



2012 ABS-A PARTICIPANT SUMMARY

Evaluation Criteria

Results for the ABS Survey are **not** formally evaluated; however statistics will appear in the Participant Summary for your information.

To provide a timely evaluation of your results, statistics presented in this Participant Summary Report reflect a minimum of 90% of participant enrollment.

Discussion

Accuracy Based Survey materials are considered to be free of matrix effects and may be used to directly compare results between instruments, and between field methods and a reference method.

The 2012 ABS for calcium, cortisol, estradiol, SHBG, testosterone, and TSH data are summarized as follows.

Calcium: Because no reference values were available for these samples only assay harmonization was assessed. The differences between the all method means and the means for the Arsenazo III Dye method group, Cresolphthalein Complexone method group and Ion Selective Electrode method group ranged between -0.1 and 0.1 mg/dL (-0.8% - 5.5%, Figure 1). Within these method groups, the difference between the highest and lowest values ranged between 0.5 – 1.4 mg/dL. The ratio of highest/lowest value ranged from 1.1 – 1.2 (Figure 2).

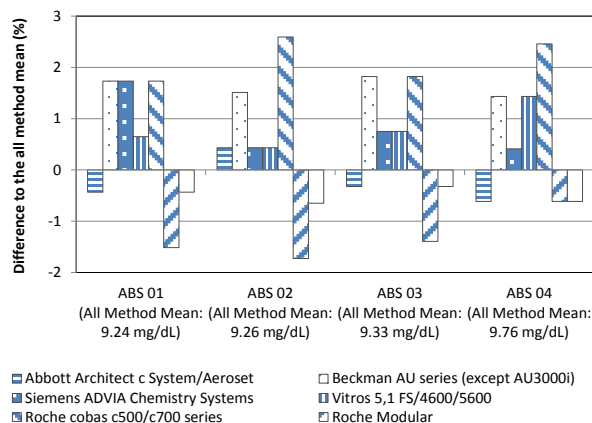


Figure1: Difference between all method mean and peer group median in percent

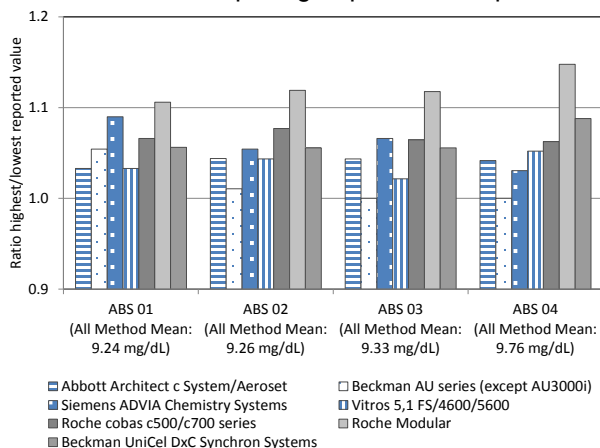


Figure 2: Difference between highest and lowest value reported for each peer group as high/low ratio

The biases of peer groups, as expressed in the differences between all method mean and the peer group median values, ranged from -1.0 – 0.2 mg/dL (Figure 1). The patterns of these peer group differences is similar for all four samples suggesting that bias may mostly be a result of differences in calibration and to a lesser extent a result of sample specific characteristics such as presence of interferences. Similarly, the differences between the highest and lowest reported values within each peer group are consistent across all samples (Figure 2).

Conclusion: Method group medians agree within ± 0.1 mg/dL. The observed measurement bias seems mainly caused by differences in calibration. Of some concern is the range of values from high to low which varied from

0.5 mg/dL to 1.4 mg/dL for the four Survey samples. This degree of variation could have clinical significance with samples from patients who have borderline hypo- or hypercalcemia.

Cortisol: Because no reference values were available for these samples only assay harmonization was assessed. The biases of the peer groups, as expressed by the differences between all method mean and the peer group median values, ranged between -1.6 µg/dL and 1.9 µg/dL (-12.7% - 13.1%, Figure 3). The patterns of these peer group differences were similar for all four samples suggesting that bias may mostly be a result of differences in calibration and to a lesser extend a result of sample specific characteristics such as presence of interferences. However, one peer group showed inconsistent bias suggesting that other factors such as assay specificity may contribute to the measurement bias for this peer group.

