AssayMax™
Human AKR1B10 ELISA Kit

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For any questions regarding troubleshooting or performing the assay, please contact our
support team at support@assaypro.com.

Thank you for choosing Assaypro.

Assay Summary

Step 1. Add 50 µl of Standard or Sample per well.
Incubate 2 hours.

Step 2. Wash, then add 50 µl of Biotinylated Antibody per well.
Incubate 1 hour.

Step 3. Wash, then add 50 µl of SP Conjugate per well.
Incubate 30 minutes.

Step 4. Wash, then add 50 µl of Chromogen Substrate per well.
Incubate 20 minutes.

Step 5. Add 50 µl of Stop Solution per well.
Read at 450 nm immediately.

Symbol Key

Consult instructions for use.

Assay Template

	A	B	C	D	E	F	G	H
12								
11								
10								
9								
8								
7								
6								
5								
4								
3								
2								
1								

AssayMax™ Human AKR1B10 ELISA Kit

Catalog No. EA5403-1
Sample insert for reference use only

Introduction

Aldo-keto reductase family 1 member B10 (AKR1B10) belongs to the AKR1B subgroup of the aldo-keto reductase (AKR) families. The molecular weight of AKR1B10 is 36.020 kDa (1). AKR1B10 is considered to be responsible for detoxifying reactive aldehydes in digested food (2-3). AKR1B10 is also thought to be crucial to cell survival mechanisms through altering lipid synthesis, mitochondrial function, and oxidative status. Hence, its role in carcinogenesis is believed to be due to its importance in these mechanisms. For example, cell proliferation and differentiation are affected by the reduction of retinals to retinols carried out by AKR1B10 which leads to a deficiency of retinoic acid, a critical signaling molecule in these processes (2-3). AKR1B10 has shown to be highly expressed in human hepatocellular carcinoma (HCC) but not the adjacent normal liver tissue; therefore, it could possibly be utilized to differentiate between HCC and benign lesions (2). AKR1B10 is overexpressed in smokers' non-small cell lung carcinoma, breast cancer, pancreatic carcinoma, and HCC (4). AKR1B10 is also overexpressed in patients with hepatitis B and C (5). As a result of the over expression, AKR1B10 has been recognized as a biomarker in HCC and smoking-related carcinomas, such as lung and bladder cancer (3). Atopic dermatitis and diabetes also exhibit altered levels of AKR1B10 expression. Loss of AKR1B10 is correlated with chronic colitis and the development of colitis-related carcinoma in inflammatory bowel disease (5). Colon, gastric, and head and neck cancers all demonstrate under-expression of AKR1B10 (6). In addition, ARK1B10 has shown potential to be a biomarker or therapeutic target for R2 episodes of leprosy (5). AKR1B10 has the ability to metabolize several compounds used in anticancer therapy, such as daunorubicin, idarubicin, and cisplatin (CDDP) leading to a resistance to these cancer drugs (2).

Principle of the Assay

The AssayMax™ Human AKR1B10 ELISA (Enzyme-Linked Immunosorbent Assay) Kit is designed for detection of AKR1B10 in human **cell culture and cell lysate samples**. This assay employs a quantitative **sandwich enzyme immunoassay** technique that measures human AKR1B10 in approximately 4 hours. A polyclonal antibody specific for human AKR1B10 has been pre-coated onto a 96-well microplate with removable strips. AKR1B10 in standards and samples is sandwiched by the immobilized antibody and a

biotinylated polyclonal antibody specific for human AKR1B10, which is recognized by a streptavidin-peroxidase (SP) conjugate. All unbound material is washed away and a peroxidase enzyme substrate is added. The color development is stopped and the intensity of the color is measured.

Caution and Warning

- This product is for **Research Use Only** and is not intended for use in diagnostic procedures.
- Prepare all reagents (diluent buffer, wash buffer, standard, biotinylated antibody, and SP conjugate) as instructed, prior to running the assay.
- Prepare all samples prior to running the assay. The dilution factors for the samples are suggested in this insert. However, the user should determine the optimal dilution factor.
- Spin down the SP conjugate vial, the biotinylated antibody vial, and the standard diluent vial before opening and using contents.
- The Stop Solution is an acidic solution.
- The kit should not be used beyond the expiration date.

