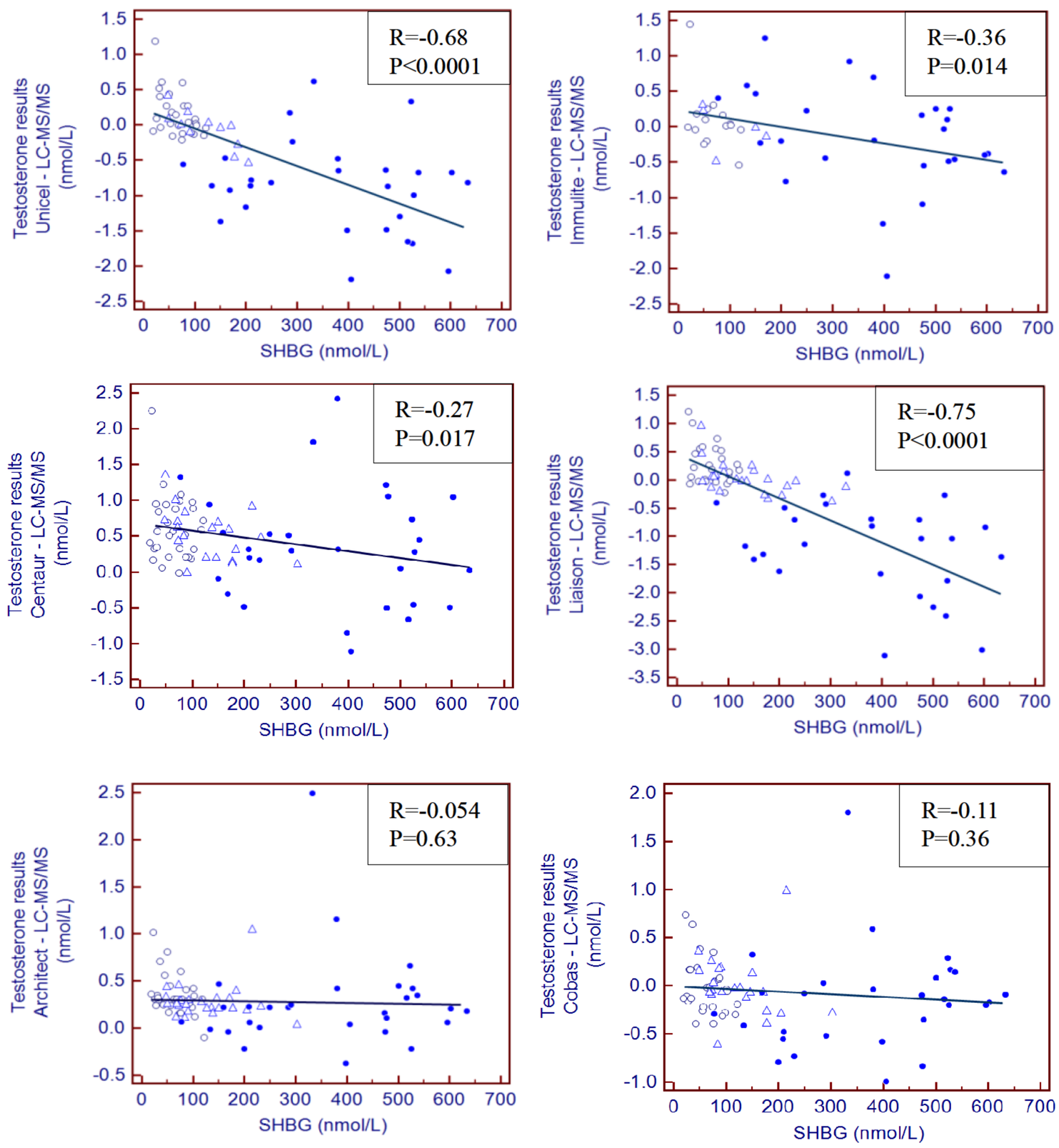

Figure 1: *Correlation between the SHBG concentration and the difference between the results of each of the six automated immunoassays and the ID-LC-MS/MS method. To convert testosterone concentrations to ng/mL, multiply by 0.3.*

Conclusion

Widely used first generation testosterone immunoassays are influenced by SHBG concentrations which leads to inaccurate results in samples from subjects with high or low SHBG concentrations, respectively. Laboratory specialists, clinicians, and researchers should be aware of this limitation in testosterone assays.

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