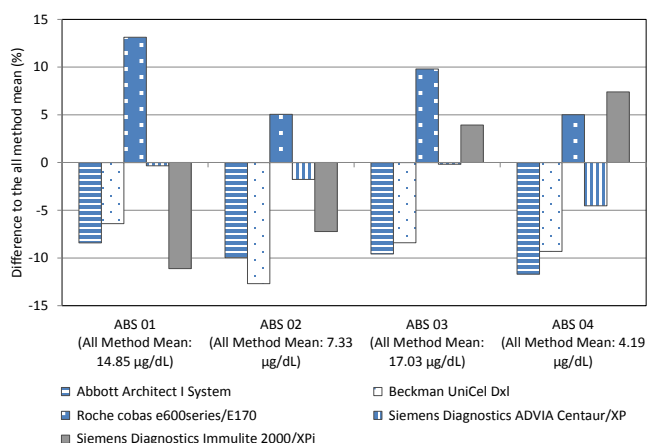


Figure 3: Difference between peer group median and all method mean in percent

The within peer group variability, as expressed by the differences between the highest and lowest values, ranged between 0.4 µg/dL and 7.8 µg/dL. The ratio of highest/lowest value ranged from 1.1 – 1.6 (Figure 4). However, when assessing all method principles, including those not covered in the peer groups, the ratios were up to 4.6, meaning that the highest reported value was 4.6 times higher than the lowest reported value. The pattern of the within peer group variability is similar for all samples.

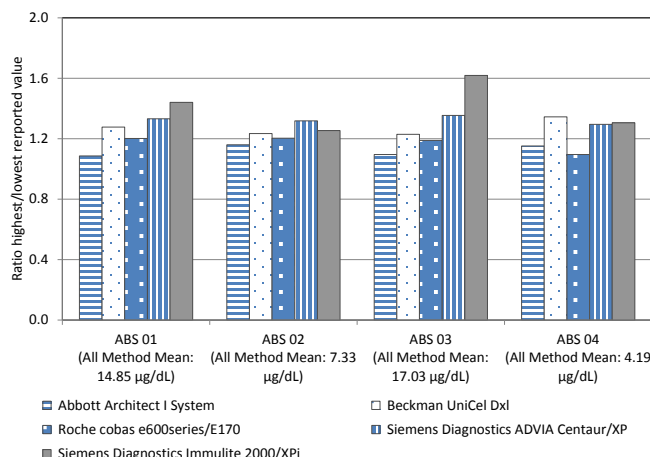


Figure 4: Difference between highest and lowest value reported for each peer group as high/low ratio

Conclusion: The differences between peer groups to the all method mean of ± 2 $\mu\text{g/dL}$ is generally acceptable. The high within peer group variability for some assays suggests that variability in laboratory operation and/or lot-to-lot variability of reagents could be a relevant contributor to the overall variability.

Estradiol: Reference method values for the four samples were obtained by IDMS. The biases between reference values and the peer group median values ranged between -5.3 and 18.9 pg/mL (-20.9 – 25.4%, Figure 5). The peer group biases appeared consistent for 3 of the 4 samples with most peer groups showing a positive bias. Sample ABS-03 showed a slightly different bias pattern suggesting that in addition to differences in calibration sample specific characteristics such as presence of interfering compounds may contribute significantly to the overall measurement bias.

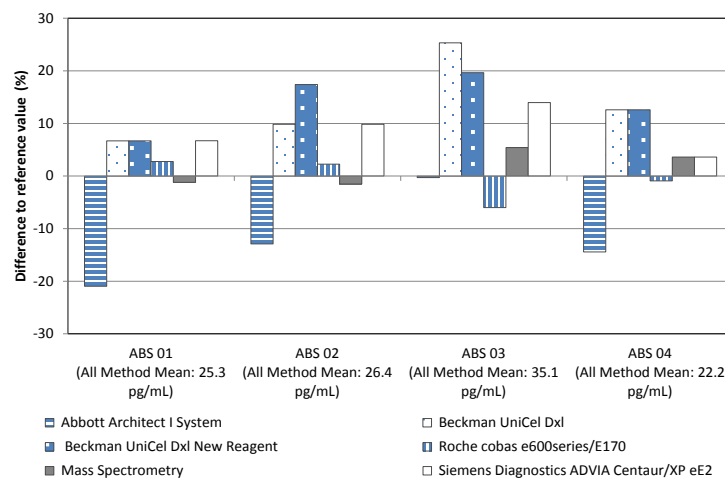


Figure 5: Difference between peer group median and reference value in percent

Within peer group variability, as expressed by the differences between the highest and lowest reported value, ranged between 9 pg/mL and 51 pg/mL . The ratio of highest/lowest value ranged from 1.4 – 11 (Figure 6), meaning that the highest reported value was 11 times higher than the lowest reported value. The high variability in values within peer group suggests that laboratory and/or lot-to-lot variability is a major contributor to the overall variability in estradiol measurements.

