Snibe Diagnostic

CE REF 130252003M:100 tests/kit
130652003M: 50 tests/kit
130752003M: 30 tests/kit

MAGLUMI® Total β HCG (CLIA)

INTENDED USE

The kit is an *in vitro* chemiluminescence immunoassay for the quantitative determination of Total β HCG in human serum and plasma using the MAGLUMI series Fully-auto chemiluminescence immunoassay analyzer and Biolumi series Integrated System, and the assay is used for an aid in early detection individuals with suspected pregnancy and monitoring of individuals with confirmed pregnancy.

SUMMARY

Human chorionic gonadotropin is produced primarily by differentiate syncytiotrophoblasts, and represents a key embryonic signal that is essential for the maintenance of pregnancy[1]. As a 237 amino acid heterodimer, HCG is comprised of α-(92-amino acid, 14.5 kD) and β-(145-amino acid, 22.2 kD) subunits that are non-covalently linked by charge interactions and contain a total of eight carbohydrate side chains[1,2]. It is a member of the glycoprotein hormone family that includes luteinizing hormone (LH), thyroid-stimulating hormone (TSH), and follicle-stimulating hormone (FSH). The α-subunit of Human chorionic gonadotropin is homologous to TSH, LH, and FSH, whereas the β-subunit is 80–85% homologous to LH[1,3]. Human chorionic gonadotropin has numerous functions, including promotes progesterone production by corpus luteal cells; promotes angiogenesis in uterine vasculature; promoted the fusion of cytotrophoblast cell and differentiation to make syncytiotrophoblast cells; causes the blockage of any immune or macrophage action by mother on foreign invading placental cells; causes uterine growth parallel to fetal growth; suppresses any myometrial contractions during the course of pregnancy; causes growth and differentiation of the umbilical cord; signals the endometrium about forthcoming implantation; acts on receptor in mother's brain causing hyperemesis gravidarum, and seemingly promotes growth of fetal organs during pregnancy[3]. In pregnancy, Human chorionic gonadotropin is produced in large amounts by the syncytiotrophoblasts of the placenta, and an increase in serum Human chorionic gonadotropin can usually be detected when implantation occurs, 7-9 days after conception[4]. Serum Human chorionic gonadotropin concentrations increase at an exponential rate, reaching peak concentrations of approximately 100000 U/L at 7-10 weeks of pregnancy[4,5]. Human chorionic gonadotropin and progesterone are good biochemical markers for the prediction of outcome in women with threatened abortion with good sensitivity and specificity[6]. In addition to quantitative determinations of various forms of Human chorionic gonadotropin used for diagnosis and monitoring of pregnancy complications such as early pregnancy loss, ectopic pregnancy[2].

TEST PRINCIPLE

Sandwich chemiluminescence immunoassay.

The sample, buffer, magnetic microbeads coated with anti-β HCG antibody are mixed thoroughly, incubating and performing a wash cycle after a precipitation in a magnetic field. ABEI labeled with another anti-HCG antibody are then added, reacting to form sandwich complexes and incubating. After precipitation in a magnetic field, decant the supernatant, and then perform another wash cycle. Subsequently, the Starter 1+2 are added to initiate a chemiluminescent reaction. The light signal is measured by a photomultiplier as relative light units (RLUs), which is proportional to the concentration of Total β HCG present in the sample.

REAGENTS

Kit Contents

Component	Description	100 tests/kit	50 tests/kit	30 tests/kit
Magnetic Microbeads	Magnetic microbeads coated with anti-β HCG antibody (~20.0 μg/mL) in PBS buffer, NaN_3 (<0.1%).	2.5 mL	1.5 mL	1.0 mL
Calibrator Low	A low concentration of β HCG antigen in PBS buffer, NaN_3 (<0.1%).	1.0 mL	1.0 mL	1.0 mL
Calibrator High	A high concentration of β HCG antigen in PBS buffer, NaN_3 (<0.1%).	1.0 mL	1.0 mL	1.0 mL
Buffer	PBS buffer, NaN_3 (<0.1%).	12.5 mL	7.0 mL	4.8 mL
ABEI Label	ABEI labeled with anti-HCG antibody (~0.125 μg/mL) in PBS buffer, NaN_3 (<0.1%).	22.5 mL	12.0 mL	7.8 mL
Diluent	Bovine serum, NaN_3 (<0.1%).	25.0 mL	15.0 mL	15.0 mL
Control 1	A low concentration of β HCG antigen (10.0 mIU/mL) in PBS buffer, NaN_3 (<0.1%).	1.0 mL	1.0 mL	1.0 mL
Control 2	A high concentration of β HCG antigen (300 mIU/mL) in PBS buffer, NaN_3 (<0.1%).	1.0 mL	1.0 mL	1.0 mL
All reagents are provided ready-to-use.				

