

Instructions for use

Androstenedione ELISA

REF

AA E-1000R



96

RUO

For research
use only –
Not for use
in diagnostic
procedures

Androstenedione ELISA

1. INTENDED USE

The Androstenedione ELISA is an enzyme immunoassay for the quantitative measurement of Androstenedione in serum and EDTA plasma.

2. PRINCIPLE OF THE TEST

The Androstenedione ELISA Kit is a solid phase enzyme-linked immunosorbent assay (ELISA), based on the **principle of competitive binding**.

The microtiter wells are coated with a polyclonal (rabbit) antibody directed towards an antigenic site of the androstenedione molecule.

During the first incubation, the androstenedione in the added sample competes with the added enzyme conjugate, which is an androstenedione molecule conjugated to horseradish peroxidase, for binding to the coated antibody.

After a washing step, to remove all unbound substances, the solid phase is incubated with the substrate solution. The reaction is abruptly stopped by addition of stop solution and optical density (OD) of the resulting yellow product is measured. The intensity of colour is inversely proportional to the concentration of the analyte in the sample.

A standard curve is constructed by plotting OD values against concentrations of standards, and concentrations of unknown samples are determined using this standard curve.

3. WARNINGS AND PRECAUTIONS

1. This kit is for research 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 (20 °C - 26 °C) before starting the test. Temperature will affect the absorbance readings of the assay. However, values for the 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 H₂SO₄. 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 Safety Data Sheets. Safety Data Sheets for this product are available upon request directly from the manufacturer.

4. REAGENTS

4.1 Reagents provided

AA E-1031 96 **Microtiterwells**

Content: 12x8 (break apart) strips, 96 wells; Wells coated with anti-Androstenedione antibody (polyclonal).

Standards and Controls - ready to use

Cat. no.	Component	Standard	Concentration ng/ml	Volume / vial
AA E-1001	 A	Standard A	0	1 ml
AA E-1002	 B	Standard B	0.1	1 ml
AA E-1003	 C	Standard C	0.3	1 ml
AA E-1004	 D	Standard D	1.0	1 ml
AA E-1005	 E	Standard E	3.0	1 ml
AA E-1006	 F	Standard F	10	1 ml
AA E-1051	 1	Control 1 (low)	Refer to vial labels or QC-Report for expected value and acceptable range!	1 ml
AA E-1052	 2	Control 2 (high)		1 ml

Contents: Contain non-mercury preservative.
Standards are calibrated against Reference Material of the National Measurement Institute Australia (NMIA-M955)

Conversion: $\text{ng/ml} \times 3.492 = \text{nmol/l}$

AA E-1040 **Enzyme Conjugate** - ready to use

Content: Androstenedione conjugated to horseradish peroxidase;
Contains non-mercury preservative.

Volume: 1 x 25 ml

SA E-0055 **Substrate Solution** - ready to use

Content: Tetramethylbenzidine (TMB).

Volume: 1 x 25 ml

FR E-0080 **Stop Solution** - ready to use

Content: contains 0.5 M H₂SO₄.
Avoid contact with the stop solution. It may cause skin irritations and burns.

Volume: 1 x 14 ml

Hazards identification:



H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.

FR E-0030 40x **Wash Solution** - 40X concentrated

Volume: 1 x 30 ml
see „Preparation of Reagents“

Note: Additional Standard A for sample dilution is available upon request.

4.2 Materials required but not provided

- A calibrated microtiter plate reader (450 nm, with reference wavelength at 620 nm to 630 nm)
- Calibrated variable precision micropipettes.
- Absorbent paper.
- Distilled 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.

Opened kits retain activity for 8 weeks if stored as described above.

4.4 Reagent Preparation

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

Wash Solution

Add distilled water to the 40X concentrated Wash Solution.

Dilute 30 ml of concentrated Wash Solution with 1170 ml distilled 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 Safety Data Sheet.

