Instructions for use

PLGF ELISA

Enzyme immunoassay for the quantitative determination of human placenta growth factor (PLGF) in human serum.

REF **RE52361**

Σ **96**

2-8°C

EU: IVD CE

I B L I N T E R N A T I O N A L G M B H

Flughafenstrasse 52a
D-22335 Hamburg, Germany

Phone: +49 (0)40-53 28 91-0
Fax: +49 (0)40-53 28 91-11

IBL@IBL-International.com
www.IBL-International.com

1 INTRODUCTION

1.1 Intended Use

The **PLGF ELISA** is an enzyme immunoassay for the quantitative measurement of human placenta growth factor (PLGF) in human serum.
It can be used as a diagnostic aid to estimate the probability of preeclampsia for pregnant women.
Details can be found in chapter 7 “Expected normal values”.

1.2 Summary and Explanation

Agiogenesis and vascular transformation are important processes in the normal development of the placenta. Abnormal angiogenesis and vascular transformation are considered to be one of the main reasons for preeclamptic pregnancies and intrauterine growth retardation. Placental growth factor PLGF, a member of the VEGF family, is produced mainly by the placenta and is a potent angiogenic factor. The corresponding receptor, the soluble fms-like tyrosine kinase-1 is considered to have angiogenic properties.

2 PRINCIPLE OF THE TEST

The PLGF ELISA Kit is a solid phase enzyme-linked immunosorbent assay (ELISA) based on the sandwich principle.
The microtiter wells are coated with a monoclonal antibody directed towards a unique antigenic site of the PLGF molecule. An aliquot of patient sample containing endogenous PLGF is incubated in the coated well.
After a washing step a biotin-linked polyclonal antibody specific for PLGF is added to the wells. Following a wash to remove any unbound antibody a streptavidin HRP enzyme complex is added to the wells. After incubation the unbound enzyme complex is washed off.
The amount of bound peroxidase is proportional to the concentration of PLGF in the sample.
Having added the substrate solution, the intensity of colour developed is proportional to the concentration of PLGF in the patient sample

3 WARNINGS AND PRECAUTIONS

1. This kit is for in vitro diagnostic use only. For professional use only.
2. All reagents of this test kit which contain human serum or plasma have been tested and confirmed negative for HIV I/II, HBsAg and HCV by FDA approved procedures. All reagents, however, should be treated as potential biohazards in use and for disposal.
3. Before starting the assay, read the instructions completely and carefully. Use the valid version of the package insert provided with the kit. Be sure that everything is understood.
4. The microplate contains snap-off strips. Unused wells must be stored at 2 °C to 8 °C in the sealed foil pouch and used in the frame provided.
5. Pipetting of samples and reagents must be done as quickly as possible and in the same sequence for each step.
6. Use reservoirs only for single reagents. This especially applies to the substrate reservoirs. Using a reservoir for dispensing a substrate solution that had previously been used for the conjugate solution may turn solution colored. Do not pour reagents back into vials as reagent contamination may occur.
7. Mix the contents of the microplate wells thoroughly to ensure good test results. Do not reuse microwells.
8. Do not let wells dry during assay; add reagents immediately after completing the rinsing steps.
9. Allow the reagents to reach room temperature (21-26°C) before starting the test. Temperature will affect the absorbance readings of the assay. However, values for the patient samples will not be affected.
10. Never pipet by mouth and avoid contact of reagents and specimens with skin and mucous membranes.
11. Do not smoke, eat, drink or apply cosmetics in areas where specimens or kit reagents are handled.
12. Wear disposable latex gloves when handling specimens and reagents. Microbial contamination of reagents or specimens may give false results.
13. Handling should be done in accordance with the procedures defined by an appropriate national biohazard safety guideline or regulation.
14. Do not use reagents beyond expiry date as shown on the kit labels.
15. All indicated volumes have to be performed according to the protocol. Optimal test results are only obtained when using calibrated pipettes and microtiterplate readers.
16. Do not mix or use components from kits with different lot numbers. It is advised not to exchange wells of different plates even of the same lot. The kits may have been shipped or stored under different conditions and the binding characteristics of the plates may result slightly different.
17. Avoid contact with *Stop Solution* containing 0.5 M H_2SO_4. It may cause skin irritation and burns.
18. Some reagents contain Proclin 300, BND and/or MIT as preservatives. In case of contact with eyes or skin, flush immediately with water.
19. TMB substrate has an irritant effect on skin and mucosa. In case of possible contact, wash eyes with an abundant volume of water and skin with soap and abundant water. Wash contaminated objects before reusing them. If inhaled, take the person to open air.
20. Chemicals and prepared or used reagents have to be treated as hazardous waste according to the national biohazard safety guideline or regulation.
21. For information on hazardous substances included in the kit please refer to Material Safety Data Sheets. Material Safety Data Sheets for this product are available upon request directly from IBL.