Reagents

- **Human AKR1B10 Microplate:** A 96-well polystyrene microplate (12 strips of 8 wells) coated with a polyclonal antibody against human AKR1B10.
- **Sealing Tapes:** Each kit contains 3 precut, pressure sensitive sealing tapes that can be cut to fit the format of the individual assay.
- **Human AKR1B10 Standard:** Human AKR1B10 in a buffered protein base (10 ng, lyophilized).
- **Biotinylated Human AKR1B10 Antibody (50x):** A 50-fold concentrated biotinylated polyclonal antibody against human AKR1B10 (120 µl).
- **MIX Diluent Concentrate (10x):** A 10-fold concentrated buffered protein base (30 ml).
- **Standard Diluent (1x):** A buffered protein base with stabilizer (2 ml).
- **Wash Buffer Concentrate (20x):** A 20-fold concentrated buffered surfactant (30 ml, 2 bottles).
- **SP Conjugate (100x):** A 100-fold concentrate (80 µl).
- **Chromogen Substrate (1x):** A stabilized peroxidase chromogen substrate tetramethylbenzidine (8 ml).
- **Stop Solution (1x):** A 0.5 N hydrochloric acid solution to stop the chromogen substrate reaction (12 ml).

Storage Condition

- Upon arrival, immediately store components of the kit at recommended temperatures up to the expiration date.

- Store Standard, SP Conjugate, and Biotinylated Antibody at -20°C.
- Store Microplate, Diluent Concentrate (10x), Standard Diluent (1x), Wash Buffer, Stop Solution, and Chromogen Substrate at 2-8°C.
- Unused microplate wells may be returned to the foil pouch with the desiccant packs and resealed. May be stored for up to 30 days in a vacuum desiccator.

Other Supplies Required

- Microplate reader capable of measuring absorbance at 450 nm
- Pipettes (1-20 µl, 20-200 µl, 200-1000 µl, and multiple channel)
- Deionized or distilled reagent grade water

Sample Collection, Preparation, and Storage

- **Cell Culture Supernatant:** Centrifuge cell culture media at 1500 rpm for 10 minutes at 4°C to remove debris and collect supernatant. Samples can be stored at -80°C. Avoid repeated freeze-thaw cycles.
- **Cell Lysate:** Rinse cell with cold PBS and then scrape the cell into a tube with 5 ml of cold PBS and 0.5 M EDTA. Centrifuge suspension at 1500 rpm for 10 minutes at 4°C and aspirate supernatant. Resuspend pellet in ice-cold Lysis Buffer (10 mM Tris pH 8.0, 130 mM NaCl, 1% Triton X-100, protease inhibitor cocktail). For every 1×10^6 cells, add approximately 100 µl of ice-cold Lysis Buffer. Incubate on ice for 60 minutes. Centrifuge at 13000 rpm for 30 minutes at 4°C and collect supernatant. Samples can be stored at -80°C. Avoid repeated freeze-thaw cycles.

Applicable samples may also include biofluids, cell culture, and tissue homogenates. If necessary, user should determine optimal dilution factor depending on application needs.

Refer to Dilution Guidelines for further instruction.

Guidelines for Dilutions of 100-fold or Greater	
(for reference only; please follow the insert for specific dilution suggested)	
100x	**10000x**

A)   4 µl sample: 396 µl buffer (100x)
      = 100-fold dilution
 	
Assuming the needed volume is less than or equal to 400 µl.
	A) 4 µl sample : 396 µl buffer (100x)
	B) 4 µl of A : 396 µl buffer (100x)
	      = 10000-fold dilution
	Assuming the needed volume is less than or equal to 400 µl.

1000x	**100000x**

A)   4 µl sample : 396 µl buffer (100x)
B)   24 µl of A : 216 µl buffer (10x)
      = 1000-fold dilution
 	
Assuming the needed volume is less than or equal to 240 µl.
	A) 4 µl sample : 396 µl buffer (100x)
	B) 4 µl of A : 396 µl buffer (100x)
	C) 24 µl of B : 216 µl buffer (10x)
	      = 100000-fold dilution
	Assuming the needed volume is less than or equal to 240 µl.

Reagent Preparation

- Freshly dilute all reagents and bring all reagents to room temperature before use.
- **MIX Diluent Concentrate (10x):** If crystals have formed in the concentrate, mix gently until the crystals have completely dissolved. Dilute the MIX Diluent Concentrate 10-fold with reagent grade water to produce a 1x solution. Store for up to 30 days at 2-8°C.
- **Human AKR1B10 Standard:** Reconstitute the Human AKR1B10 Standard (10 ng) with 0.5 ml of **Standard Diluent** to generate a 20 ng/ml standard stock solution. Allow the vial to sit for 10 minutes with gentle agitation prior to making dilutions. Prepare duplicate or triplicate standard points by serially diluting from the standard stock solution (20 ng/ml) 2-fold with equal volume of **MIX Diluent** to produce 10, 5, 2.5, 1.25, 0.625, 0.313, and 0.156 ng/ml solutions. MIX Diluent serves as the zero standard (0 ng/ml). Aliquot remaining stock solution to limit repeated freeze-thaw cycles. This solution should be stored at -20°C and **used within 30 days**.

