Human insulin autoantibodies, IAA ELISA kit

Catalog No.E1264h
(96 tests)
Operating instruction

FOR RESEARCH USE ONLY; NOT FOR THERAPEUTIC OR DIAGNOSTIC APPLICATIONS!
PLEASE READ THROUGH ENTIRE PROCEDURE BEFORE BEGINNING!

Intended use
This immunoassay kit allows for the specific measurement of human insulin autoantibodies, IAA concentrations in cell culture supernates, serum and plasma.

Introduction
Insulin autoantibodies (IAA) precede clinical type 1 diabetes. Type 1 diabetes, commonly referred to as insulin-dependent diabetes (IDDM), is caused by pancreatic beta-cell destruction that leads to an absolute insulin deficiency. The clinical onset of diabetes does not occur until 80% to 90% of these cells have been destroyed. Prior to clinical onset, type 1 diabetes is often characterized by circulating autoantibodies against a variety of islet cell antigens, including glutamic acid decarboxylase (GAD), tyrosine phosphatase (IA2), and insulin. The autoimmune destruction of the insulin-producing pancreatic beta cells is thought to be the primary cause of type 1 diabetes. The presence of these autoantibodies provides early evidence of autoimmune disease activity, and their measurement can be useful in assisting the physician with the prediction, diagnosis, and management of patients with diabetes. Insulin is the only beta-cell specific autoantigen thus far identified. Antibodies to insulin are found predominantly, though not exclusively, in young children developing type 1 diabetes. In insulin-naive (untreated) patients, the prevalence of antibodies to insulin is almost 100% in very young individuals and almost absent in adult onset of type 1 diabetes. Because the risk of diabetes is increased with the presence of each additional autoantibody marker, the positive predictive value of insulin antibody measurement is increased when measured in conjunction with antibodies to GAD and IA-2.

Test principle
This assay employs the quantitative sandwich enzyme immunoassay technique. A antibody specific for IAA has been pre-coated onto a microplate. Standards and samples are pipetted into the wells and any IAA present is bound by the immobilized antibody. An enzyme-linked antibody specific for IAA is added to the wells. Following a wash to remove any unbound antibody-enzyme reagent, a substrate solution is added to the wells and color develops in proportion to the amount of IAA bound in the initial step. The color development is stopped and the intensity of the color is measured.

Materials and components

<table>
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<tr>
<th>Reagent</th>
<th>Quantity</th>
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Sample collection and storage

**Cell culture supernates** - Remove particulates by centrifugation and assay immediately or aliquot and store samples at \( \leq -20^\circ C \). Avoid repeated freeze-thaw cycles.

**Serum** - Use a serum separator tube (SST) and allow samples to clot for 30 minutes before centrifugation for 15 minutes at approximately 1000 x g. Remove serum and assay immediately or aliquot and store samples at -20\( ^\circ C \).

**Plasma** - Collect plasma using EDTA or heparin as an anticoagulant. Centrifuge samples for 15 minutes at 1000 x g at 2 - 8\( ^\circ C \) within 30 minutes of collection. Store samples at \( \leq -20^\circ C \). Avoid repeated freeze-thaw cycles.

**Note:** Citrate plasma has not been validated for use in this assay.

Limitations of the procedure

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1. The kit should not be used beyond the expiration date on the kit label.
2. Do not mix or substitute reagents with those from other lots or sources.
3. If samples generate values higher than the highest standard, further dilute the samples with the Assay Diluent and repeat the assay. Any variation in standard diluent, operator, pipetting technique, washing technique, incubation time or temperature, and kit age can cause variation in binding.
4. This assay is designed to eliminate interference by soluble receptors, ligands, binding proteins, and other factors present in biological samples. Until all factors have been tested in the Quantikine Immunoassay, the possibility of interference cannot be excluded.