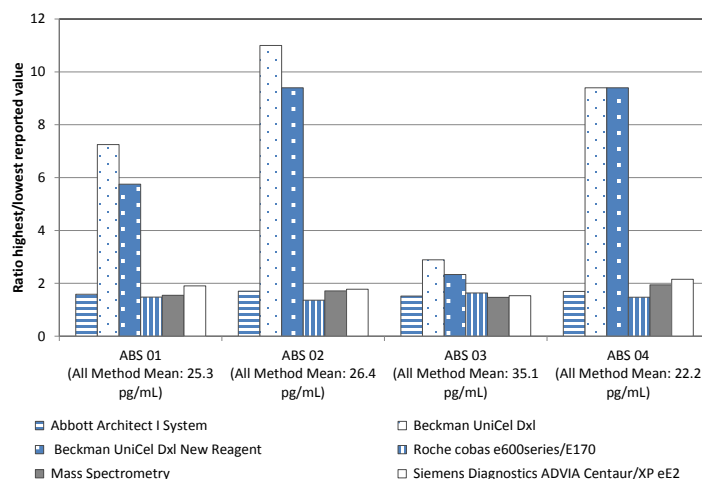


Figure 6: Difference between highest and lowest value reported for each peer group as high/low ratio

Conclusion: The measurement bias of individual peer groups appears small compared to the within peer group variability. The variability within and across peer groups could result in misinterpretation of patient data i.e., when assessing responses to aromatase inhibitor therapy.

Sex-Hormone Binding Globulin: Because no reference values were available for these samples only assay harmonization was assessed. Only 2 peer groups covering 11 out of 19 methods could be formed. The biases of the peer groups, as expressed by the differences between all method mean and the peer group median values, ranged between -4.2 and 0.7 nmol/L (-10.3% and 1.8%, Figure 7). The patterns of these peer group differences were similar for all four samples suggesting that bias may mostly be a result of differences in calibration and to a lesser extend a result of sample specific characteristics such as presence of interferences.

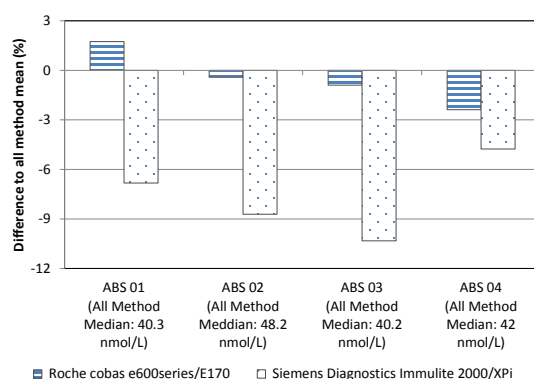


Figure 7: Difference between peer group median and all method mean in percent

Within peer group variability, as expressed by the differences between the highest and lowest reported value, ranged between 1.2 and 8 nmol/L. The ratio of highest/lowest value ranged from 1.0 – 1.25 (Figure 8). However, when assessing all method principles, including those not covered in the peer groups, the ratios were up to 1.5, meaning that the highest reported value was 1.5 times higher than the lowest reported value.

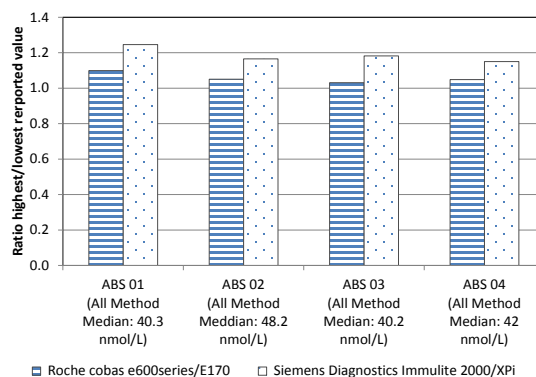


Figure 8: Difference between highest and lowest value reported for each peer group as high/low ratio

Conclusions: The limited data show good agreement of median values. The variability in values within peer group suggests that laboratory and/or lot-to-lot variability is a major contributor to the overall variability in SHBG measurements.

Testosterone: Reference method values for the four samples were obtained by IDMS. The bias between the reference value and the peer group median values ranged between -324 and 1.3 ng/dL (-46.8 – 1.3%, Figure 9). Some peer groups showed different bias patterns at high testosterone levels commonly observed in adult men and low levels commonly observed in children and women. This suggests that in addition to differences in calibration sample specific characteristics related to gender and/or testosterone concentration may contribute significantly to the overall measurement bias.