Standard Point	Dilution	[AKR1B10] (ng/ml)
P1	1 part Standard (20 ng/ml) + 1 part MIX Diluent	10
P2	1 part P1 + 1 part MIX Diluent	5.0
P3	1 part P2 + 1 part MIX Diluent	2.5
P4	1 part P3 + 1 part MIX Diluent	1.25
P5	1 part P4 + 1 part MIX Diluent	0.625
P6	1 part P5 + 1 part MIX Diluent	0.313
P7	1 part P6 + 1 part MIX Diluent	0.156
P8	MIX Diluent	0.0

- **Biotinylated Human AKR1B10 Antibody (50x):** Spin down the antibody briefly and dilute the desired amount of the antibody 50-fold with MIX Diluent to produce a 1x solution. The undiluted antibody should be stored at -20°C.
- **Wash Buffer Concentrate (20x):** If crystals have formed in the concentrate, mix gently until the crystals have completely dissolved. Dilute the Wash Buffer Concentrate 20-fold with reagent grade water to produce a 1x solution.
- **SP Conjugate (100x):** Spin down the SP Conjugate briefly and dilute the desired amount of the conjugate 100-fold with MIX Diluent to produce a 1x solution. The undiluted conjugate should be stored at -20°C.

Assay Procedure

- Prepare all reagents, standard solutions, and samples as instructed. Bring all reagents to room temperature before use. The assay is performed at room temperature (20-25°C).
- Remove excess microplate strips from the plate frame and return them immediately to the foil pouch with desiccants inside. Reseal the pouch securely to minimize exposure to water vapor and store in a vacuum desiccator.
- Add 50 μl of Human AKR1B10 Standard or sample to each well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. Cover wells with a sealing tape and incubate for 2 hours. Start the timer after the last addition.
- Wash the microplate manually or automatically using a microplate washer. Invert the plate and decant the contents; hit 4-5 times on absorbent material to completely remove the liquid. If washing manually, wash five times with 200 μl of Wash Buffer per well. Invert the plate each time and decant the contents; hit 4-5 times on absorbent material to completely remove the liquid. If using a microplate washer, wash six times with 300 μl of Wash Buffer per well; invert the plate and hit 4-5 times on absorbent material to completely remove the liquid.
- Add 50 μl of Biotinylated Human AKR1B10 Antibody to each well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. Cover wells with a sealing tape and incubate for 1 hour.
- Wash the microplate as described above.
- Add 50 μl of SP Conjugate to each well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. Cover wells with a sealing tape and incubate for 30 minutes. Turn on the microplate reader and set up the program in advance.
- Wash the microplate as described above.
- Add 50 μl of Chromogen Substrate to each well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. Incubate for 20 minutes or until the optimal blue color density develops.

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- Add 50 μl of Stop Solution to each well. The color will change from blue to yellow. Gently tap plate to ensure thorough mixing. Break any bubbles that may have formed.
- Read the absorbance on a microplate reader at a wavelength of 450 nm **immediately**. If wavelength correction is available, subtract readings at 570 nm from those at 450 nm to correct optical imperfections. Otherwise, read the plate at 450 nm only. Please note that some unstable black particles may be generated at high concentration points after stopping the reaction for about 10 minutes, which will reduce the readings.

Data Analysis

- Calculate the mean value of the duplicate or triplicate readings for each standard and sample.
- To generate a standard curve, plot the graph using the standard concentrations on the x-axis and the corresponding mean 450 nm absorbance (OD) on the y-axis. The best fit line can be determined by regression analysis using log-log or four-parameter logistic curve fit.
- Determine the unknown sample concentration from the Standard Curve and multiply the value by the dilution factor.

Typical Data

- The typical data is provided for reference only. Individual laboratory means may vary from the values listed. Variations between laboratories may be caused by technique differences.

Standard Point	ng/ml	OD	Average OD
P1	10	2.234 2.172	2.203
P2	5.0	1.692 1.644	1.668
P3	2.5	1.001 0.971	0.986
P4	1.25	0.578 0.556	0.567
P5	0.625	0.339 0.325	0.332
P6	0.313	0.212 0.204	0.208
P7	0.156	0.150 0.146	0.148
P8	0.0	0.092 0.091	0.092

Standard Curve

- The curve is provided for illustration only. A standard curve should be generated each time the assay is performed.

Human AKR1B10 Standard Curve
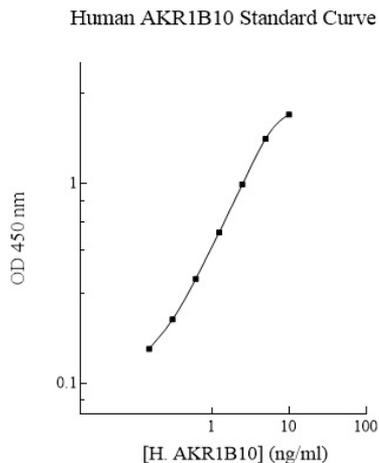
Reference Value

- These cell lines were tested in house (n=10). The cell line averages are provided for reference only.

