
Instructions for use

Aldosterone ELISA

REF

MS E-5200



IVD



Aldosterone ELISA

INTENDED USE

For the direct quantitative determination of Aldosterone in human serum, plasma and urine by an enzyme immunoassay.

For *in vitro* diagnostic use only.

PRINCIPLE OF THE TEST

The principle of the following enzyme immunoassay test follows the typical competitive binding scenario. Competition occurs between an unlabeled antigen (present in standards, control and patient samples) and an enzyme-labelled antigen (conjugate) for a limited number of antibody binding sites on the microwell plate. The washing and decanting procedures remove unbound materials. After the washing step, the enzyme substrate is added. The enzymatic reaction is terminated by addition of the stopping solution. The absorbance is measured on a microtiter plate reader. The intensity of the colour formed is inversely proportional to the concentration of aldosterone in the sample. A set of standards is used to plot a standard curve from which the amount of aldosterone in patient samples and controls can be directly read.

CLINICAL APPLICATIONS

Aldosterone is a potent mineral corticoid whose synthesis and release are controlled by the renin-angiotensin system of the body. Aldosterone promotes the reabsorption of sodium in the distal tubules of the kidney resulting in potassium secretion along with sodium retention, which controls the circulating blood volume. Chronic overproduction and secretion of aldosterone leads to hypertension.

Measurement of aldosterone levels in serum in conjunction with plasma renin levels can be used to differentiate between primary and secondary aldosteronism.

Condition	Serum Aldosterone	Plasma Renin
Primary Aldosteronism	High	Low
Secondary Aldosteronism	High	High

The measurement of aldosterone in concert with selective suppression and stimulation tests can be used to further differentiate primary aldosteronism into two basic types:

- Primary aldosteronism caused by an adenoma of one or both adrenals.
- Primary aldosteronism caused by adrenal hyperplasia.

This differentiation is vital in the treatment and management of the disease. The adrenal adenomas respond well to surgery whereas hyperplastic disease of the adrenals is generally better managed medically. In summary, the precise and accurate measurement of serum aldosterone by enzyme immunoassay can be an important adjunct to a diagnostic laboratory battery for the differential diagnosis of hypertensive disease.

PROCEDURAL CAUTIONS AND WARNINGS

- Users should have a thorough understanding of this protocol for the successful use of this kit. Reliable performance will only be attained by strict and careful adherence to the instructions provided.
- Control materials or serum pools should be included in every run at a high and low level for assessing the reliability of results.
- When the use of water is specified for dilution or reconstitution, use deionized or distilled water.
- In order to reduce exposure to potentially harmful substances, gloves should be worn when handling kit reagents and human specimens.
- All kit reagents and specimens should be brought to room temperature and mixed gently but thoroughly before use. Avoid repeated freezing and thawing of reagents and specimens.
- A calibrator curve must be established for every run.
- The control should be included in every run and fall within established confidence limits.
- Improper procedural techniques, imprecise pipetting, incomplete washing as well as improper reagent storage may be indicated when assay values for the control do not reflect established ranges.
- When reading the microplate, the presence of bubbles in the microwells will affect the optical densities (ODs). Carefully remove any bubbles before performing the reading step.
- The substrate solution (TMB) is sensitive to light and should remain colourless if properly stored. Instability or contamination may be indicated by the development of a blue colour, in which case it should not be used.
- When dispensing the substrate and stopping solution, do not use pipettes in which these liquids will come into contact with any metal parts.
- To prevent contamination of reagents, use a new disposable pipette tip for dispensing each reagent, sample, standard and control.
- Do not mix various lot numbers of kit components within a test and do not use any component beyond the expiration date printed on the label.
- Kit reagents must be regarded as hazardous waste and disposed of according to national regulations.

