Estradiol ELISA Kit

Catalog Number KA1907

96 assays

Version: 05

Intended for research use only

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Introduction

Intended Use

Enzyme immunoassay for the quantitative measurement of active free Estradiol, an estrogenic steroid, in saliva. Results may be used in research of various hormonal sexual disorders and in assessing placental function in complicated pregnancy. It is intended only for research only.

Background

Estradiol (1,3,5(10)-estratriene-3,17β-diol; 17β-estradiol; E21) is a C18 steroid hormone with a phenolic A ring. This steroid hormone has a molecular weight of 272.4. It is the most potent natural Estrogen, produced mainly by the Graffian follicle of the female ovary and the placenta, and in smaller amounts by the adrenals, and the male testes (1-3).

Estradiol (E2) is secreted into the blood stream where 98% of it circulates bound to sex hormone binding globulin (SHBG) and to a lesser extent to other serum proteins such as albumin. Only a small fraction circulates as free hormone or in the conjugated form (4, 5). Estrogenic activity is effected via estradiol-receptor complexes which trigger the appropriate response at the nuclear level in the target sites. These sites include the follicles, uterus, breast, vagine, urethra, hypothalamus, pituitary and to a lesser extent the liver and skin.

In non-pregnant women with normal menstrual cycles, estradiol secretion follows a cyclic, biphasic pattern with the highest concentration found immediately prior to ovulation (6, 7). The rising estradiol concentration is understood to exert a positive feedback influence at the level of the pituitary where it influences the secretion of the gonadotropins, follicle stimulating hormone (FSH), and luteinizing hormone (LH), which are essential for follicular maturation and ovulation, respectively (8). Following ovulation, estradiol levels fall rapidly until the luteal cells become active resulting in a secondary gentle rise and plateau of estradiol in the luteal phase. During pregnancy, maternal serum Estradiol levels increase considerably, to well above the pre-ovulatory peak levels and high levels are sustained throughout pregnancy (9).

Principle of the Assay

The Estradiol ELISA Kit is based on the competition principle and the microplate separation.

An unknown amount of Estradiol present in the sample and a fixed amount of Estradiol conjugated with horseradish peroxidase compete for the binding sites of a polyclonal Estradiol antiserum coated onto the wells. After two hours incubation the microtiter plate is washed to stop the competition reaction. Having added the substrate solution the concentration of Estradiol is inversely proportional to the optical density measured.

General Information

Materials Supplied

List of component:

Component	Detail	Amount
Microtiterwells	Wells coated with a anti-Estriol antibody (polyclonal)	96 (8x12) wells
Enzyme Conjugate	Ready to use, Estradiol conjugate to horseradish peroxidase, contains non-mercury preservative.	26 mL
Substrate Solution	Ready to use, tetramethylbenzidine (TMB).	25 mL
Stop Solution	Ready to use, contains 0.5 M H_2SO_4. Avoid contact with the stop solution. It may cause skin irritation and burns.  Hazards identification: H290 May be corrosive to metals. H314 Causes severe skin burns and eye damage.	14 mL
Wash Solution (40X)	Concentrate for 1200 mL.	30 mL

Standards and Controls - Ready to use

Component	Concentration (pg/mL)	Amount
Standard A	0	1 mL
Standard B	1	1 mL
Standard C	5	1 mL
Standard D	10	1 mL
Standard E	50	1 mL
Standard F	100	1 mL
Control 1	Control values and ranges please refer to vial label or QC-Datasheet	1 mL
Control 2	Control values and ranges please refer to vial label or QC-Datasheet	1 mL

Contents: Contain non-mercury preservative.

Storage Instruction

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.

Opened kits retain activity for two month if stored as described above.

Materials Required but Not Supplied

- ✓ Calibrated EIA reader adjusted to read at 450 nm
- ✓ Calibrated variable precision micropipettes (100 µL and 200 µL)
- ✓ Distilled or Deionized water
- ✓ 0.9% NaCl solution
- ✓ Timer (60 min. range)
- ✓ Reservoirs (disposable)
- ✓ Test tube or microtube rack in a microplate configuration
- ✓ Semi-logarithmic graph paper or software for data reduction

Precautions for Use

- Warning and Precaution
- ✓ This kit is for research use only.
- ✓ 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.
- ✓ 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.
- ✓ 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.
- ✓ Pipetting of samples and reagents must be done as quickly as possible and in the same sequence for each step.
- ✓ 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.
- ✓ Mix the contents of the microplate wells thoroughly to ensure good test results. Do not reuse microwells.
- ✓ Do not let wells dry during assay; add reagents immediately after completing the rinsing steps.
- ✓ 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 samples will not be affected.
- ✓ Never pipet by mouth and avoid contact of reagents and specimens with skin and mucous membranes.
- ✓ Do not smoke, eat, drink or apply cosmetics in areas where specimens or kit reagents are handled.
- ✓ Wear disposable latex gloves when handling specimens and reagents. Microbial contamination of reagents or specimens may give false results.
- ✓ Handling should be done in accordance with the procedures defined by an appropriate national biohazard safety guideline or regulation.
- ✓ Do not use reagents beyond expiry date as shown on the kit labels.