4.6 Damaged Test Kits

In case of any severe damage to the test kit or components, the manufacturer 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 or EDTA plasma can be used in this assay.

Do not use Heparin or citrate plasma. Heparin plasma leads to slightly reduced values. For citrate plasma the results are significantly increased.

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

In general it should be avoided to use haemolytic, icteric or lipaemic specimens. For further information refer to chapter "Interfering Substances".

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.

Plasma:

Whole blood should be collected into centrifuge tubes containing anticoagulant and centrifuged immediately after collection.

(E.g. Sarstedt Monovette for EDTA plasma)

5.2 Specimen Storage and Preparation

Specimens should be capped and may be stored for up to 5 days at 2 °C to 8 °C prior to assaying.

Specimens stored for a longer time (up to 12 months) 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 *Standard A* 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 sample + 90 µl *Standard A* (mix thoroughly)

b) dilution 1:100: 10 µl dilution a) 1:10 + 90 µl *Standard A* (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.

1.	Secure the desired number of Microtiter wells in the frame holder.
2.	Dispense 20 µl of each Standard, Control and samples <u>with new disposable tips</u> into appropriate wells.
3.	Dispense 200 µl Enzyme Conjugate into each well. Thoroughly mix for 10 seconds. It is important to have a complete mixing in this step.
4.	Incubate for 60 minutes at room temperature.
5.	Briskly shake out the contents of the wells. Rinse the wells 4 times with diluted <i>Wash Solution</i> (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.	Add 200 µl of Substrate Solution to each well.
7.	Incubate for 30 minutes at room temperature.
8.	Stop the enzymatic reaction by adding 100 µl of Stop Solution to each well.
9.	Determine the absorbance (OD) of each well at 450 nm (reading) and at 620 nm to 630 nm (background subtraction, recommended) with a microtiter plate reader. It is recommended that the wells be read within 10 minutes after adding the <i>Stop Solution</i> .

6.3 Calculation of Results

1. Calculate the average absorbance values for each set of standards, controls and 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 > 10.0 ng/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 Density (450 nm)
Standard A (0 ng/ml)	1.93
Standard B (0.1 ng/ml)	1.76
Standard C (0.3 ng/ml)	1.39
Standard D (1.0 ng/ml)	0.87
Standard E (3.0 ng/ml)	0.47
Standard F (10.0 ng/ml)	0.23

7. EXPECTED NORMAL VALUES

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

In a study conducted with serum of apparently normal healthy donors, using the Androstenedione ELISA the following values are observed:

Females

Age (years)	n	Mean (ng/ml)	Median (ng/ml)	2.5 th Percentile (ng/ml)	97.5 th Percentile (ng/ml)	Range (min. - max.) (ng/ml)
0 - 10	29	0.39	0.30	0.02	0.86	0.00 – 0.99
11 - 17	17	1.36	1.18	0.25	2.78	0.10 – 2.83
18 - 53	66	2.19	2.12	0.75	3.89	0.30 – 4.39
54 - 82	26	1.32	1.20	0.35	2.49	0.25 – 2.72

Males

Age (years)	n	Mean (ng/ml)	Median (ng/ml)	2.5 th Percentile (ng/ml)	97.5 th Percentile (ng/ml)	Range (min. - max.) (ng/ml)
0 - 10	34	0.40	0.26	0.01	1.31	0.00 - 1.54
11 - 17	16	1.75	1.53	0.33	3.30	0.11 - 3.50
18 - 53	36	2.15	2.06	0.45	4.20	0.44 - 4.56
54 - 82	44	1.95	1.96	0.30	3.93	0.26 - 4.26

8. QUALITY CONTROL

Good laboratory practice requires that controls be run with each standard 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 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 the manufacturer directly.

9. PERFORMANCE CHARACTERISTICS

9.1 Assay Dynamic Range

The range of the assay is between 0.021 – 10 ng/ml.