LIMITATIONS

- All the reagents within the kit are calibrated for the direct determination of aldosterone in human serum, plasma and urine. The kit is not calibrated for the determination of aldosterone in saliva or other specimens of human or animal origin.
- Do not use grossly hemolyzed, grossly lipemic, icteric or improperly stored serum or plasma.
- Any samples or control sera containing azide or thimerosal are not compatible with this kit, as they may lead to false results.
- Only calibrator A may be used to dilute any high samples. Only the urine diluent may be used to dilute any high urine samples. The use of any other reagents may lead to false results.
- The results obtained with this kit should never be used as the sole basis for a clinical diagnosis. For example, the occurrence of heterophilic antibodies in patients regularly exposed to animals or animal products has the potential of causing interferences in immunological tests. Consequently, the clinical diagnosis should include all aspects of a patient's background including the frequency of exposure to animals/products if false results are suspected.

SAFETY CAUTIONS AND WARNINGS

POTENTIAL BIOHAZARDOUS MATERIAL

Human serum that may be used in the preparation of the standards and control has been tested and found to be non-reactive for Hepatitis B surface antigen and has also been tested for the presence of antibodies to HCV and Human Immunodeficiency Virus (HIV) and found to be negative. However no test method can offer complete assurance that HIV, HCV and Hepatitis B virus or any infectious agents are absent. The reagents should be considered a potential biohazard and handled with the same precautions as applied to any blood specimen.

CHEMICAL HAZARDS

Avoid contact with reagents containing TMB, hydrogen peroxide and sulfuric acid. If contacted with any of these reagents, wash with plenty of water. TMB is a suspected carcinogen.

SPECIMEN COLLECTION AND STORAGE

Serum: Approximately 0.2 ml of serum is required per duplicate determination. Collect 4-5 ml of blood into an appropriately labelled tube and allow it to clot. Centrifuge and carefully remove the serum layer. Store at 4°C for up to 24 hours or at -10°C or lower if the analyses are to be done at a later date.

Plasma: Approximately 0.2 ml of plasma is required per duplicate determination. Collect 4-5 ml of blood into EDTA plasma tubes. Store at 4°C for up to 24 hours or at -10°C or lower if the analyses are to be done at a later date.

Urine: Approximately 0.2 ml of urine is required per duplicate determination. Collect 24-hour urine into a specimen collection container. Store at 4°C for up to 24 hours or at -10°C or lower if the analyses are to be done at a later date.

Consider all human specimens as possible biohazardous materials and take appropriate precautions when handling.

SPECIMEN PRETREATMENT

Serum and plasma: This assay is a direct system; no specimen pretreatment is necessary.

Urine: Dilute urine samples 1:50 in urine diluent before use.

Example: To 1 ml of urine diluent, add 20 µl of urine sample.

REAGENTS AND EQUIPMENT NEEDED BUT NOT PROVIDED

- Precision pipettes to dispense 50, 100, 150 and 300 µl
- Disposable pipette tips
- Distilled or deionized water
- Plate shaker
- Microwell plate reader with a filter set at 450nm and an upper OD limit of 3.0 or greater* (see assay procedure step 10).
- *Urine Diluent - Required if urine samples are to be analysed. Used for dilution of urine specimens before assaying. Has to be ordered separately (MS E-5241; 20 mL)*

REAGENTS PROVIDED

AA E-0030 WASH-CONC 10x Wash Buffer Concentrate – X10

Contents: One bottle containing buffer with a non-ionic detergent and a non-mercury preservative.

Volume: 50 mL/bottle

Storage: Refrigerate at 2-8°C

Stability: 12 months or as indicated on label.

Preparation: Dilute 1:10 in distilled or deionized water before use. If the whole plate is to be used dilute 50 mL of the wash buffer concentrate in 450 mL of water.

AA E-0055 **SUBSTRATE** **TMB Substrate** - Ready To Use.

Contents: One bottle containing tetramethylbenzidine and hydrogen peroxide in a non-DMF or DMSO containing buffer.

Volume: 16 mL/bottle

Storage: Refrigerate at 2-8°C

Stability: 12 months or as indicated on label.

AA E-0080 **STOP-SOLN** **Stopping Solution** - Ready To Use.