- ✓ All indicated volumes have to be performed according to the protocol. Optimal test results are only obtained when using calibrated pipettes and microtiterplate readers.
- ✓ 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.
- ✓ Avoid contact with Stop Solution containing 0.5 M H_2SO_4. It may cause skin irritation and burns.
- ✓ Some reagents contain Proclin, BND and MIT as preservatives. In case of contact with eyes or skin, flush immediately with water.
- ✓ 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.
- ✓ Chemicals and prepared or used reagents have to be treated as hazardous waste according to the national biohazard safety guideline or regulation.
- ✓ 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 manufacturer.

- 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.
- Damaged Test Kits

  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.

- Limitation 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.

  The person should not eat, drink, chew gum or brush teeth for 30 minutes before sampling. Otherwise rinse mouth thoroughly with cold water 5 min prior to sample collection. Do not collect samples when oral diseases, inflammation or lesions exist (blood contamination).
- ✓ Interfering Substances

  Blood contamination of more than 0.16% in saliva samples will affect results, and usually can be seen by eye. Therefore, samples containing any visible blood should not be used.

  Concentrations of Sodium Azide ≥ 0.02% interferes in this assay and may lead to false results.
- ✓ Drug Interferences

  The Estradiol ELISA Kit should not be used for persons being taken with fulvestrant (Faslodex®) which cross reacts in the Estradiol ELISA Kit and could lead to falsely elevated test result.
- ✓ High-Dose-Hook Effect

  No hook effect was observed in this test.

Assay Protocol

Reagent Preparation

- Bring all reagents to room temperature before 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.

Sample Preparation

- Specimen Collection and Preparation

✓ Eating, drinking, chewing gums or brushing teeth should be avoided for 30 minutes before sampling. Otherwise, it is recommended to rinse mouth thoroughly with cold water 5 minutes prior to sampling. Do not collect samples when oral diseases, inflammation or lesions exist (blood contamination).

In case of visible blood contamination the person should discard the sample, rinse the sampling device with water, wait for 10 minutes and take a new sample.

Note: Samples containing sodium azide should not be used in the assay.

✓ Specimen Collection

It is recommended to collect saliva samples with commercially available equipment.

Do not use any cotton swab for sampling, such as Salivettes; this in most cases will result in significant interferences.

Due to the episodic secretion pattern of steroid hormones it is important to care for a proper timing of the sampling.

In order to avoid arbitrary results we recommend that always 5 samples be taken within a period of 2-3 hours (multiple sampling) preferably before a meal.

As food might contain significant amounts of steroid hormones samples preferably should be taken while fasting. If fasting should be a problem the collection period should be timed just before lunch or before dinner.

✓ Specimen Storage and Preparation

Specimens should be capped and may be stored for up to one week at 4°C prior to assaying.

Specimens held for a longer time should be frozen -20°C prior to assay. Even repeated thawing and freezing is no problem.

Each sample has to be frozen, thawed, and centrifuged at least once anyhow in order to separate the mucins by centrifugation.

Upon arrival of the samples in the lab the samples have to stay in the deep freeze at least overnight. Next morning the frozen samples are warmed up to room temperature and mixed carefully.

Then the samples have to be centrifuged for 5 to 10 minutes (at 3000-2000 x g).

Now the clear colorless supernatant is easy to pipette.

If a set of multiple samples have to be tested, the lab (after at least one freezing, thawing, and centrifugation cycle) has to mix the aliquots of the 5 single samples in a separate sampling device and perform the testing from this mixture.

✓ Specimen Dilution

If in an initial assay, a specimen is found to contain more than the highest standard, the specimens can be diluted with 0.9 % NaCl and re-assayed as described in Assay Procedure.

For the calculation of the concentrations this dilution factor has to be taken into account.

Example:

Dilution 1:10 10 µL saliva + 90 µL 0.9 % NaCl (mix thoroughly)

Dilution 1:100 10 µL of dilution a + 90 µL 0.9 % NaCl (mix thoroughly).

Assay Procedure

- General Remarks

1. All reagents and specimens must be allowed to come to room temperature before use. All reagents must be mixed without foaming.
2. Once the test has been started, all steps should be completed without interruption.
3. Use new disposal plastic pipette tips for each standard, control or sample in order to avoid cross contamination.
4. 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.
5. As a general rule the enzymatic reaction is linearly proportional to time and temperature.

- 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 100 µL of each Standard, Control and samples with new disposable tips into appropriate wells.
3. Incubate for 30 minutes at room temperature.
4. Dispense 200 µL of Enzyme Conjugate into each sample and standard well.
   Mix the plate thoroughly for 10 seconds. It is important to have a complete mixing in this step.
5. Incubate for 120 minutes at room temperature.
6. 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!

