LDN®
IMMUNOASSAYS AND SERVICES
BIOGENIC AMINES & NEUROSCIENCE | ENDOCRINOLOGY | FOOD SAFETY
LABOR DIAGNOSTIKA NORD GmbH & Co. KG | Am Eichenhain 1 | 48531 Nordhorn | Germany | Tel. +49 5921 8197-0 | Fax +49 5921 8197-222 | info@ldn.de | www.ldn.de



## Instructions for use

# DHEA-S ELISA

REF **AA E-1100R**

2°C – 8°C

Σ 96

RUO For research use only – Not for use in diagnostic procedures

**DHEA-S ELISA**

***INTENDED USE***
For the direct quantitative determination of DHEA-S by an enzyme immunoassay in human serum.

***PRINCIPLE OF THE TEST***
The principle of the following enzyme immunoassay test follows the typical competitive binding scenario. Competition occurs between an unlabelled antigen (present in standards, controls and samples) and an enzyme-labelled antigen (conjugate) for a limited number of antibody binding sites on the microplate. 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 DHEA-S in the sample. A set of standards is used to plot a standard curve from which the amount of DHEA-S in samples and controls can be directly read.

***PROCEDURAL CAUTIONS AND WARNINGS***
1. 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.
2. Control materials or serum pools should be included in every run at a high and low level for assessing the reliability of results.
3. When the use of water is specified for dilution or reconstitution, use deionized or distilled water.
4. In order to reduce exposure to potentially harmful substances, gloves should be worn when handling kit reagents and human specimens.
5. 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.
6. A standard curve must be established for every run.
7. The controls should be included in every run and fall within established confidence limits.
8. Improper procedural techniques, imprecise pipetting, incomplete washing as well as improper reagent storage may be indicated when assay values for the controls do not reflect established ranges.
9. When reading the microplate, the presence of bubbles in the wells will affect the optical densities (ODs). Carefully remove any bubbles before performing the reading step.
10. 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.
11. When dispensing the substrate and stopping solution, do not use pipettes in which these liquids will come into contact with any metal parts.
12. To prevent contamination of reagents, use a new disposable pipette tip for dispensing each reagent, sample, standard and control.
13. 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.
14. Kit reagents must be regarded as hazardous waste and disposed of according to national regulations.

***LIMITATIONS***
1. All the reagents within the kit are calibrated for the direct determination of DHEA-S in human serum. The kit is not calibrated for the determination of DHEA-S in saliva, plasma or other specimens of human or animal origin.
2. Do not use grossly hemolyzed, grossly lipemic, icteric or improperly stored serum.
3. Any samples or control sera containing azide or thimerosal are not compatible with this kit, as they may lead to false results.
4. Only Standard A may be used to dilute any high serum samples. The use of any other reagent may lead to false results.

***SAFETY CAUTIONS AND WARNINGS***
***POTENTIAL BIOHAZARDOUS MATERIAL***
Human serum that may be used in the preparation of the standards and controls 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. No test method however, 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***

Approximately 0.1 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. Consider all human specimens as possible biohazardous materials and take appropriate precautions when handling.

***SPECIMEN PRETREATMENT***

This assay is a direct system; no specimen pretreatment is necessary.

***REAGENTS AND EQUIPMENT NEEDED BUT NOT PROVIDED***

1. Precision pipettes to dispense 25, 50, 150, 200 and 300 µl
2. Disposable pipette tips
3. Distilled or deionized water
4. Plate shaker
5. Microplate reader with a filter set at 450 nm and an upper OD limit of 3.0 or greater* (see assay procedure step 10)

***REAGENTS PROVIDED***

**1. AA E-0030** WASH-CONC 10x **Wash Buffer Concentrate** – requires preparation **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.

**2. 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.

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

Contents: One vial containing 1M sulfuric acid.

Volume: 6 ml/vial

Storage: Refrigerate at 2 – 8 ˚C

Stability: 12 months or as indicated on label.