4 REAGENTS

4.1 Reagents provided

1. ***Microtiterwells***, 12x8 (break apart) strips, 96 wells;
   Wells coated with anti-PLGF antibody (monoclonal).
2. ***Zero Standard***, 1 vial, 1 mL, ready to use
   Concentration: 0 pg/mL
   Contains non-mercury preservative.
3. ***Standard (Standard 1-5)*****,** 5 vials, 1 mL, ready to use;
   Concentrations: 25; 50; 125; 500; 1000 pg/mL
   Contain non-mercury preservative.
4. ***Control Low & High***, 2 vials, 1 mL each, ready to use;
   For control values and ranges please refer to vial label or QC-Datasheet.
   Contain non-mercury preservative.
5. ***Enzyme Conjugate***, 1 vial, 14 mL, ready to use,
   biotinylated goat-anti-human PLGF Antibody
   Contains non-mercury preservative.
6. ***Enzyme Complex***, 1 vial, 14 mL, ready to use,
   contains Strepavidin horseradish Peroxidase
   Contains non-mercury preservative.
7. ***Assay Buffer***, 1 vial, 30 mL, ready to use,
   Contains non-mercury preservative.
8. ***Wash Solution***, 1 vial, 30 mL (40X concentrated),
   see „Preparation of Reagents“.
9. ***Substrate Solution***, 1 vial, 14 mL, ready to use,
   Tetramethylbenzidine (TMB).
10. ***Stop Solution***, 1 vial, 14 mL, ready to use,
    contains 0.5 M H_2SO_4,
    Avoid contact with the stop solution. It may cause skin irritations and burns.

Note: Additional Zero *Standard 0* for sample dilution is available upon request.

4.2 Materials required but not provided

- A microtiter plate calibrated reader (450 ± 10 nm).
- Calibrated variable precision micropipettes.
- Absorbent paper.
- Distilled or deionized water
- Timer
- Semi logarithmic graph paper or software for data reduction

4.3 Storage Conditions

When stored at 2 °C to 8 °C unopened reagents will retain reactivity until expiration date. Do not use reagents beyond this date.
Opened reagents must be stored at 2 °C to 8 °C. Microtiter wells must be stored at 2 °C to 8 °C. Once the foil bag has been opened, care should be taken to close it tightly again.

4.4 Reagent Preparation

Bring all reagents and required number of strips to room temperature prior to use.

Wash Solution
Add deionized water to the 40X concentrated Wash Solution.
Dilute 30 mL of concentrated *Wash Solution* with 1170 mL deionized water to a final volume of 1200 mL.
The diluted Wash Solution is stable for 2 weeks at room temperature.

4.5 Disposal of the Kit

The disposal of the kit must be made according to the national regulations. Special information for this product is given in the Material Safety Data Sheet.

4.6 Damaged Test Kits

In case of any severe damage to the test kit or components, IBL has to be informed in writing, at the latest, one week after receiving the kit. Severely damaged single components should not be used for a test run. They have to be stored until a final solution has been found. After this, they should be disposed according to the official regulations.

5 SPECIMEN COLLECTION AND PREPARATION

Serum should be used in this assay.
Do not use haemolytic, icteric or lipaemic specimens.
Please note: Samples containing sodium azide should not be used in the assay.

5.1 Specimen Collection

Serum:
Collect blood by venipuncture (e.g. Sarstedt Monovette for serum), allow to clot, and separate serum by centrifugation at room temperature. Do not centrifuge before complete clotting has occurred. Patients receiving anticoagulant therapy may require increased clotting time.