Warnings and Precautions

- For *in vitro* diagnostic use.
- For professional use only.
- Exercise the normal precautions required for handling all laboratory reagents.
- Personal protective measures should be taken to prevent any part of the human body from contacting samples, reagents, and controls, and should comply with local operating requirements for the assay.
- A skillful technique and strict adherence to the package insert are necessary to obtain reliable results.
- Do not use kit beyond the expiration date indicated on the label.
- Do not interchange reagent components from different reagents or lots.
- Avoid foam formation in all reagents and sample types (specimens, calibrators and controls).
- All waste associated with biological samples, biological reagents and disposable materials used for the assay should be considered potentially infectious and should be disposed of in accordance with local guidelines.
- This product contains sodium azide. Sodium azide may react with lead or copper plumbing to form highly explosive metal azides. Immediately after disposal, flush with a large volume of water to prevent azide build-up. For additional information, see Safety Data Sheets available for professional user on request.

Note: If any serious incident has occurred in relation to the device, please report to Shenzhen New Industries Biomedical Engineering Co., Ltd. (Snibe) or our authorized representative and the competent authority of the Member State in which you are established.

Reagent Handling

- To avoid contamination, wear clean gloves when operating with a reagent kit and sample. When handling reagent kit, replace the gloves that have been in contact with samples, since introduction of samples will result in unreliable results.
- Do not use kit in malfunction conditions; e.g., the kit leaking at the sealing film or elsewhere, obviously turbid or precipitation is found in reagents (except for Magnetic Microbeads) or control value is out of the specified range repeatedly. When kit in malfunction conditions, please contact Snibe or our authorized distributor.
- To avoid evaporation of the liquid in the opened reagent kits in refrigerator, it is recommended that the opened reagent kits to be sealed with reagent seals contained within the packaging. The reagent seals are single use, and if more seals are needed, please contact Snibe or our authorized distributor.
- Over time, residual liquids may dry on the septum surface. These are typically dried salts and have no effect on assay efficacy.
- Use always the same analyzer for an opened reagent integral.
- For magnetic microbeads mixing instructions, refer to the Preparation of the Reagent section of this package insert.
- For further information about the reagent handing during system operation, please refer to Analyzer Operating Instructions.

Storage and Stability

- Do not freeze the integral reagents.
- Store the reagent kit upright to ensure complete availability of the magnetic microbeads.
- Protect from direct sunlight.

Stability of the Reagents	
Unopened at 2-8°C	until the stated expiration date
Opened at 2-8°C	6 weeks
On-board	4 weeks

Stability of Controls	
Unopened at 2-8°C	until the stated expiration date
Opened at 10-30°C	6 hours
Opened at 2-8°C	6 weeks
Frozen at -20°C	3 months
Frozen and thawed cycles	no more than 3 times

SPECIMEN COLLECTION AND PREPARATION

Specimen Types

Only the specimens listed below were tested and found acceptable.

Specimen Types	Collection Tubes
Serum	Tubes without additive/accessory, or tubes containing clot activator or clot activator with gel.
Plasma	K2-EDTA

- The sample types listed were tested with a selection of sample collection tubes that were commercially available at the time of testing, i.e. not all available tubes of all manufacturers were tested. Sample collection systems from various manufacturers may contain differing materials which could affect the test results in some cases. Follow tube manufacturers' instructions carefully when using collection tubes.

Specimen Conditions

- Do not use grossly hemolyzed/hyperlipidaemia specimens and specimens with obvious microbial contamination.
- Ensure that complete clot formation in serum specimens has taken place prior to centrifugation. Some serum specimens, especially those from patients receiving anticoagulant or thrombolytic therapy, may exhibit increased clotting time. If the serum specimen is centrifuged before a complete clotting, the presence of fibrin may cause erroneous results.
- Samples must be free of fibrin and other particulate matter.
- To prevent cross contamination, use of disposable pipettes or pipette tips is recommended.