Hazards identification:

H315 Causes skin irritation.
H319 Causes serious eye irritation.

**4. Standards** and **Controls** – Ready To Use.

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

| Cat. no. | Symbol | Standard | Concentration | Volume/Vial |
|---|---|---|---|---|
| **AA E-1101** | STANDARD A | **Standard A** | 0 µg/ml | 2.0 ml |
| **AA E-1102** | STANDARD B | **Standard B** | 0.005 µg/ml | 0.5 ml |
| **AA E-1103** | STANDARD C | **Standard C** | 0.02 µg/ml | 0.5 ml |
| **AA E-1104** | STANDARD D | **Standard D** | 0.1 µg/ml | 0.5 ml |
| **AA E-1105** | STANDARD E | **Standard E** | 0.5 µg/ml | 0.5 ml |
| **AA E-1106** | STANDARD F | **Standard F** | 2.5 µg/ml | 0.5 ml |
| **AA E-1107** | STANDARD G | **Standard G** | 10 µg/ml | 0.5 ml |
| **AA E-1151** | CONTROL 1 | **Control 1** | Refer to vial labels for expected value and acceptable range! | 0.5 ml |
| **AA E-1152** | CONTROL 2 | **Control 2** | | 0.5 ml |

Contents: DHEA-S in a protein-based buffer with a non-mercury preservative. Prepared by spiking buffer with a defined quantity of DHEA-S.

Storage: Refrigerate at 2 – 8 ˚C

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

**5. AA E-1113** ASSAY-BUFF **Assay Buffer** – Ready To Use.

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

Volume: 30 ml/vial

Storage: Refrigerate at 2 – 8 ˚C

Stability: 12 months or as indicated on label.

**6. AA E-1131** 96 **Rabbit Anti-DHEA-S Antibody-Coated Break-Apart Well Microplate** – Ready To Use.

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

Storage: Refrigerate at 2 – 8 ˚C

Stability: 12 months or as indicated on label.

**7. AA E-1140** CONJUGATE-CONC 50x **DHEA-S-Horseradish Peroxidase (HRP) Conjugate Concentrate –** requires preparation **X50**

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

Volume: 0.8 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 (e.g. 40 µl of HRP in 2 ml of assay buffer). If the whole plate is to be used dilute 0.5 ml of HRP in 25 ml of assay buffer. Discard any that is left over.

***ASSAY PROCEDURE***

| Specimen Pretreatment: ***None.*** |
|---|

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

| | |
|---|---|
| **1.** | **Prepare** working solutions of the **DHEA-S-HRP conjugate** and **wash buffer.** |
| **2.** | Remove the required number of well strips. Reseal the bag and return any unused strips to the refrigerator. |
| **3.** | **Pipette 25 µl** of each **standard, control and specimen sample** into correspondingly labeled wells in duplicate. |
| **4.** | **Pipette 200 µl** of the **conjugate working solution** into each well.<br>*(We recommend using a multichannel pipette.)* |
| **5.** | **Incubate** on a plate shaker (approximately 200 rpm) for **45 minutes at room temperature.** |
| **6.** | Wash the wells **3 times** with **300 µl of diluted wash buffer** per well and tap the plate firmly against absorbent paper to ensure that it is dry.<br>*(The use of a washer is recommended.)* |
| **7.** | Pipette **150 µl** of **TMB substrate** into each well at timed intervals. |
| **8.** | Incubate on a plate shaker for **15 – 20 minutes** at room temperature<br>*(or until Standard 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 microplate 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 450 nm filter is unavailable, a 405 or 415 nm filter may be substituted. The optical densities will be lower; however, this will not affect the results of donor/control samples.* |

***CALCULATIONS***

1. Calculate the mean optical density of each standard duplicate.
2. Draw a standard curve on semi-log paper with the mean optical densities on the Y-axis and the standard concentrations on the X-axis. If immunoassay software is being used, a 4-parameter or 5-parameter curve is recommended.
3. Calculate the mean optical density of each unknown duplicate.
4. Read the values of the unknowns directly off the standard curve.
5. If a sample reads more than 10 µg/ml then dilute it with Standard A at a dilution of no more than 1:8. The result obtained should be multiplied by the dilution factor.

