

# The Detection Methods of Multiple HCG-Related Molecules for Tumor Marker



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## Mini Review

Tumor markers are playing an increasingly important role in cancer detection and management. Which is one of the most important diagnostic methods is laboratory-based tests are potentially useful in screening for early malignancy, aiding cancer diagnosis, determining prognosis, surveillance following curative surgery for cancer.

Tumor markers are substances that are produced by cancer or by other cells of the body in response to certain benign (noncancerous) conditions or cancer. Most tumor markers are made by normal cells as well as by cancer cells. It is a biomarker found in blood, urine, or body tissues that can be elevated by the presence cancer.

Human chorionic gonadotropin (HCG) that produces in case of malignancy is different than that produced in pregnancy; it also has a different function. The elevated level of HCG can't be detected in man and non-pregnant woman in normal, that why it use as a tumor marker.

### 1.1. HCG detection method

Human chorionic gonadotropin (hCG) used for detecting choriocarcinoma and germ cell tumors, by analyzed urine or blood, for assess stage, prognosis, and response to treatment [1]. Many immunoassay methods and immunosensors are being developed for detection of tumor-related biomarkers.

Immunoassays rely on the ability of an antibody to recognize and bind a specific macromolecule in what might be a complex mixture of macromolecules, that employ a variety of different labels to allow for detection of antibodies and antigens, which it typically chemically linked or conjugated to the desired antibody or antigen.

There are three main detecting method of HCG:

I. There are professional laboratory quantitative serum hCG tests (PRL tests)

II. Point of care or physicians office qualitative serum and urine hCG tests (POC tests),

III. Home or over the counter qualitative hCG tests (OTC tests).

Most of those detecting method depends on sandwich assays, with monoclonal antibodies and sophisticated spectrometric, lanthanide, or luminescence detection systems, Depending on the mixture of monoclonal antibodies, these assays may measure differing mixtures of hCG-related molecules . The immobilized or captured hCG is then detected by a separate antibody (monoclonal or polyclonal) raised against a distant site on the hormone [2]. The positive result is indicated by a line formed by the *immobilized antibody-hCG-dye antibody complex* [3].

There are independent variants of HCG, each produced by different cells with separate biological functions. Multiple hCG-related molecules , nonnicked hCG (the hormone), nicked hCG, hyper- and hypoglycosylated hCG, hCG missing the C-terminal extension, free  $\alpha$ -subunit, large free  $\alpha$ -subunit, free  $\beta$ -subunit, nicked free  $\beta$ -subunit,  $\beta$ -core fragment and more. Do all the devices measure the all hCG-related molecules?

Unfortunately, most the devices detect regular hCG, hyperglycosylated hCG, and free  $\beta$ -subunit, Not all hCG or hCG immunoassay kits measure the same thing, which causes some problems. hCG tests are identified that give a disproportionate number of false positive results [4]. Also Individual variations in levels of nicked human chorionic gonadotropin, free beta and beta core, and differences in their recognition by immunoassays cause discordant results [5]. In addition, the majority of tests do not detect hCG or its free  $\beta$ -subunit missing the C-terminal segment [6,7].

In choriocarcinoma and testicular germ cell malignancies cytotrophoblast cell predominate. It appears that the carcinogenesis process le makes a non-differentiating non-villous invasive cytotrophoblast cells producing hyperglycosylated hCG [3]. Free b has also been indicated as a superior tumor marker for testicular cancer [2] hyperglycosylated hCG is a potent marker for these malignancies. But there is an issue; small amount of HCG-hyperglycosylated is poorly detected due to the configuration of the antibodies in these devices [8].

According to previous, traditional method of detecting hCG tests are identified that give a disproportionate number of false results, and it can't detect early markers of malignancy.

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