Preparation for Analysis

- Inspect all specimens for foam. Remove foam with an applicator stick before analysis. Use a new applicator stick for each specimen to prevent cross contamination.
- Frozen specimens must be completely thawed before mixing. Mix thawed specimens thoroughly by low speed vortexing or by gently inverting. Visually inspect the specimens. If layering or stratification is observed, mix until specimens are visibly homogeneous. If specimens are not mixed thoroughly, inconsistent results may be obtained.
- Specimens should be free of fibrin, red blood cells, or other particulate matter. Such specimens may give reliable results and must be centrifuged prior to testing. Transfer clarified specimen to a sample cup or secondary tube for testing. For centrifuged specimens with a lipid layer, transfer only the clarified specimen and not the lipemic material.
- The sample volume required for a single determination of this assay is 15 μL.

Specimen Storage

Specimens removed from the separator, red blood cells or clot may be stored up to 8 hours at 10-30°C, or 3 days at 2-8°C, or 12 months frozen at -20°C. Frozen specimens subjected to up to 2 freeze/thaw cycles have been evaluated.

Specimen Shipping

- Package and label specimens in compliance with applicable local regulations covering the transport of clinical specimens and infectious substances.
- Do not exceed the storage limitations listed above.

Specimen Dilution

- Samples, Total β HCG concentrations above the analytical measuring interval, can be diluted with Diluent either automated dilution protocol or manual dilution procedure. The recommended dilution ratio is 1:50. The concentration of the diluted sample must be >100 mIU/mL.
- For manual dilution, multiply the result by the dilution factor. For dilution by the analyzers, the analyzer software automatically takes the dilution into account when calculating the sample concentration.

PROCEDURE

Materials Provided

Total β HCG (CLIA) assay, control barcode labels.

Materials Required (But Not Provided)

- General laboratory equipment.
- Fully-auto chemiluminescence immunoassay analyzer Maglumi 600, Maglumi 800, Maglumi 1000, Maglumi 2000, Maglumi 2000 Plus, Maglumi 4000, Maglumi 4000 Plus, MAGLUMI X3, MAGLUMI X6, MAGLUMI X8, or Integrated System Biolumi 8000 and Biolumi CX8.
- Additional accessories of test required for the above analyzers include Reaction Module, Starter 1+2, Wash Concentrate, Light Check, Tip, and Reaction Cup. Specific accessories and accessories' specification for each model refer to corresponding Analyzer Operating Instructions.
- Please use accessories specified by Snibe to ensure the reliability of the test results.

Assay Procedure

Preparation of the Reagent

- Take the reagent kit out of the box and visually inspect the integral vials for leaking at the sealing film or elsewhere. If there is no leakage, please tear off the sealing film carefully.
- Open the reagent area door; hold the reagent handle to get the RFID label close to the RFID reader (for about 2s); the buzzer will beep; one beep sound indicates successful sensing.
- Keeping the reagent straight insert to the bottom along the blank reagent track.
- Observe whether the reagent information is displayed successfully in the software interface, otherwise repeat the above two steps.
- Resuspension of the magnetic microbeads takes place automatically when the kit is loaded successfully, ensuring the magnetic microbeads are totally resuspended homogenous prior to use.

Assay Calibration

- Select the assay to be calibrated and execute calibration operation in reagent area interface. For specific information on ordering calibrations, refer to the calibration section of Analyzer Operating Instructions.
- Execute recalibration according to the calibration interval required in this package insert.

Quality Control

- When new lot used, check or edit the quality control information.
- Scan the control barcode, choose corresponding quality control information and execute testing. For specific information on ordering quality controls, refer to the quality control section of the Analyzer Operating Instructions.

Sample Testing

- After successfully loading the sample, select the sample in interface and edit the assay for the sample to be tested and execute testing. For specific information on ordering patient specimens, refer to the sample ordering section of the Analyzer Operating Instructions.

To ensure proper test performance, strictly adhere to Analyzer Operating Instructions.