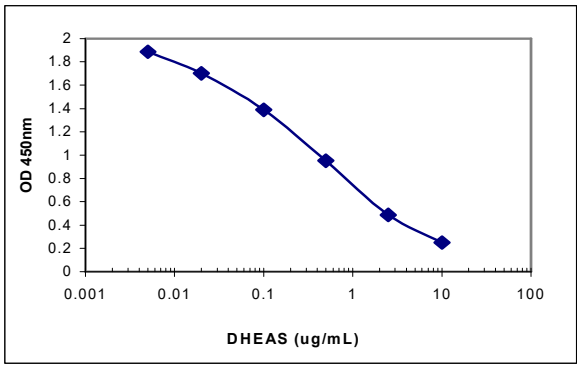
***TYPICAL TABULATED DATA***

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

| Standard | OD 1 | OD 2 | Mean OD | Value (µg/ml) |
|---|---|---|---|---|
| A | 2.106 | 2.060 | 2.083 | 0 |
| B | 1.910 | 1.863 | 1.887 | 0.005 |
| C | 1.636 | 1.769 | 1.703 | 0.02 |
| D | 1.398 | 1.382 | 1.390 | 0.1 |
| E | 0.966 | 0.938 | 0.952 | 0.5 |
| F | 0.496 | 0.479 | 0.488 | 2.5 |
| G | 0.250 | 0.252 | 0.251 | 10 |
| Unknown | 0.690 | 0.688 | 0.689 | 1.20 |

***TYPICAL STANDARD 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 Standard A (based on 10 replicate analyses) minus 2 SD. Therefore, the sensitivity of the DHEA-S ELISA kit is **0.005 µg/ml**.

***SPECIFICITY (CROSS REACTIVITY)***

The following compounds were tested for cross-reactivity with the DHEA-S ELISA kit with DHEA-S cross-reacting at 100%.

| Steroid | % Cross Reactivity |
|---|---|
| DHEA-S | 100 |
| Androsterone | 16.0 |
| Androstenedione | 1.7 |
| Testosterone | 0.9 |
| Progesterone | 0.6 |
| DHT | 0.6 |
| Cortisol | 0.5 |

The following steroids were tested but cross-reacted at less than 0.001%: 17β-Estradiol, Estrone, Estrone-Sulfate and Pregnenolone.

***INTRA-ASSAY PRECISION***

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

| Sample | Mean | SD | CV% |
|---|---|---|---|
| 1 | 0.24 | 0.02 | 7.5 |
| 2 | 2.02 | 0.18 | 8.9 |
| 3 | 9.54 | 0.11 | 11.5 |

***INTER-ASSAY PRECISION***

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

| Sample | Mean | SD | CV% |
|---|---|---|---|
| 1 | 0.13 | 0.02 | 15.3 |
| 2 | 1.11 | 0.09 | 8.1 |
| 3 | 6.38 | 0.27 | 4.2 |

***RECOVERY***
Spiked samples were prepared by adding defined amounts of DHEA-S to three serum samples. The results (in µg/ml) are tabulated below:

| Sample | Obs. Result | Exp. Result | Recovery % |
|---|---|---|---|
| 1 Unspiked | 0.67 | – | – |
| + 0.1 | 0.84 | 0.77 | 109.1 |
| + 1.0 | 1.97 | 1.67 | 118.0 |
| + 5.0 | 5.80 | 5.67 | 102.3 |
| 2 Unspiked | 1.21 | – | – |
| + 0.1 | 1.41 | 1.31 | 107.6 |
| + 1.0 | 2.01 | 2.21 | 91.0 |
| + 5.0 | 4.95 | 6.21 | 79.7 |
| 3 Unspiked | 1.72 | – | – |
| + 0.1 | 1.93 | 1.82 | 106.0 |
| + 1.0 | 2.65 | 2.72 | 97.4 |
| + 5.0 | 5.45 | 6.72 | 81.1 |