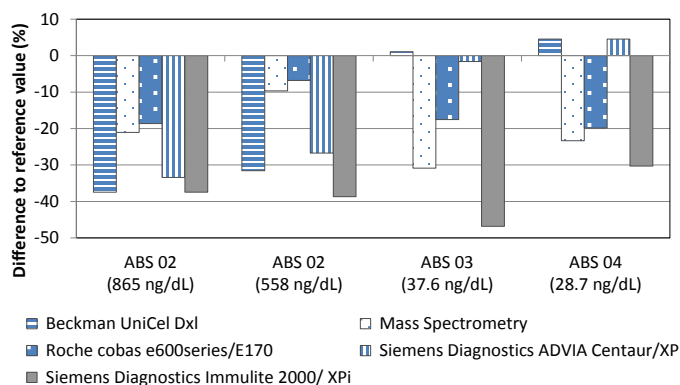


Figure 9: Difference between peer group median and reference value in percent

The within peer group variability, as expressed by the differences between the highest and lowest values, ranged between 6 ng/dL and 360 ng/dL. The ratio of highest/lowest value ranged from 1.1 – 3.4 (Figure 10). However, when assessing all method principles, including those not covered in the peer groups, the ratios were up to 12.4, meaning that the highest reported value was 12.4 times higher than the lowest reported value.

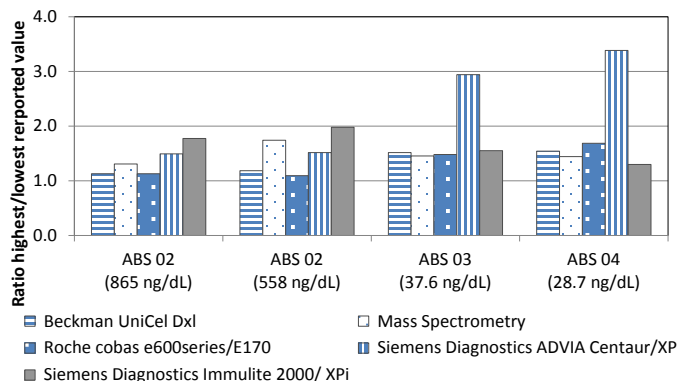


Figure 10: Difference between highest and lowest value reported for each peer group as high/low ratio

Conclusion: The high variability in testosterone measurements appears to have multiple sources such as differences in assay calibration, sample specific characteristics, laboratory and/or lot-to-lot variability. The extent of variation could have clinical significance with samples from male patients who might be androgen deficient and female patient with androgen excess.

Bioavailable Testosterone: Because no reference values were available for these samples only assay harmonization was assessed. There were too few participants to form a peer group. The differences between the highest and lowest value ranged between 119 and 373 ng/dL. The ratio of highest/lowest value ranged from 2 – 58 (Figure 11), meaning that the highest reported value was 58 times higher than the lowest reported value.

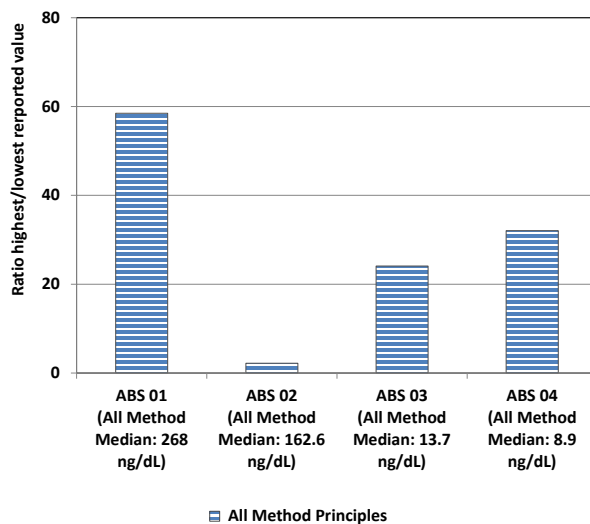


Figure 11: Difference between highest and lowest value reported for each peer group as high/low ratio

Conclusions: The limited data show substantial variability in bioavailable testosterone measurements.

Free Testosterone: Because no reference values were available for these samples only assay harmonization was assessed. The differences between the highest and lowest value across samples ranged between 56.2 and 434 pg/mL. The ratio of highest/lowest value ranged from 44 – 223 (Figure 12), meaning that the highest reported value was 223 times higher than the lowest reported value.

