For in vitro diagnostic use only.

Estradiol (E2) Assay Reagent Kit (CMIA)
Package Insert

INTENDED USE

The Estradiol (E2) Assay Reagent Kit (CMIA) is a chemiluminescent microparticle immunoassay (CMIA) for the quantitative determination of E2 in human serum or plasma.

PACKING SIZE

24 Device/Kit,30Device/Kit,48 Device/Kit,60 Device/Kit

SUMMARY

Estradiol (17β-estradiol) is a natural estrogen with a molecular mass of 272.4 daltons. Most circulating estradiol is strongly bound to sex hormone binding protein and loosely bound to albumin. It is estimated that only 1-5% of estradiol is free (unbound). In non-pregnant women, estradiol is secreted by the ovary and the corpus luteum. The adrenals and testes (in men) are also believed to secrete minute amounts of estradiol. Estradiol levels are lowest at menses and into the early follicular phase and rise in the late follicular phase to a peak just prior to the hLH (human Luteinizing Hormone) surge, initiating ovulation. As the hLH peaks, the levels of estradiol decrease before rising again in the luteal phase. Endometrial growth is stimulated by estradiol and progesterone (secreted by the corpus luteum) in preparation for implantation of a fertilized egg. If conception does not occur, the secretion of estradiol and progesterone by the corpus luteum decreases, initiating menses.

Levels of estradiol are used to monitor ovulatory status. Because estradiol levels reflect follicular maturation, the measurement of estradiol as cited in the scientific literature has been used as a valuable tool in the assessment of sexual development in children, anovulation and/or amenorrhea, polycystic ovary syndrome and causes of infertility and menopause.

During in vitro fertilization, estradiol levels are routinely measured after gonadotropin stimulation to determine follicular status. Estradiol also affects areas other than reproductive tissues such as cardiovascular, immune and central nervous systems. For this reason estrogen has been investigated in the pathogenesis of cardiovascular disease, hormone-dependent cancers and osteoporotic fracture. Abnormally high levels in males are indicative of feminizing syndromes such as gynecomastia.

PRINCIPLE OF TEST

The Estradiol assay is a competitive binding immunoassay for the quantitative measurement of E2 in human serum, plasma using CMIA technology, with flexible assay protocols.

In the first step, sample and anti-E2 coated paramagnetic microparticles are combined. E2 present in the sample binds to the anti-E2 coated microparticles. After incubation, E2 ALP-labeled conjugate is added to create a reaction mixture in the second step. Following wash cycle, substrate is added to the reaction mixture. The resulting chemiluminescent reaction is measured as relative light units (RLUs).The light production is inversely proportional to the concentration of E2 in the sample. The amount of analyte in the sample is determined by analyzer.

REAGENTS

The device is pre-dispensed with buffer needed for single use.
The device is constituted with Buffers described below is the main reagent

Object	Content
Micro-particles Buffer	Anti -E2 (Sheep, monoclonal) coated Micro-particles in TRIS buffer with protein (bovine) stabilizer. Minimum concentration: 0.1% solid. Preservative: ProClin-300.
Conjugate Buffer	E2- alkaline phosphatase (ALP) labeled conjugate in TRIS buffer with protein (bovine) stabilizer. Preservative: ProClin-300.
Wash Buffer	TRIS buffer with surfactant. Preservative: ProClin-300.
Substrate Buffer	AMPPD, Enhancer, Surfactant, ProClin-300.

Reagent Handling

The reagents in the kit have been assembled into a ready-for-use unit that cannot be separated.

All information required for correct operation is read in from the respective reagent barcodes.

MATERIALS PROVIDED

·E2 Test Device
·Product Insert
·Calibration Solution (optional)
·Control Solution (optional)

MATERIALS REQUIRED BUT NOT PROVIDED

·Analyzer

STORAGE AND STABILITY

▪Store at 2-8℃ and avoid light.
▪Do not freeze.
▪Store the reagent kit upright prior to use.
▪Expiration date: up to the stated expiration date.

Note: The E2 Reagent Kit must be stored at 2-8℃ in an upright position, and must be used immediately after removal from 2-8℃ storage or the device was opened. Unused reagents should be put back into the kit in time.

SPECIMEN COLLECTION AND STORAGE

Specimen Types

Validated specimen types to be used with this assay:

Specimen Types	Collection Tubes
Human serum	Serum Serum separator tubes
Human plasma	Sodium heparin Lithium heparin Potassium EDTA Sodium EDTA

Other anticoagulants have not been validated for use with this assay.

The instrument does not provide the capability to verily specimen type. It is the responsibility of the operator to verify that the correct specimen types are used in the assay.