Calibration

Traceability: This method has been standardized against the WHO 5th International Standard 07/364.

Test of assay specific calibrators allows the detected relative light unit (RLU) values to adjust the master curve.
Recalibration is recommended as follows:

- Whenever a new lot of Reagent or Starter 1+2 is used.
- Every 28 days.
- The analyzer has been serviced.
- Control values lie outside the specified range.

Quality Control

Controls are recommended for the determination of quality control requirements for this assay and should be run in singlicate to monitor the assay performance. Refer to published guidelines for general quality control recommendations, for example Clinical and Laboratory Standards Institute (CLSI) Guideline C24 or other published guidelines[7].

Quality control is recommended once per day of use, or in accordance with local regulations or accreditation requirements and your laboratory's quality control procedures, quality control could be performed by running the Total β HCG assay:

- Whenever the kit is calibrated.
- Whenever a new lot of Starter 1+2 or Wash Concentrate is used.

Controls are only applicable with MAGLUMI and Biolumi system and only used matching with the same top seven LOT numbers of corresponding reagents. For each target value and range refer to the label.

The performance of other controls should be evaluated for compatibility with this assay before they are used. Appropriate value ranges should be established for all quality control materials used.

Control values must lie within the specified range, whenever one of the controls lies outside the specified range, calibration should be repeated and controls retested. If control values lie repeatedly outside the predefined ranges after successful calibration, patient results must not be reported and take the following actions:

- Verify that the materials are not expired.
- Verify that required maintenance was performed.
- Verify that the assay was performed according to the package insert.
- If necessary, contact Snibe or our authorized distributors for assistance.

If the controls in kit are not enough for use, please order Total β HCG (CLIA) Controls (REF: 160201257MT) from Snibe or our authorized distributors for more.

RESULTS

Calculation

The analyzer automatically calculates the Total β HCG concentration in each sample by means of a calibration curve which is generated by a 2-point calibration master curve procedure. The results are expressed in mIU/mL. For further information please refer to the Analyzer Operating Instructions.

Interpretation of Results

The expected ranges for the Total β HCG assay were obtained by testing 2126 apparently healthy pregnant women in China, gave the following expected value:

Week of gestation	N	Mean (mIU/mL)	5th-95th percentiles (mIU/mL)	Week of gestation	N	Mean (mIU/mL)	5th-95th percentiles (mIU/mL)
3	122	30.364	6.1-73.1	11	162	110616.439	35039-203614
4	121	267.311	9.9-742	12	135	88711.429	27801-210914
5	123	2181.202	233-7184	13	167	77055.783	19330-148019
6	124	10020.446	278-32683	14	140	36556.706	13912-62586
7	125	57968.625	3838-165878	15	130	34869.025	12001-71054
8	124	97587.175	31846-151198	16	139	28228.826	9087-56399
9	123	110275.400	63861-152897	17	135	26609.469	8189-55761
10	126	98302.032	46995-190856	18	130	25703.656	8071-58243

- ≤1.212 mIU/mL Total β HCG for 97.5 % of the values obtained from 130 healthy, non-pregnant premenopausal women in China.
- ≤7.105 mIU/mL Total β HCG for 97.5% of the values obtained from 127 healthy, postmenopausal women in China.

Results may differ between laboratories due to variations in population and test method. It is recommended that each laboratory establish its own reference interval.

LIMITATIONS

- Results should be used in conjunction with patient's medical history, clinical examination and other findings.
- If the Total β HCG results are inconsistent with clinical evidence, additional testing is needed to confirm the result.
- Specimens from patients who have received preparations of mouse monoclonal antibodies for diagnosis or therapy may contain human anti-mouse antibodies (HAMA). Such specimens may show either falsely elevated or depressed values when tested with assay kits which employ mouse monoclonal antibodies[8,9]. Additional information may be required for diagnosis.
- Heterophilic antibodies in human serum can react with reagent immunoglobulins, interfering with *in vitro* immunoassays. Patients routinely exposed to animals or animal serum products can be prone to this interference and anomalous values may be observed[10].
- Bacterial contamination of the specimens may affect the test results.

SPECIFIC PERFORMANCE CHARACTERISTICS

Representative performance data are provided in this section. Results obtained in individual laboratories may vary.

