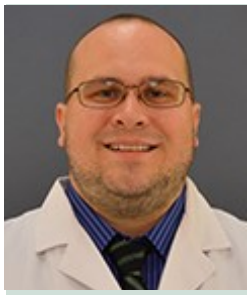
Update on Beta human Chorionic Gonadotropin (hCG) Testing: A Protein of Many Faces



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Chorionic Gonadotropin (CG) is a glycoprotein produced by the syncytiotrophoblast cells of the placenta as a heterodimer with an α and β subunit. The α subunit of CG is homologous to the α subunit of Luteinizing Hormone, Follicle Stimulating Hormone, and Thyroid Stimulating Hormone. However the β subunit of CG is unique, and therefore serves as the antigenic target of immunoassay tests used to measure CG in blood and urine. Hence tests for CG in the clinical laboratory are known as βhCG assays. The primary role of βhCG testing is the detection and monitoring of pregnancy. The secondary role of βhCG testing is monitoring treatment response in trophoblastic diseases and germ cell tumors that produce βhCG.[1]

βhCG does not exist as a singular form, but as many varied molecular forms which include, but are not limited to intact hCG, hyperglycosylated hCG (hCG-H), nicked hCG (hCGn), free β subunit (hCGβ), nicked free β subunit (hCGβn), and β core fragment (hCGβcf).[1] The production level of each molecular form is different between each type of trophoblastic disease and germ cell tumor. Furthermore, the reactivity of the available βhCG immunoassays to each molecular form is not standardized, such that more than a two-fold difference in βhCG level can be seen when analyzing a sample by different immunoassays.[2] For these reasons there does not currently exist a βhCG immunoassay that is FDA approved for use as a tumor marker.

This does not mean that utilization of βhCG for monitoring treatment response in trophoblastic diseases and germ cell tumors is improper. It emphasizes that clinicians and laboratories must be knowledgeable of the limitations of the βhCG immunoassays that they utilize. At UVMMC, we use the VITROS® total βhCG II immunoassay, which in three studies was shown to be one of four immunoassays that detects all molecular forms of βhCG.[3-5] Proper use of the VITROS® total βhCG II immunoassay as a tumor marker would be to measure a baseline βhCG prior to the initiation of definitive therapy and then monitor the level over time. The key point is that βhCG levels obtained by different immunoassays cannot be used interchangeably, once established a patient should be followed using the same immunoassay.

Towards the communication of the above concepts, **on November 20th, 2017 the Chemistry lab will change the name of the βhCG Tumor Marker serum test to Beta-Human Chorionic Gonadotropin (β-hCG), Quantitative and will be attaching the following comment to all results:**

“This assay has not been FDA cleared for use as a tumor marker. The results of this assay cannot be interpreted as absolute evidence for the presence or absence of malignant disease. The VITROS total Beta hCG II immunoassay detects the intact hormone, "nicked" forms of hCG, hyperglycosylated hCG, the beta-core fragment, and the free beta-subunit. Results obtained with different assay methods or kits may be different and cannot be used interchangeably.”

If you have any questions concerning this change please contact Dr. Clayton Wilburn (clayton.wilburn@uvmhealth.org) in the laboratory.

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REFERENCES:

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