5.2 Specimen Storage and Preparation

Specimens should be capped and may be stored for up to 24 hours at 2 °C to 8 °C prior to assaying.
Specimens held for a longer time should be frozen only once at -20°C prior to assay. Thawed samples should be inverted several times prior to testing.

5.3 Specimen Dilution

If in an initial assay, a specimen is found to contain more than the highest standard, the specimens can be diluted with *Assay Buffer* and reassayed as described in Assay Procedure.
For the calculation of the concentrations this dilution factor has to be taken into account.
Example:
a) dilution 1:10: 10 µL Serum + 90 µL *Assay Buffer* (mix thoroughly)
b) dilution 1:100: 10 µL dilution a) 1:10 + 90 µL *Assay Buffer* (mix thoroughly).

6 ASSAY PROCEDURE

6.1 General Remarks

- All reagents and specimens must be allowed to come to room temperature before use. All reagents must be mixed without foaming.
- Once the test has been started, all steps should be completed without interruption.
- Use new disposal plastic pipette tips for each standard, control or sample in order to avoid cross contamination.
- Absorbance is a function of the incubation time and temperature. Before starting the assay, it is recommended that all reagents are ready, caps removed, all needed wells secured in holder, etc. This will ensure equal elapsed time for each pipetting step without interruption.
- As a general rule the enzymatic reaction is linearly proportional to time and temperature.

6.2 Test Procedure

Each run must include a standard curve.
All standards, samples, and controls should be run in duplicate. All standards, samples, and controls should be run concurrently so that all conditions of testing are the same.

1. Secure the desired number of Microtiter wells in the holder.
2. Dispense **25 µL** of each ***Standard, Controls*** and **sample** with new disposable tips into appropriate wells.
3. Dispense **250 µL** of ***Assay Buffer*** into appropriate wells.
4. Incubate for **30 minutes** at room temperature (without covering the plate).
5. Briskly shake out the contents of the wells.
   Rinse the wells **3 times** with diluted Wash Solution (400 µL per well). Strike the wells sharply on absorbent paper to remove residual droplets.
   Important note:
   The sensitivity and precision of this assay is markedly influenced by the correct performance of the washing procedure!
6. Dispense **100 µL** ***Enzyme Conjugate*** into each well.
7. Incubate for **60 minutes** at room temperature (without covering the plate).
8. Briskly shake out the contents of the wells.
   Rinse the wells **3 times** with diluted Wash Solution (400 µL per well). Strike the wells sharply on absorbent paper to remove residual droplets.
9. Add **100 µL** of ***Enzyme Complex*** to each well.
10. Incubate for **30 minutes** at room temperature.
11. Briskly shake out the contents of the wells.
    Rinse the wells 3 times with diluted Wash Solution (400 µL per well). Strike the wells sharply on absorbent paper to remove residual droplets.
12. Add **100 µL** of ***Substrate Solution*** to each well.

13. Incubate for **30 minutes** at room temperature.
14. Stop the enzymatic reaction by adding **100 µL** of ***Stop Solution*** to each well
15. Determine the absorbance (OD) of each well at **450 ± 10 nm** with a microtiter plate reader.
    It is recommended that the wells be read **within 10 minutes** after adding the *Stop Solution*.

6.3 Calculation of Results

1. Calculate the average absorbance values for each set of standards, controls and patient samples.
2. Using semi-logarithmic graph paper, construct a standard curve by plotting the mean absorbance obtained from each standard against its concentration with absorbance value on the vertical (Y) axis and concentration on the horizontal (X) axis.
3. Using the mean absorbance value for each sample determine the corresponding concentration from the standard curve.
4. Automated method: The results in the Instructions for Use have been calculated automatically using a 4 Parameter curve fit. (4 Parameter Rodbard or 4 Parameter Marquardt are the preferred methods.) Other data reduction functions may give slightly different results.
5. The concentration of the samples can be read directly from this standard curve. Samples with concentrations higher than that of the highest standard have to be further diluted or reported as > 1000 pg/mL. For the calculation of the concentrations this dilution factor has to be taken into account.

6.3.1 Example of Typical Standard Curve

The following data is for demonstration only and **cannot** be used in place of data generations at the time of assay.