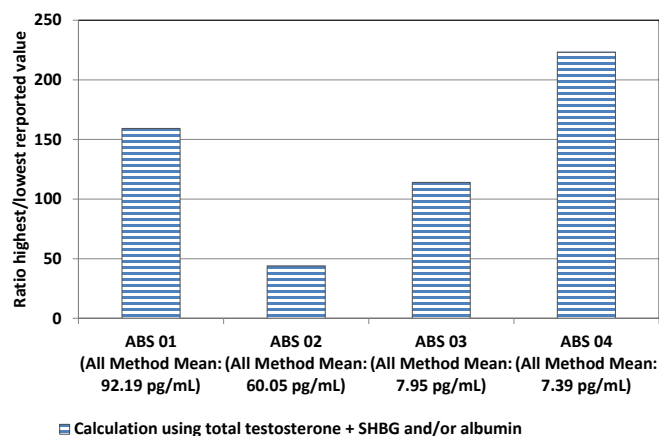


Figure 12: Difference between highest and lowest value reported for each peer group as high/low ratio

Conclusions: The limited data show substantial variability in free testosterone measurements.

Thyroid Stimulating Hormone (TSH): Because no reference values were available for these samples only assay harmonization was assessed. The biases of the peer groups, as expressed by the differences between all method mean and the peer group median values, ranged between -0.37 and 0.32 $\mu\text{IU/L}$ (-22.0% - 13.3% , Figure 13). The peer group biases appeared consistent for 3 of the 4 samples. Sample ABS- 03 showed a slightly different bias pattern suggesting that in addition to differences in calibration sample specific characteristics such as presence of interfering compounds may contribute significantly to the overall measurement bias.

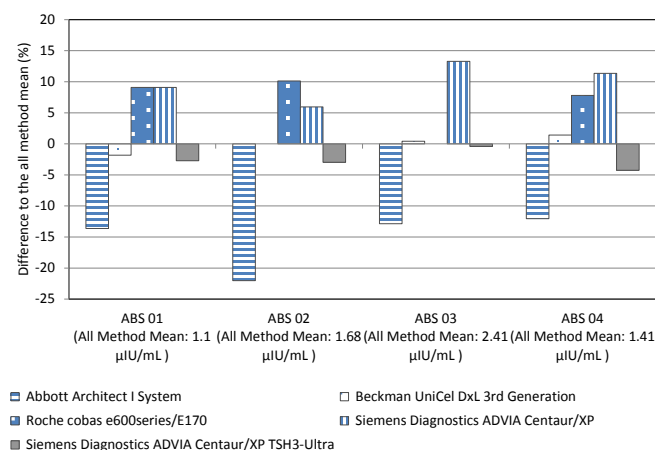


Figure 13: Difference between peer group median and all method mean in percent

The within peer group variability, as expressed by difference between the highest and lowest values, ranged between 0.9 and 6.3 $\mu\text{IU/L}$. The ratio of highest/lowest value ranged from 1.1 – 1.3 (Figure 14). When assessing all method principles, including those not covered in the peer groups, the ratios were up to 1.7 , meaning that the highest reported value was 1.7 times higher than the lowest reported value.

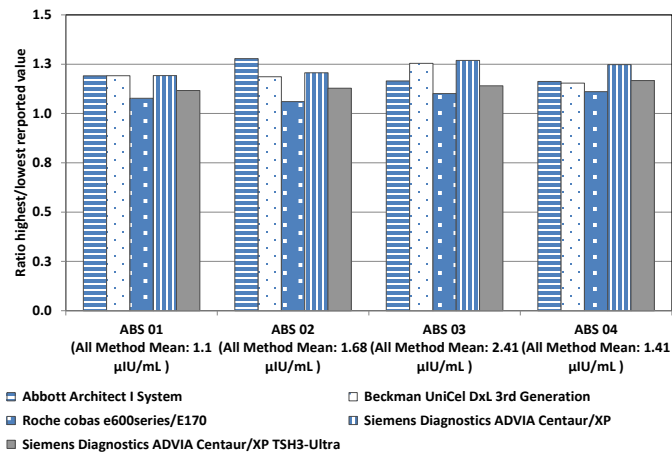


Figure 14: Difference between highest and lowest value reported for each peer group as high/low ratio

Conclusion: Method group medians agree within ± 0.4 $\mu\text{IU/L}$. The observed measurement bias seems mainly caused by differences in calibration though sample specific characteristics may contribute to the measurement bias.

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