Cell Culture Supernatants	Dilution Factor	Average Value (ng/mg)
293T (human embryonic kidney)	1x	Not Detected
A549 (human adenocarcinoma)	4x	1.439
HeLa (human cervical cancer)	1x	0.051
Jurkat E6-1 (human T-cell leukemia)	1x	0.103
Cell Culture Lysates	Dilution Factor	Average Value (ng/mg)
293T (human embryonic kidney)	5x	0.618
A549 (human adenocarcinoma)	4000x	1722
HeLa (human cervical cancer)	5x	0.852
Jurkat E6-1 (human T-cell leukemia)	5x	0.668

Performance Characteristics

- This assay recognizes both natural and recombinant human AKR1B10.

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- The minimum detectable dose of human AKR1B10 as calculated by 2SD from the mean of a zero standard was established to be 97 pg/ml.
- Intra-assay precision was determined by testing three reference control samples twenty times in one assay.
- Inter-assay precision was determined by testing three reference control samples in twenty assays.

	Intra-Assay Precision			Inter-Assay Precision		
Sample	1	2	3	1	2	3
n	20	20	20	20	20	20
CV (%)	5.5%	4.9%	4.7%	10.4%	10.3%	9.6%
Average CV (%)	5.0%			10.1%		

Recovery

Standard Added Value	0.3 – 2.5 ng/ml
Recovery %	87 – 109%
Average Recovery %	96%

Linearity

- Lysate samples were serially diluted to test for linearity.

Average Percentage of Expected Value (%)	
Sample Dilution	A549 (human adenocarcinoma) Cell Culture Lysate
2000x	101%
4000x	102%
8000x	98%

Cross-Reactivity

- No significant cross-reactivity observed with AKR1A1, AKR1B1, AKR1C1, AKR1C3, and AKR1C4.

Troubleshooting

Issue	Causes	Course of Action
Low Precision	Use of improper components	• Check the expiration date listed before use. • Do not interchange components from different lots.
	Improper wash step	• Check that the correct wash buffer is being used. • Check that all wells are empty after aspiration. • Check that the microplate washer is dispensing properly. • If washing by pipette, check for proper pipetting technique.
	Splashing of reagents while loading wells	• Pipette properly in a controlled and careful manner.
	Inconsistent volumes loaded into wells	• Pipette properly in a controlled and careful manner. • Check pipette calibration. • Check pipette for proper performance.
	Insufficient mixing of reagent dilutions	• Thoroughly agitate the lyophilized components after reconstitution. • Thoroughly mix dilutions.
	Improperly sealed microplate	• Check the microplate pouch for proper sealing. • Check that the microplate pouch has no punctures. • Check that three desiccants are inside the microplate pouch prior to sealing.
Unexpectedly Low or High Signal Intensity	Microplate was left unattended between steps	• Each step of the procedure should be performed uninterrupted.
	Omission of step	• Consult the provided procedure for complete list of steps.
	Steps performed in incorrect order	• Consult the provided procedure for the correct order.
	Insufficient amount of reagents added to wells	• Check pipette calibration. • Check pipette for proper performance.
	Wash step was skipped	• Consult the provided procedure for all wash steps.
	Improper wash buffer	• Check that the correct wash buffer is being used.
	Improper reagent preparation	• Consult reagent preparation section for the correct dilutions of all reagents.
	Insufficient or prolonged incubation periods	• Consult the provided procedure for correct incubation time.
Deficient Standard Curve Fit	Non-optimal sample dilution	• Sandwich ELISA: If samples generate OD values higher than the highest standard point (P1), dilute samples further and repeat the assay. • Competitive ELISA: If samples generate OD values lower than the highest standard point (P1), dilute samples further and repeat the assay. • User should determine the optimal dilution factor for samples.
	Contamination of reagents	• A new tip must be used for each addition of different samples or reagents during the assay procedure.
	Contents of wells evaporate	• Verify that the sealing film is firmly in place before placing the assay in the incubator or at room temperature.
	Improper pipetting	• Pipette properly in a controlled and careful manner. • Check pipette calibration. • Check pipette for proper performance.

	Insufficient mixing of reagent dilutions	• Thoroughly agitate the lyophilized components after reconstitution. • Thoroughly mix dilutions.

References

(1) Uniprot: O60218.
(2) DiStefano J *et al*. (2019) *Cancers*. 11(4):486.
(3) Chung Y *et al*. (2012) *Mod Pathol*. 25:758-766.
(4) Wang Y *et al*. (2017) *Sci Rep*. 7:42199.
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