Standard	Optical Units (450 nm)
Zero Standard (0 pg/mL)	0.06
Standard 1 (25 pg/mL)	0.18
Standard 2 (50 pg/mL)	0.28
Standard 3 (125 pg/mL)	0.59
Standard 4 (500 pg/mL)	1.63
Standard 5 (1000 pg/mL)	2.35

7 EXPECTED NORMAL VALUES

It is strongly recommended that each laboratory should determine its own normal and abnormal values.

In a study conducted with apparently normal healthy adults, using the PLGF ELISA the following values are observed (5% - 95% Percentiles):

Population	number	PLGF (pg/mL)
Adult Females non-pregnant	65	20.3 – 85.9
Men	99	16.7 – 63.1

The PLGF concentrations in normal pregnancies showed a steady increase with a peak at 28 to 32 weeks, and a consistent decline thereafter (5% - 95% Percentiles).
In Pregnancies with gestosis medians and normal values are significantly decreased:

Population	number	Median PLGF (pg/mL)	5% – 95% Percentile PLGF (pg/mL)
Healthy pregnant women	59	207	33 - 918
Healthy pregnant women (pregnancy weeks 27 – 32)	17	537.95	161 – 950
Pregnant women with Gestosis	34	33.08	12 - 139
Pregnant women with Gestosis (pregnancy weeks 27 – 32)	13	77.14	13.97 - 268

In order to estimate the probability of preeclampsia, it is recommend to determine PLGF in the 15-18th or 20-22nd week of pregnancy.
If the PLGF concentration in serum in the
15 – 18th week of pregnancy is < 42 pg/mL
20 – 22nd week of pregnancy is <100 pg/mL
there is an elevated probability of development of preeclampsia during this pregnancy.

The results alone should not be the only reason for any therapeutic consequences. The results should be correlated to other clinical observations and diagnostic tests.

8 QUALITY CONTROL

Good laboratory practice requires that controls be run with each calibration curve. A statistically significant number of controls should be assayed to establish mean values and acceptable ranges to assure proper performance.
It is recommended to use control samples according to state and federal regulations. The use of control samples is advised to assure the day to day validity of results. Use controls at both normal and pathological levels.
The controls and the corresponding results of the QC-Laboratory are stated in the QC certificate added to the kit. The values and ranges stated on the QC sheet always refer to the current kit lot and should be used for direct comparison of the results.
It is also recommended to make use of national or international Quality Assessment programs in order to ensure the accuracy of the results.
Employ appropriate statistical methods for analysing control values and trends. If the results of the assay do not fit to the established acceptable ranges of control materials patient results should be considered invalid.
In this case, please check the following technical areas: Pipetting and timing devices; photometer, expiration dates of reagents, storage and incubation conditions, aspiration and washing methods.
After checking the above mentioned items without finding any error contact your distributor or IBL directly.

9 PERFORMANCE CHARACTERISTICS

9.1 Assay Dynamic Range

The range of the assay is between 1.06 – 1000 pg/mL.

9.2 Specificity of Antibodies (Cross Reactivity)

Less than 20% cross-reactivity with rhVEGF/PLGF and less than 0.07% cross-reactivity with rhFLT, rmPLGF-2, rhPDGF and rhVEGF was observed.

9.3 Sensitivity

The analytical sensitivity of the PLGF ELISA was calculated by adding 2 standard deviations to the mean of 20 replicate analyses of the Zero Standard and was found to be < 1.062 pg/mL.

9.4 Reproducibility

9.4.1 Intra Assay

The within assay variability is shown below:

Sample	n	Mean (pg/mL)	CV (%)
1	10	50.5	2.8
2	10	478.6	1.7

9.4.2 Inter Assay

The between assay variability is shown below:

Sample	n	Mean (pg/mL)	CV (%)
1	6	45.8	4.10
2	10	421.4	7.0

9.5 Recovery

Sera have been spiked by adding PLGF solutions with known concentrations in a 1:1 ratio.
The % Recovery has been calculated by multiplication of the ratio of the measured and the expected values with 100.