Specimen Conditions

- Do not use specimens with the following conditions:
  heat-inactivated
  pooled
  grossly hemolyzed
  obvious microbial contamination
- For optimal results, serum and plasma specimens should be free of fibrin, red blood cells or other particulate matter.
- Ensure that complete clot formation in serum specimens has taken place prior to centrifugation. Some specimens especial those from patients receiving anticoagulant or thrombolytic therapy may exhibit increased clotting time. If the specimen is centrifuged before a complete clot forms, the presence of fibrin may cause erroneous results.
- To prevent cross contamination, use of disposable pipettes or pipette tips is recommended.

Preparation for Analysis

- Follow the tube manufacturer's processing instructions for specimen collection tubes.
- Specimens must be mixed THOROUGHLY after thawing, by LOW speed vortex, and centrifuged prior to use to remove red blood cells or particulate matter to ensure consistency in the results.
- Inspect all specimens for bubbles. Remove bubbles with an applicator stick before analysis. Use a new applicator stick for each specimen to prevent cross contamination.

Specimen Storage

Specimen Type	Storage Temperature	Maximum Storage Time
Serum/Plasma	2-8℃	6 days

- If testing is delayed more than 24 hours, remove serum or plasma from the clot, serum separator or red blood cells.
- If testing is delayed more than 6 days, specimens should be frozen at -10℃ or colder.
- Specimens stored frozen at -10℃ or colder for 3 months showed no performance difference.
- Avoid more than 3 freeze/thaw cycles.

Specimen Shipping

- Before shipping specimens, it is recommended that specimens be removed from the clot, red blood cells, or separator gel.
- When shipping specimens, package and label specimens in compliance with applicable state, federal and international regulations covering the transport of clinical specimens and infectious substances.
- Specimens may be shipped ambient, at 2-8℃ (wet ice), or frozen (dry ice). Do not exceed the storage time limitations listed above.

INSTRUMENT

The E2 Test Device is designed for use on the REALY Analyzer System.

TEST PROCEDURE

Assay Procedure

For optimum performance of the assay follow the directions given in this document for the analyzer concerned. Refer to the appropriate operator's manual for analyzer specific assay instructions. Resuspension of the microparticles takes place automatically prior to use. Read in the test-specific parameters via the reagent barcode. If in exceptional cases the barcode cannot be read, enter the digit sequence of numbers. Bring the cooled reagents to approx. 20℃ and place on the reagent disk of the analyzer. Avoid foam formation. The system automatically regulates the temperature of the reagents.

For this test device, the transfer volume of specimens, calibrators or controls into the sample hole is 70 µL. (No less than 70 µL.)

Reagent strips should be left at room temperature between 20 and 25 ℃ for more than 30 minutes before use and kept away from light.

In order to avoid the magnetic beads adsorbed on the side wall and top due to the upside down and side placement of the reagent strip during transportation, the reagent strip should be mixed by shaking and mixing before use. The reagent strip should be mixed upside down for about 30 seconds, and then the reagent strip should be mixed upward for about 30 seconds.The reagent strip was then gently shaken so that the magnetic beads fell completely to the bottom of the strip.

Calibration

Every Test Device has a barcode label containing specific information for calibration of the particular reagent lot. The pre-defined master curve is adapted to the analyzer using the relevant CalSet.

Calibration frequency: Calibration must be performed before using a new lot of device.
Renewed calibration is recommended as follows:

- After 90 days (when using the same reagent lot on the analyzer);
- As required: e.g. quality control findings outside the defined limits.

Note: Refer to Instruction of Analyzer for the procedure of calibration.

Quality Control

For quality control, please use Control of REALY or Control Universal.

In addition, other suitable control material can be used. Controls for the various concentration ranges should be run individually at least once every 24 hours when the test is in use, once per reagent kit, and following each calibration.

The control intervals and limits should be adapted to each laboratory's individual requirements. Values obtained should fall within the defined limits. Each laboratory should establish corrective measures to be taken if values fall outside the defined limits.

Specimen Dilution Procedures

Specimens with an E2 concentration greater than 2400pg/mL will be flagged as "> 2400 pg/mL" and may be diluted using Manual Dilution Procedure. Use the 1:10 dilution is recommended. The operator must enter the dilution factor in the Patient or Control order screen. The system will use this dilution factor to automatically calculate the concentration of the sample before dilution.

EXPECTED VALUES

Healthy men	11.3-43.2 pg/mL

Healthy women	
Follicular phase	12.4-233 pg/mL
Ovulation phase	41.0-398 pg/mL
Luteal phase	22.3-341 pg/mL
Postmenopause	5-138 pg/mL

Healthy pregnant women	
1st trimester	154-3243 pg/mL
2nd trimester	1561-21280 pg/mL
3rd trimester	8525- 30000 pg/mL

Conversion factors: pg/mL x 3.67 = pmol/L

Each facility should establish its own reference ranges to assure proper representation of specific populations.