Contents: One vial containing 1M sulfuric acid.

Volume: 6 mL/bottle

Storage: Refrigerate at 2-8°C

Stability: 12 months or as indicated on label.

Calibrators and Controls- Ready To Use.

Listed below are approximate concentrations, please refer to vial labels for exact concentrations:

Cat. no.	Symbol	Calibrator	Concentration	Volume/Vial
MS E-5201	STANDARD A	Calibrator A	0 pg/ml	2.0 ml
MS E-5202	STANDARD B	Calibrator B	15 pg/ml	0.6 ml
MS E-5203	STANDARD C	Calibrator C	50 pg/ml	0.6 ml
MS E-5204	STANDARD D	Calibrator D	200 pg/ml	0.6 ml
MS E-5205	STANDARD E	Calibrator E	500 pg/ml	0.6 ml
MS E-5206	STANDARD F	Calibrator F	1000 pg/ml	0.6 ml
MS E-5251	CONTROL 1	Control 1	Refer to vial labels for expected value and acceptable range!	0.6 ml
MS E-5252	CONTROL 2	Control 2		0.6 ml

Contents: Aldosterone in a human serum-based buffer with a non-mercury preservative. Prepared by spiking serum with a defined quantity of aldosterone.

Storage: Refrigerate at 2-8°C

Stability: 12 months in unopened vials or as indicated on label. Once opened, the standards should be used within 14 days or aliquoted and stored frozen. Avoid multiple freezing and thawing cycles.

MS E-5213 **ASSAY-BUFF** **Assay Buffer** - Ready To Use.

Contents: One vial containing a protein-based buffer with a non-mercury preservative.

Volume: 15 mL/bottle

Storage: Refrigerate at 2-8°C

Stability: 12 months or as indicated on label.

MS E-5231 **96** **Rabbit Anti-Aldosterone Antibody Coated Microwell Plate-Break Apart Wells** - Ready To Use.

Contents: One 96 well (12x8) polyclonal antibody-coated microwell plate in a resealable pouch with desiccant.

Storage: Refrigerate at 2-8°C

Stability: 12 months or as indicated on label.

MS E-5240 **CONJUGATE-CONC** **50x** **Aldosterone-Horseradish Peroxidase (HRP) Conjugate Concentrate – X50**

Contents: Aldosterone-HRP conjugate in a protein-based buffer with a non-mercury preservative.

Volume: 0.3 mL/vial

Storage: Refrigerate at 2-8°C

Stability: 12 months or as indicated on label.

Preparation: Dilute 1:50 in assay buffer before use (eg. 40 µl of HRP in 2 ml of assay buffer). If the whole plate is to be used dilute 240 µl of HRP in 12ml of assay buffer. Discard any that is left over.

ASSAY PROCEDURE

All reagents must reach room temperature before use. Calibrators, controls and specimen samples should be assayed in duplicate. Once the procedure has been started, all steps should be completed without interruption.

	Dilute urine samples 1:50 with Urine Diluent . Before use.
1.	Prepare working solutions of the aldosterone- conjugate and wash buffer .
2.	Remove the required number of microwell strips. Reseal the bag and return any unused strips to the refrigerator.
3.	Pipette 50 µL of each calibrator, control and specimen sample (serum or diluted urine) into the corresponding wells in duplicate.
4.	Pipette 100 µL of the conjugate working solution into each well. (We recommend using a multichannel pipette).
5.	Incubate on a plate shaker (approximately 200 rpm) for 1 hour at room temperature .
6.	Wash the wells 3 times with prepared wash buffer (300 µL/well for each wash) and tap the plate firmly against absorbent paper to ensure that it is dry (The use of a washer is recommended).
7.	Pipette 150 µL of TMB substrate into each well at timed intervals.
8.	Incubate the plate on a plate shaker at room temperature for 15-20 minutes. (or until Calibrator A attains dark blue colour for desired OD).
9.	Pipette 50 µl of stopping solution into each well at the same timed intervals as in step 7.
10.	Read the plate on a microwell plate reader at 450 nm within 20 minutes after addition of the stopping solution.
	If the OD exceeds the upper limit of detection or if a 450nm filter is unavailable, a 405 or 415nm filter may be substituted. The optical densities will be lower, however, this will not affect the results of patient/control samples.