***LINEARITY***
Three serum samples were diluted with Standard A. The results (in µg/ml) are tabulated below:

| Sample | Obs. Result | Exp. Result | Recovery % |
|---|---|---|---|
| 1 | 2.88 | – | – |
| 1:2 | 1.74 | 1.44 | 120.8 |
| 1:4 | 0.88 | 0.72 | 122.2 |
| 1:8 | 0.43 | 0.36 | 119.4 |
| 2 | 6.32 | – | – |
| 1:2 | 3.17 | 3.16 | 100.3 |
| 1:4 | 1.63 | 1.58 | 103.2 |
| 1:8 | 0.78 | 0.79 | 98.7 |
| 3 | 7.12 | – | – |
| 1:2 | 3.09 | 3.56 | 86.8 |
| 1:4 | 1.54 | 1.78 | 86.5 |
| 1:8 | 0.80 | 0.89 | 89.9 |

***EXPECTED NORMAL VALUES***
Each laboratory should collect data and establish their own range of expected normal values.

| Group | Range (µg/ml) |
|---|---|
| Males | 0.39 – 4.63 |
| Females | 0.46 – 2.75 |
| Postmenopausal Females | 0.48 – 2.08 |



***REFERENCES***

1. Chasalow FI, Blethen SL, Bradlow HL. Dehydroepiandrosterone Sulfate (DHEAS) and DHEAS-like Compounds in Fibrocystic Disease of the Breast. *Steroids*. 1988; 52(3):205–15.
2. Chasalow FI, et al. Serum Levels of Dehydroepiandrosterone Sulfate as Determined by Commercial Kits and Reagents. *Steroids*. 1989;54(4):373–81.
3. de Peretti E, Forest MG. Pattern of Plasma Dehydroepiandrosterone Sulfate Levels in Humans from Birth to Adulthood: Evidence for Testicular Production. *J Clin Endocrinol Metab*. 1978; 47(3):572–77.
4. Holtzclaw WD, Gordon GB. Measurement of Serum Levels of Dehydroepiandrosterone Sulfate: A Comparison of Radioimmunoassay and Enzymatic Analysis. *Steroids*. 1989; 54(4): 355–71.
5. Koritnik DR, et al. A Radioimmunoassay for Dehydroepiandrosterone Sulfate in the Circulation of Rhesus Monkeys. *Steroids*. 1983; 42(6):653–67.
6. Orentreich N, et al. Age Changes and Sex Differences in Serum Dehydroepiandrosterone Sulfate Concentrations Throughout Adulthood. *J Clin Endocrol Metab*. 1984; 59(3):551–55.
7. Smith MR, et al. A Radioimmunoassay for the Estimationof Serum Dehydroepiandrosterone Sulphate in Normaland Pathological Sera. *Clin Chim Acta*. 1975; 65(1): 5–13.
8. Check JH, et al. Falsely Elevated Steroidal Assay Levels Related to Heterophile Antibodies Against Various Animal Species. *Gynecol Obstet Invest*. 1995; 40(2):139–40.

***CHANGE HISTORY***

| | | | |
|---|---|---|---|
| **Previous Version:** | 9.0a-r | **New Version:** | 9.0b-r |
| **Changes:** | ***REAGENTS PROVIDED***<br>Hazard labelling for component AA E-0080 updated | | |



**Symbols:**

| | | | | | |
|---|---|---|---|---|---|
|  | Storage temperature |  | Manufacturer |  | Contains sufficient for <n> tests |
|  | Use-by date | LOT | Batch code | | |
|  | Consult instructions for use | CONT | Content | | |
|  | Caution | REF | Catalogue number |  | Distributor |
|  | Date of manufacture | | | RUO | For research use only! |