INTERPRETATION OF RESULTS

As interpret the results, the patient's overall clinical situation, including symptoms, medical history and other related data, should be referred to.

LIMITATIONS

- If the E2 results are inconsistent with clinical evidence, additional testing is suggested to confirm the result.
- For diagnostic purposes, results should be used in conjunction with other data; e.g., symptoms, results of other tests, clinical impressions, etc.
- Specimens from patients who have received preparations of mouse monoclonal antibodies for diagnosis or therapy may contain human anti-mouse antibodies (HAMA). Specimens containing HAMA may produce anomalous values when tested with assay kits such as REALY E2 that employ mouse monoclonal antibodies.
- Heterophilic antibodies in human serum can react with reagent immunoglobulins, interfering with in vitro immunoassays. Patients routinely exposed to animals or to animal serum products can be prone to this interference and anomalous results may be observed. Additional information may be required for diagnosis.
- Although the REALY E2 assay is specifically designed to minimize the effects of HAMA and heterophilic antibodies, assay results that are not consistent with other clinical observations may require additional information for diagnosis.

PERFORMANCE CHARACTERISTICS

Linearity

The linearity of E2 Reagent Kit was determined by using E2 calibrator to prepare 6 different specimens, measuring all these specimens follow the test instruction and then do linear fitting, the results show that the linear correlation coefficient (r) was not less than 0.9900.

Precision/Reproducibility

Intra-assay coefficient of variation was evaluated on 3 different levels of control serum. Repeatedly measured 20 times,calculating the coefficient of variation.

Intra-assay Precision			
Control	Mean (pg/mL)	SD (pg/mL)	CV
Level 1	59.43	4.83	8.13%
Level 2	569.59	40.35	7.08%
Level 3	1952.06	93.7	4.80%

Inter-assay coefficient of variation was evaluated on three batches of kits. Repeatedly measured 3 different levels of control serum 30 times, calculating the coefficient of variation.

Inter-assay Precision			
Control	Mean (pg/mL)	SD (pg/mL)	CV
Level 1	50.45	4.89	9.69%
Level 2	550.07	45.57	8.28%
Level 3	1931.34	114.31	5.92%

Analytical Sensitivity

The analytical sensitivity is defined as the concentration of E2 equivalent to the mean RLU of 20 replicates of the zero standard minus two standard deviations corresponding to the concentration from the standard curve. The analytical sensitivity is typically less than 10 pg/mL.

Analytical Specificity

The specificity of the E2 assay system was assessed by measuring the apparent response of the assay to various potentially cross-reactive analytes.

Compound	Concentration	Cross-reactivity
Cortisone	2000 ng/mL	< 10%
Testosterone	5000 ng/mL	< 10%
Estriol(E3)	4000 ng/mL	< 10%
Estrone (E1)	1000 ng/mL	< 10%
Cortisol	1000 ng/mL	< 10%
Aldosterone	100 µg/mL	< 10%

Interference

The following compounds in both low-level specimen and high-level specimen show no cross-reactivity when tested with the E2 Assay Reagent Kit at a concentration below:

Compound	Concentration
Hemoglobin	1000 mg/dL
Bilirubin	50 mg/dL
Triglycerides	1000 mg/dL

Method Comparison

The comparison between the E2 Assay Reagent Kit (y) and a commercially available E2 test kit (x), using clinical samples gave the following correlations (pg/mL):

Linear regression
y=1.0637x-0.0186
r=0.9737
Number of samples measured: 80
The sample concentrations were between about 15.5 - 2055.7 pg/mL.

WARNINGS AND PRECAUTIONS

- For *In Vitro* Diagnostic Use.
- Do not use expired or clearly damaged kits.
- Operating according to the steps described, can make the risk of daily handling patients` samples and blood products into a minimum, however, no matter what the source of the products, handling mode or the previous proof, these potentially infectious substances used shall be in accordance with the unified considerations and Good Laboratory Practice (GLP).
- Proper disinfectant should be used to eliminate pollution.
- Follow local rules and regulations to keep and dispose of these items and containers for these items.
- The ProClin-300 is a potential skin sensitizer. Avoid dumping or splashing this reagent on your skin and clothing. In case of contact with this reagent, wash thoroughly with soap and water.
- Avoid foam formation in all reagents and sample types (specimens, calibrators and controls).
- The reagents should be kept away from light, and unused reagents should be put back into the kit in time and be careful to avoid light.

