Reevaluation of Discriminatory and Threshold Levels for Serum $\beta$-hCG in Early Pregnancy

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1. Discuss the definitions of “threshold” and “discriminatory” hCG values and the distinctions the authors draw between them. What is the clinical utility of a threshold hCG value? The authors chose to use the 99% probability level as the discriminatory level. Do you agree with their choice for this clinical setting? Should the role of discriminatory values differ according to plans for diagnosis (laparoscopy) or treatment (methotrexate)? Should the 99% probability level be used for all three ultrasonographic landmarks?

2. The study participants had a 56% viability rate. Is this rate typical for the patients you see in the emergency department? Is this rate typical for the patients you see in the office? Would varying clinical settings alter probabilities of imaging viable pregnancy structures?

3. How did the authors show that discriminatory and threshold hCG values did not differ among individuals performing the ultrasonogram? Are different ultrasonographers equally capable of detecting a gestational sac? A yolk sac? A fetal pole?

4. Explore the differences between International Standards, International Reference Preparations, and International Reference Reagents. (A useful article for beginning the discussion for hCG is Sturgeon CM et al. Differences in Recognition of the 1st WHO International Reference Reagents for hCG-Related Isoforms by Diagnostic Immunoassays for Human Chorionic Gonadotropin. Clinical Chemistry 2009;55:1484–91.) Discuss whether the use of different preparations for standardization and calibration has a clinically significant effect on threshold and discriminatory levels. Which standard was used in the authors’ assay?

5. Review the participant exclusion criteria. Discuss whether the criteria chosen by the authors were appropriate for the study objectives.

6. Review the 95% confidence intervals for discriminatory hCG values for the gestational sac, yolk sac, and fetal pole in Table 1 and Figure 1. What discriminatory hCG values do you use for gestational sac? How many viable pregnancies had hCG levels in that range in the authors’ study?

7. Discuss why the authors used fractional polynomial, rather than linear or quadratic, logistic regression to generate point estimates and 95% confidence intervals for predicted probabilities of imaging the structures in viable pregnancies.

8. Discuss whether and how you would use the authors’ discriminatory values for clinical care. Discuss whether and how you would use the authors’ threshold values for clinical care.