CALCULATIONS

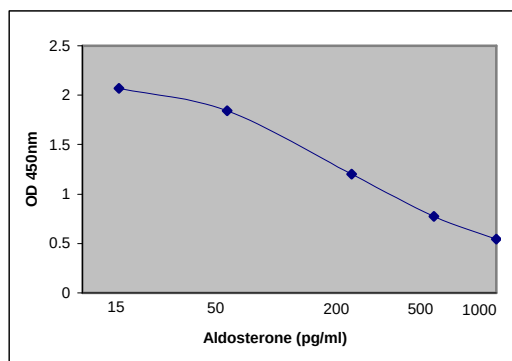
- Calculate the mean optical density of each calibrator duplicate.
- Draw a calibrator curve on semi-log paper with the mean optical densities on the Y-axis and the calibrator concentrations on the X-axis. If immunoassay software is being used, a 4-parameter curve is recommended.
- Calculate the mean optical density of each unknown duplicate.
- Read the values of the serum and plasma samples directly off the calibrator curve.
- Read the values of the urine samples directly off the curve and multiply by a factor of 50. Next, multiply by the volume of collected 24-hour urine (in mL) to obtain values in pg/24 hour. Finally, divide the pg/24 hour values by 1×10^6 to obtain values in µg/24 hour.
- If a serum or plasma sample reads more than 1000 pg/ml then dilute it with calibrator A at a dilution of no more than 1:8. The result obtained should be multiplied by the dilution factor. If a urine sample reads more than 1000 pg/ml then dilute it with the urine diluent at a dilution of no more than 1:2 (from the original 1:50 dilution). The result obtained should be multiplied by the dilution factor.

TYPICAL TABULATED DATA

Calibrator	OD 1	OD 2	Mean OD	Value (pg/ml)
A	2.267	2.197	2.232	0
B	2.102	2.037	2.070	15
C	1.848	1.836	1.842	50
D	1.210	1.190	1.200	200
E	0.763	0.788	0.776	500
F	0.542	0.550	0.549	1000
Unknown	1.522	1.493	1.508	112

TYPICAL CALIBRATOR CURVE

Sample curve only. **Do not** use to calculate results.



PERFORMANCE CHARACTERISTICS

SENSITIVITY

The lower detection limit is calculated from the standard curve by determining the resulting concentration of the mean OD of Calibrator A (based on 10 replicate analyses) minus 2 SD. Therefore, the sensitivity of the Direct Aldosterone ELISA kit is **10.0 pg/ml**.

SPECIFICITY (CROSS REACTIVITY)

The following compounds were tested for cross-reactivity with the Direct Aldosterone ELISA kit with aldosterone cross-reacting at 100%.

Steroid	%Cross Reactivity
Aldosterone	100
11-Deoxycorticosterone	1.1

The following steroids were tested but cross-reacted at less than 0.001%: Androsterone, Cortisone, 11-Deoxycortisol, 21-Deoxycortisol, Dihydrotestosterone, Estradiol, Estriol, Estrone and Testosterone.

INTRA-ASSAY PRECISION

Three samples were assayed ten times each on the same calibrator curve. The results (in pg/ml) are tabulated below:

Sample	Mean	SD	CV%
1	18.79	1.96	10.4
2	128.67	5.26	4.1
3	507.22	27.44	5.4

INTER-ASSAY PRECISION

Three samples were assayed ten times over a period of four weeks. The results (in pg/ml) are tabulated below:

Sample	Mean	SD	CV%
1	18.36	1.72	9.4
2	128.52	12.50	9.7
3	505.77	48.55	9.6

RECOVERY

Spiked samples were prepared by adding defined amounts of aldosterone to three patient serum samples. The results (in pg/ml) are tabulated below:

Sample	Obs.Result	Exp.Result	Recovery%
1	45.30	-	-
Unspiked	119.1	96.3	123.7
+51.0	143.8	147.2	97.6
+101.90	227.5	249.1	91.3
+203.80			
2	130.0	-	-
Unspiked	209.4	181.0	115.7
+51.0	243.1	231.9	104.8
+101.90	307.5	333.8	92.1
+203.80			
3	208.4	-	-
Unspiked	289.3	259.4	111.5
+51.0	341.6	310.3	110.1
+101.90	460.1	412.2	111.6
+203.80			

LINEARITY

Two patient serum samples were diluted with calibrator A. The results (in pg/ml) are tabulated below:

Sample	Obs.Result	Exp.Result	Recovery%
1	395.1	-	-
1:2	198.6	197.6	100.5
1:4	80.7	98.8	81.7
1:8	44.2	49.5	89.5
2	414.2	-	-
1:2	206.7	207.1	99.8
1:4	103.9	103.6	100.3
1:8	56.7	51.8	109.5

EXPECTED NORMAL VALUES-SERUM / PLASMA

As for all clinical assays each laboratory should collect data and establish their own range of expected normal values.

Group	Range (pg/ml)
Normal Salt Intake, Standing	40-310
Normal Salt Intake, Recumbent	10-160

REFERENCE NORMAL VALUES-URINE

As for all clinical assays each laboratory should collect data and establish their own range of expected normal values.

Group	Range (µg/24 hr)
Normal Salt Intake	5-19

Wilson, J.D. and Foster, D.W. Williams Textbook of Endocrinology 8th Edition. W.B. Saunders Company, London. p 582, 1992.

REFERENCES

- Varsano-Aharon, N., and Ulick, S., Further Simplifications in the Immunoassay of Plasma Aldosterone. J. Clin. Endocrinol. Metab. 39/2:375-379, 1974.
- Himathongkam, T., et al., Potassium-Aldosterone-Renin Interrelationships. J. Clin. Endocrinol. Metab. 41/1:153-159, 1975.
- Lun, S., et al., A Direct Radioimmunoassay for Aldosterone in Plasma. Clin. Chem. 29/2:268-271, 1983.
- Cartledge, S. and Lawson, N., Aldosterone and Renin Measurements. Ann. Clin. Biochem. 37:262-278, 2000.
- Sequeira, S.J., et al., Evaluation of an Aldosterone Radioimmunoassay: The Renin-Angiotensin-Aldosterone Axis as a Function of Sex and Age. Ann. Clin. Biochem. 23:65-75, 1986.
- Stabler, T.V. and Siegel, A.L., Chemiluminescence Immunoassay of Aldosterone in Serum. Clin. Chem. 37/11:1987-1989, 1991.
- Miller, M.A., et al., Extraction Method and Nonextracted Kit Comparison for Measuring Plasma Aldosterone. Clin. Chem. 43/10:1995-1997, 1997.
- Vallotton M.B., Primary Aldosteronism. Part 1. Diagnosis of Primary Hyperaldosteronism. Clin. Endocrinol. 45:47-52, 1996.
- Oelkers, W., et al., Diagnosis, Therapy Surveillance in Addison's Disease: Rapid Adrenocorticotrophin (ACTH) Test and Measurement of Plasma ACTH, Renin Activity and Aldosterone. J. Clin. Endocrinol. Metab. 75:259-264, 1992.
- Ad Dujaili, E.A.S, and Edwards, C.R.W., Optimization of a Direct Radioimmunoassay for Plasma Aldosterone. J. Steroid Biochem. 14:481-487, 1981.
- Corry, D.B, and Tuck, M.L., Secondary Aldosteronism. Endocrinol. Metab. Clin. North Am. 24:511-528, 1995.
- Check, J.H., et al, Falsely Elevated Steroidal Assay Levels Related to Heterophile Antibodies Against Various Animal Species. Gynecol. Obstet. Invest. 40:139-140, 1995.

Symbols:

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