Sample	Endogenus PLGF Conc. (pg/mL)	Added PLGF Conc (pg/mL)	Measured PLGF Conc. (pg/mL)	Expected PLGF Conc. (pg/mL)	Recovery (%)
1	21.28	0	21.28		
		500	509.59	510.64	99.8
		250	226.72	260.64	87.0
		63	63.98	73.14	87.5
		25	32.17	35.64	90.3
2	41.97	0	41.97		
		500	516.37	520.99	99.1
		250	283.89	270.99	104.8
		63	78.01	83.49	93.4
		25	40.63	45.99	88.4
3	444.18	0	444.18		
		500	682.31	722.09	94.5
		250	458.57	472.09	97.1
		63	279.63	284.59	98.3
		25	260.68	247.09	105.5

9.6 Linearity

Sera were diluted with Zero Standard.

Sample	Dilution	Measured PLGF Conc. (pg/mL)	Expected PLGF Conc (pg/mL)	Recovery (%)
P2	undil	28.47	28.47	
	1 : 2	15.35	14.24	107.8
	1 : 4	7.82	7.12	109.9
	1 : 8	3.90	3.56	109.7
	1:16	2.00	1.78	112.6
P4	undil	49.73	49.73	
	1 : 2	21.89	24.86	88.1
	1 : 4	13.32	12.43	107.2
	1 : 8	6.95	6.22	111.9
	1:16	3.47	3.11	111.6
P5	undil	479.10	479.10	
	1 : 2	259.93	239.55	108.5
	1 : 4	122.22	119.77	102.0
	1 : 8	64.49	59.89	107.7
	1:16	32.89	29.94	109.8

9.7 Diagnostic Specificity

The diagnostic specificity is defined as the probability of the assay of scoring negative in the absence of the specific analyte.
In the 15^{th} – 18^{th} week of pregnancy it is 0.83.

9.8 Diagnostic Sensitivity

The diagnostic sensitivity is defined as the probability of the assay of scoring positive in the presence of the specific analyte.
In the 15^{th} – 18^{th} week of pregnancy it is 0.87.

10 LIMITATIONS OF USE

Reliable and reproducible results will be obtained when the assay procedure is performed with a complete understanding of the package insert instruction and with adherence to good laboratory practice.
Any improper handling of samples or modification of this test might influence the results.

10.1 Interfering Substances

Haemoglobin (up to 4 mg/mL), Bilirubin (up to 0.5 mg/mL) have no influence on the assay results. Triglcerides of 1.9 mg/mL and higher may influence the test result.

10.2 Drug Interferences

Until today no substances (drugs) are known to us, which have an influence to the measurement of PLGF in a sample.

10.3 High-Dose-Hook Effect

No hook effect was observed in this test up to 250000 pg/mL (250 ng/mL)

11 LEGAL ASPECTS

11.1 Reliability of Results

The test must be performed exactly as per the manufacturer's instructions for use. Moreover the user must strictly adhere to the rules of GLP (Good Laboratory Practice) or other applicable national standards and/or laws. This is especially relevant for the use of control reagents. It is important to always include, within the test procedure, a sufficient number of controls for validating the accuracy and precision of the test.
The test results are valid only if all controls are within the specified ranges and if all other test parameters are also within the given assay specifications. In case of any doubt or concern please contact IBL.

11.2 Therapeutic Consequences

Therapeutic consequences should never be based on laboratory results alone even if all test results are in agreement with the items as stated under point 11.1. Any laboratory result is only a part of the total clinical picture of a patient. Only in cases where the laboratory results are in acceptable agreement with the overall clinical picture of the patient should therapeutic consequences be derived.
The test result itself should never be the sole determinant for deriving any therapeutic consequences.

11.3 Liability

Any modification of the test kit and/or exchange or mixture of any components of different lots from one test kit to another could negatively affect the intended results and validity of the overall test. Such modification and/or exchanges invalidate any claim for replacement.
Claims submitted due to customer misinterpretation of laboratory results subject to point 11.2. are also invalid. Regardless, in the event of any claim, the manufacturer's liability is not to exceed the value of the test kit. Any damage caused to the test kit during transportation is not subject to the liability of the manufacturer.