BIBLIOGRAPHY

1. National Institute of Standards and Technology. NIST Chemistry WebBook, SRD 69. Estradiol. 2017.
2. Endogenous Hormones and Breast Cancer Collaborative Group. Free Estradiol and Breast Cancer Risk in Postmenopausal Women:Comparison of Measured and Calculated Values. Cancer Epidemiology,Biomarkers & Prevention.Vol.12, 1457–1461, December 2003.
3. Whitely RJ, Meikle AW, Watts NB. Endocrinology: Part VII: Gonadal Steroids in Tietz Textbook of Clinical Chemistry, 2nd Edition. 1994. Edited by Burtis, CA and Ashwood ER.Philadelphia, PA: W B Saunders Co., 1857-1863.
4. Bulun SE,Adashi EY, The Physiology and Pathology of the Female Reproductive Axis,in Williams Textbook of Endocrinology, 11th edition. Edited by Kronenberg HM,Melmed S,Polonsky KS,and Larsen PR,Philadelphia,PA: Saunders Elsevier, 541-614, 2008.
5. Burger HG,Hale GE, Robertson DM and Dennerstein L. A review of hormonal changes during the menopausal transition: focus on findings from the Melbourne Women's Midlife Health Project. Human Reproduction Update, Vol.13, No.6 pp. 559–565, 2007.
6. Styne DM and Grumbach MM,Puberty:Ontogeny, Neuroendocrinology, Physiology and Disorders,in Williams Textbook of Endocrinology, 11th edition. Edited by Kronenberg HM, Melmed S, Polonsky KS, and Larsen PR, Philadelphia, PA: Saunders Elsevier, 969-1166, 2008.
7. Hendriks DJ, Klinkert ER, Bancsi LFJMM, Looman CWN, Habbema JDF, te Velde ER, and Broekmans FJ. Use of Stimulated Serum Estradiol Measurements for the Prediction of Hyperresponse to Ovarian Stimulation in Vitro Fertilization (IVF). Journal of Assisted Reproduction and Genetics, Vol. 21, No. 3, March 2004.
8. Petrone AB,Simpkins JW,and Barr TL.17β-Estradiol and Inflammation: Implications for Ischemic Stroke. Aging and Disease, Volume 5,Number 5; 340-345, October 2014.
9. Newman JD and Handelsman DJ. Challenges to the Measurement of Oestradiol: Comments on an Endocrine Society Position Statement. Clin Biochem Rev 35 (2) 2014 75-80.
10. Bhasin S,Testicular Disorders, in Williams Textbook of Endocrinology, 11th edition. Edited by Kronenberg HM, Melmed S, Polonsky KS, and Larsen PR, Philadelphia, PA: Saunders Elsevier, 645-737, 2008.
11. Approved Guideline - Procedures for the Handling and Processing of Blood Specimens for Common Laboratory Tests, GP44-A4.2010. Clinical and Laboratory Standards Institute.
12. Approved Standard - Sixth Edition, Procedures for the Collection of Diagnostic Blood Specimens by Venipuncture,GP41-A6.2007.Clinical and Laboratory Standards Institute.
13. Cembrowski GS,Carey RN. Laboratory quality management: QC-QA.ASCP Press, Chicago, IL,1989.
14. Kricka L. Interferences in immunoassays - still a threat. Clin Chem 2000; 46: 1037-1038.
15. Bjerner J, et al. Immunometric assay interference: incidence and prevention. Clin Chem 2002; 48: 613-621.
16. Lingwood D, Ballantyne JS. Alkaline phosphatase-immunoglobulin conjugate binds to lipids in vitro, independent of antibody selectivity. Journal of Immunological Methods 2006; 311: 174-177.

SYMBOLS

Symbol	Meaning	Symbol	Meaning
IVD	In vitro diagnostic medical device		Storage temperature limit
	Manufacturer	EC REP	Authorized representative in the European Community /European Union
	Date of Manufacture		Use-by date
	Do not re-use		Consult instructions for use or consult electronic instructions for use
LOT	Batch code		Do not use if package is damaged and consult instructions for use
REF	Catalogue number	Σ	Contains sufficient for <n> tests

Hangzhou Realy Tech Co., Ltd.
#2 Building, No. 763, Yuansha Village, Xinjie Street, Xiaoshan District, 311200 Hangzhou City, Zhejiang Province, PEOPLE'S REPUBLIC OF CHINA
Website: www.realytech.com

EC REP **Luxus Lebenswelt GmbH**
Kochstr.1,47877, Willich, Germany

Number:1100051703
Version:1.6
Effective Date:2023-08-10