Precision

Precision was determined using the assay, samples and controls in a protocol (EP05-A3) of the CLSI (Clinical and Laboratory Standards Institute): duplicates at two independent runs per day for 5 days at three different sites using three lots of reagent kits (n = 180). The following results were obtained:

Sample	Mean (mIU/mL) (n=180)	Within-Run		Between-Run		Reproducibility	
		SD (mIU/mL)	%CV	SD (mIU/mL)	%CV	SD (mIU/mL)	%CV
Serum Pool 1	9.893	0.411	4.15	0.162	1.64	0.567	5.73
Serum Pool 2	758.831	24.373	3.21	15.615	2.06	36.477	4.81
Serum Pool 3	4534.043	126.249	2.78	72.633	1.60	182.008	4.01
Plasma Pool 1	10.098	0.374	3.70	0.245	2.43	0.522	5.17
Plasma Pool 2	762.998	24.434	3.20	11.902	1.56	37.718	4.94
Plasma Pool 3	4471.973	145.372	3.25	73.791	1.65	313.959	7.02
Control 1	10.130	0.367	3.62	0.186	1.84	0.517	5.10
Control 2	302.915	10.319	3.41	5.024	1.66	14.409	4.76

Linear Range

1.00-5000 mIU/mL (defined by the Limit of Quantitation and the maximum of the master curve).

Reportable Interval

0.500-250000 mIU/mL (defined by the Limit of Detection and the maximum of the master curve×Recommended Dilution Ratio).

Analytical Sensitivity

Limit of Blank (LoB) =0.050 mIU/mL.
Limit of Detection (LoD) =0.500 mIU/mL.
Limit of Quantitation (LoQ) =1.00 mIU/mL.

Analytical Specificity

Interference

Interference was determined using the assay, three samples containing different concentrations of analyte were spiked with potential endogenous and exogenous interferents in a protocol (EP7-A2) of the CLSI. The measurement deviation of the interference substance is within ±10%. The following results were obtained:

Interference	No interference up to	Interference	No interference up to
Bilirubin	60 mg/dL	Rheumatoid factor	1500 IU/mL
Hemoglobin	1500 mg/dL	ANA	398 AU/mL
Intralipid	2000 mg/dL	Biotin	0.5 mg/dL
HAMA	40 ng/mL		

Cross-Reactivity

Cross-reactivity was determined using the assay, three samples containing different concentrations of analyte were spiked with potential cross-reactants in a protocol (EP7-A2) of the CLSI. The measurement deviation of the interference substance is within ±10%. The following results were obtained:

Cross-reactant	No interference up to	Cross-reactant	No interference up to
Luteinizing hormone	250 mIU/mL	Prolactin	1000 ng/mL
Follicle-Stimulating Hormone	200 mIU/mL	Human Growth Hormone	100 ng/mL
Thyroid-stimulating hormone	300 μIU/mL	HCG α subunit	500 mIU/mL

High-Dose Hook

No high-dose hook effect was seen for Total β HCG concentrations up to 500000 mIU/mL.

Method Comparison

A comparison of the Total β HCG assay with a commercially available immunoassay, gave the following correlations (mIU/mL):
Number of samples measured: 159
Passing-Bablok: y=0.9964x+0.0792, τ=0.983.
The clinical specimen concentrations were between 0.998 and 5208 mIU/mL.

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SYMBOLS EXPLANATIONS

	Consult instructions for use		Manufacturer
2°C 8°C	Temperature limit (Store at 2-8 °C)		Use-by date
Σ	Contains sufficient for<n> tests		Keep away from sunlight
	This way up	EC REP	Authorized representative in the European Community
IVD	*In vitro* diagnostic medical device	CONTENTS	Kit component
REF	Catalogue number	LOT	Batch code
CE	CE marking		

Shenzhen New Industries Biomedical Engineering Co., Ltd.
No.23, Jinxiu East Road, Pingshan District, 518122 Shenzhen, P.R. China
Tel: +86-755-21536601 Fax:+86-755-28292740

EC REP **Shanghai International Holding Corp. GmbH (Europe)**
Eiffestrasse 80, 20537 Hamburg, Germany
Tel: +49-40-2513175 Fax: +49-40-255726