12 REFERENCES / LITERATURE

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Symbols / Symbole / Symbôles / Símbolos / Símbolos / Σύμβολα

REF	Cat.-No.: / Kat.-Nr.: / No.- Cat.: / Cat.-No.: / N.º Cat.: / N.–Cat.: / Αριθμός-Κατ.:
LOT	Lot-No.: / Chargen-Bez.: / No. Lot: / Lot-No.: / Lote N.º: / Lotto n.: / Αριθμός -Παραγωγή:
	Use by: / Verwendbar bis: / Utiliser à: / Usado por: / Usar até: / Da utilizzare entro: / Χρησιμοποιείται από:
	No. of Tests: / Kitgröße: / Nb. de Tests: / No. de Determ.: / N.º de Testes: / Quantità dei tests: / Αριθμός εξετάσεων:
CONC	Concentrate / Konzentrat / Concentré / Concentrar / Concentrado / Concentrato / Συμπύκνωμα
LYO	Lyophilized / Lyophilisat / Lyophilisé / Liofilizado / Liofilizado / Liofilizzato / Λυοφιλιασμένο
IVD	In Vitro Diagnostic Medical Device. / In-vitro-Diagnostikum. / Appareil Médical pour Diagnostics In Vitro. / Dispositivo Médico para Diagnóstico In Vitro. / Equipamento Médico de Diagnóstico In Vitro. / Dispositivo Medico Diagnostico In vitro. / Ιατρική συσκευή για In-Vitro Διάγνωση.
	Evaluation kit. / Nur für Leistungsbewertungszwecke. / Kit pour évaluation. / Juego de Reactivos para Evaluació. / Kit de avaliação. / Kit di evaluazione. / Κιτ Αξιολόγησης.
	Read instructions before use. / Arbeitsanleitung lesen. / Lire la fiche technique avant emploi. / Lea las instrucciones antes de usar. / Ler as instruções antes de usar. / Leggere le istruzioni prima dell'uso. / Διαβάστε τις οδηγίες πριν την χρήση.
	Keep away from heat or direct sun light. / Vor Hitze und direkter Sonneneinstrahlung schützen. / Garder à l'abri de la chaleur et de toute exposition lumineuse. / Manténgase alejado del calor o la luz solar directa. / Manter longe do calor ou luz solar directa. / Non esporre ai raggi solari. / Να φυλάσσεται μακριά από θερμότητα και άμεση επαφή με το φως του ηλίου.
	Store at: / Lagern bei: / Stocker à: / Almacene a: / Armazenar a: / Conservare a: / Αποθήκευση στους:
	Manufacturer: / Hersteller: / Fabricant: / Productor: / Fabricante: / Fabbricante: / Παραγωγός:
	Caution! / Vorsicht! / Attention! / ¡Precaución! / Cuidado! / Attenzione! / Προσοχή!

Symbols of the kit components see MATERIALS SUPPLIED.
Die Symbole der Komponenten sind im Kapitel KOMPONENTEN DES KITS beschrieben.
Voir MATERIEL FOURNI pour les symbôles des composants du kit.
Símbolos de los componentes del juego de reactivos, vea MATERIALES SUMINISTRADOS.
Para símbolos dos componentes do kit ver MATERIAIS FORNECIDOS.
Per i simboli dei componenti del kit si veda COMPONENTI DEL KIT.
Για τα σύμβολα των συστατικών του κιτ συμβουλευτείτε το ΠΑΡΕΧΟΜΕΝΑ ΥΛΙΚΑ.

COMPLAINTS: Complaints may be submitted initially written or vocal. Subsequently they need to be filed including the test performance and results in writing in case of analytical reasons.

WARRANTY: The product is warranted to be free from material defects within the specific shelf life and to comply with product specifications delivered with the product. The product must be used according to the Intended use, all instructions given in the instructions for use and within the product specific shelf life. Any modification of the test procedure or exchange or mixing of components of different lots could negatively affect the results. These cases invalidate any claim for replacement.

LIMITATION OF LIABILITY: IN ALL CIRCUMSTANCES THE EXTENT OF MANUFACTURER'S LIABILITY IS LIMITED TO THE PURCHASE PRICE OF THE KIT(S) IN QUESTION. IN NO EVENT SHALL MANUFACTURER BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING DAMAGES FOR LOST PROFITS, LOST SALES, INJURY TO PERSON OR PROPERTY OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL LOSS.


IBL International GmbH
Flughafenstr. 52A, 22335 Hamburg, Germany

Tel.: + 49 (0) 40 532891 -0 Fax: -11
E-MAIL: IBL@IBL-International.com
WEB: http://www.IBL-International.com