7. Add 200 µL of Substrate Solution to each well.
8. Incubate for 30 minutes at room temperature.
9. Stop the enzymatic reaction by adding 100 µL of Stop Solution to each well.
10. 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.

Data Analysis

Calculation of Results

- Calculate the average absorbance values for each set of standards, controls and samples.
- 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.
- Using the mean absorbance value for each sample, determine the corresponding concentration from the standard curve.
- Automated method: The results in the IFU have been calculated automatically using a 4 PL (4 Parameter Logistics) curve fit. 4 Parameter Logistics is the preferred method. Other data reduction functions may give slightly different results.
- 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 > 100 pg/mL. For the calculation of the concentrations this dilution factor has to be taken into account.
- 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	Absorbance Units
Standard A (0 pg/mL)	1.89
Standard B (1 pg/mL)	1.71
Standard C (5 pg/mL)	1.48
Standard D (10 pg/mL)	1.20
Standard E (50 pg/mL)	0.46
Standard F (100 pg/mL)	0.32

- Expected Normal Values

  In order to determine the normal range of SLV Estradiol, 18 saliva samples from adult male and 54 female apparently healthy subjects, ages 19 to 75 years, were collected in the morning and analyzed using the Estradiol ELISA Kit.

  The following ranges were calculated from this study.

	Age group	Salivary Estradiol [pg/mL]	
Women	19 - 50 yrs.	n = 41	0.6 – 6.3
	51 - 75 yrs	Postmenopausal: n = 13	0.6 - 3.1
Men	18 – 75 yrs	n = 18	0.6 - 3.1

  Salivary Estradiol values show a clear circadian rhythm. We therefore recommend the saliva samples be obtained the same hour each day.

- 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 abnormal 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 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 the manufacture directly.

Performance Characteristics

- Assay Dynamic Range: The range of the assay is between 0.6 - 100 pg/mL.
- Specificity:

  The following materials have been evaluated for cross reactivity. The percentage indicates cross reactivity at 50% displacement compared to Estradiol.

Compound	Cross reactiivity [%]
Estradiol-17 beta	100
Androstenedione	0
Androsterone	0
Corticosterone	0
Cortisone	0
Epiandrosterone	0
16-Epiestriol	0
Estadiol-3-sulfate	0
Estradiol-3-glucoronide	0
Estradiol-17 alpha	0
Estriol	2.27
Estriol-16-glucoronide	0
Estrone	6.86
Estrone-3-sulfate	0
Dehydroepiandrosterone	0
11-Desoxycortisol	0
21-Desoxycortisol	0
Dihydrotestosterone	0
Dihydroepiandrosterone	0
20-Dihydroprogesterone	0
11-Hydroxyprogesterone	0
17 alpha-Hydroxyprogesterone	0.003
17 alpha-Pregnenolone	0
17 alpha Progesterone	0
Pregnanediol	0
Pregnanetriol	0
Pregnenolone	0
Progesterone	0
Testosterone	0.033
Fulvestrant	0.9

- Sensitivity:

  The lowest detectable level of Estradiol that can be distinguished from the Zero Standard is 0.6 pg/mL at the 95 % confidence limit.

- Reproducibility:

✓ Intra Assay

The intra-assay variation was determined by 20 replicate measurements of three saliva samples using the Estradiol ELISA Kit. The within assay variability is shown below:

	Sample 1	Sample 2	Sample 3
Mean (pg/mL)	8.3	30.5	21.4
SD (pg/mL)	0.7	0.7	0.7
CV (%)	8.3	2.4	3.2
n =	20	20	20

✓ Inter Assay

The inter-assay (between-run) variation was determined by duplicate measurements of four saliva samples over 10 different days runs.

The between assay variability is shown below:

	Sample 1	Sample 2	Sample 3
Mean (pg/mL)	6.6	29.9	65.0
SD (pg/mL)	0.8	1.5	1.8
CV (%)	12.0	4.9	2.8
n =	40	40	40

✓ Recovery

Recovery of the ELISA was determined by adding increasing amounts of the analyte to three different saliva samples containing different amounts of endogenous analyte. Each sample (non-spiked and spiked) was assayed and analyte concentrations of the samples were calculated from the standard curve. The percentage recoveries were determined by comparing expected and measured values of the samples.

	Sample 1	Sample 2	Sample3
Concentration (pg/mL)	0.6	19.8	20.8
Average % recovery	98.9	90.1	106.3
Range of Recovery % from to	86.6 112.0	85.4 96.1	102.4 111.0

✓ Linearity

Three samples (saliva) containing different amounts of analyte were serially diluted up to 1:16 with 0.9% NaCl and assayed with the Estradiol ELISA Kit. The percentage recovery was calculated by comparing the expected and measured values for Saliva estradiol.

		Sample 1	Sample 2	Sample 3
Concentration (pg/mL)		75.6	62.9	31.7
Average % recovery		104.8	95.7	91.6
Range of Recovery %	from	96.0	88.5	90
	to	112.8	106.7	93.3

Resources

References

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Plate Layout

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