9.2 Specificity of Antibodies (Cross Reactivity)

The following substances were tested for cross reactivity of the assay:

Compound	Cross reactivity %
Androstenedione	100.0
Androsterone	< 0.01
Aldosterone	0.0
Cortisol	0.2
Dihydrotestosterone	< 0.01
Dihydroepiandrosterone	< 0.01
Estriol	1.8
16-Epiestriol	< 0.01
Estradiol	< 0.01
Estriol-3-glucuronide	< 0.01
Estriol-16-glucuronide	< 0.01
Estriol-16-sulfate	< 0.01
Estrone	< 0.01
17a-Pregnenolone	< 0.01
17 OH-Progesterone	0.3
Progesterone	< 0.01
Testosterone	0.6

9.3 Sensitivity

The analytical sensitivity of the Androstenedione ELISA was calculated by subtracting 2 standard deviations from the mean of 20 replicate analyses of the Standard A and was found to be 0.021 ng/ml.

9.4 Reproducibility

9.4.1 Intra-Assay

The within-assay variability is shown below:

Sample	n	Mean (ng/ml)	CV (%)
1	20	0.7	9.2
2	20	1.2	5.3
3	20	8.0	6.9

9.4.2 Inter-Assay

The between-assay variability is shown below:

Sample	n	Mean (ng/ml)	CV (%)
1	40	1.0	8.7
2	40	3.0	8.1
3	40	4.3	8.3

9.4.3 Inter-Lot

The inter-assay (between-lots) variation was determined by measuring each sample 6 times with 3 different kit lots:

Sample	n	Mean (ng/ml)	CV (%)
1	18	3.4	5.2
2	18	5.3	8.7
3	18	7.1	5.6

9.5 Recovery

Samples have been spiked by adding Androstenedione solutions with known concentrations. The recovery (%) was calculated by multiplying the ratio of measured and expected values with 100.

	Sample 1	Sample 2	Sample 3
Concentration [ng/ml]	1.5	1.4	2.0
Average Recovery [%]	106.6	102.6	104.0
Range of Recovery [%]	from 96.4	99.1	93.3
	to 112.9	108.6	114.0

9.6 Linearity

	Sample 1	Sample 2	Sample 3
Concentration [ng/ml]	6.2	4.7	7.2
Average Recovery [%]	97.0	96.3	93.4
Range of Recovery [%]	from 92.3	91.6	86.7
	to 102.9	101.3	105.6

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) and triglyceride (up to 30 mg/ml) have no influence on the assay results.

10.2 Drug Interferences

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

10.3 High-Dose-Hook Effect

Hook effect was not observed in this test up to a concentration of 186 ng/ml of Androstenedione.

11. REFERENCES / LITERATURE

1. Kicman, A. T., Bassindale, T., Cowan, D. A., Dale, S., Hutt, A. J., and Leeds, A. R. Effect of androstenedione ingestion on plasma testosterone in young women; a dietary supplement with potential health risks. Clin Chem 2003, 49:167-169.
2. Brown, G.A., Vukovich, M.D., Martini, E.R., Kohut, M.L., Franke, W.D., Jackson, D.A., and King, D.S. Endocrine responses to chronic androstenedione intake in 30- to 56-year-old men. J Clin Endocrinol Metab 2000, 85:4074-4080.
3. Erickson GF 1993 Normal regulation of ovarian androgen production. Seminars in Reproductive Endocrinology 11:307-312
4. Mango D, Scirpa P, Battaglia F, Tartaglia E, Manna P. Diagnostic significance of steroid hormones in patients with ovarian cancer. J Endocrinol Invest. 1986 Aug;9(4):307-14

Symbols:

	Storage temperature		Manufacturer		Contains sufficient for <n> tests
	Expiry date	LOT	Batch code		
	Consult instructions for use	CONT	Content		
	Caution	REF	Catalogue number	RUO	For research use only!