Reagent preparation

**Bring all reagents to room temperature before use.**

**Wash Buffer** - If crystals have formed in the concentrate, warm to room temperature and mix gently until the crystals have completely dissolved. Dilute 20 mL of Wash Buffer Concentrate into deionized or distilled water to prepare 500 ml of Wash Buffer.

**Standard** - Reconstitute the **Standard** with 1.0 mL of **Sample Diluent**. This reconstitution produces a stock solution of 400 ng/mL. Allow the standard to sit for a minimum of 15 minutes with gentle agitation prior to making serial dilutions. The diluted standard serves as the high standard (200 ng/mL). The **Sample Diluent** serves as the zero standard (0 ng/mL).
Detection Reagent A and B - Dilute to the working concentration specified on the vial label using Assay Diluent A and B (1:100), respectively.

Assay procedure
Allow all reagents to reach room temperature. Arrange and label required number of strips.
1. Prepare all reagents, working standards and samples as directed in the previous sections.
2. Add 100 uL of Standard, Control, or sample* per well. Cover with the adhesive strip. Incubate for 2 hours at 37°C.
3. Remove the liquid of each well, don’t wash.
4. Add 100 uL of Detection Reagent A to each well. Incubate for 1 hour at 37°C. Detection Reagent A may appear cloudy. Warm to room temperature and mix gently until solution appears uniform.
5. Aspirate each well and wash, repeating the process three times for a total of three washes. Wash by filling each well with Wash Buffer (350 uL) using a squirt bottle, multi-channel pipette, manifold dispenser or autowasher. Complete removal of liquid at each step is essential to good performance. After the last wash, remove any remaining Wash Buffer by aspirating or decanting. Invert the plate and blot it against clean paper towels.
6. Add 100 uL of Detection Reagent B to each well. Cover with a new adhesive strip. Incubate for 1 hours at 37°C.
7. Repeat the aspiration/wash as in step 5.
8. Add 90 uL of Substrate Solution to each well. Incubate for 30 minutes at room temperature. Protect from light.
9. Add 50 uL of Stop Solution to each well. If color change does not appear uniform, gently tap the plate to ensure thorough mixing.
10. Determine the optical density of each well within 30 minutes, using a microplate reader set to 450 nm.

Specificity
This assay recognizes recombinant and natural human IAA. No significant cross-reactivity or interference was observed.

Sensitivity
The minimum detectable dose of human IAA is typically less than 0.78 ng/mL.
The sensitivity of this assay, or Lower Limit of Detection (LLD) was defined as the lowest detectable concentration that could be differentiated from zero.

Detection Range
3.12-200 ng/mL. The assay range was estimated by calculating the coefficient of variation (CV) of each standard constructing five independent standard curves. The standard curve concentrations used for the ELISA's were 200 ng/mL, 100 ng/mL, 50 ng/mL, 25 ng/mL, 12.5 ng/mL, 6.25 ng/mL, 3.12 ng/mL.

Important Note:
1. The wash procedure is critical. Insufficient washing will result in poor precision and falsely
elevated absorbance readings.

2. It is recommended that no more than 32 wells be used for each assay run if manual pipetting is used since pipetting of all standards, specimens and controls should be completed within 5 minutes. A full plate of 96 wells may be used if automated pipetting is available.

3. Duplication of all standards and specimens, although not required, is recommended.

4. When mixing or reconstituting protein solutions, always avoid foaming.

5. To avoid cross-contamination, change pipette tips between additions of each standard level, between sample additions, and between reagent additions. Also, use separate reservoirs for each reagent.

6. To ensure accurate results, proper adhesion of plate sealers during incubation steps is necessary.

Calculation of results
Average the duplicate readings for each standard, control, and sample and subtract the average zero standard optical density. Create a standard curve by reducing the data using computer software capable of generating a four parameter logistic (4-PL) curve-fit. As an alternative, construct a standard curve by plotting the mean absorbance for each standard on the y-axis against the concentration on the x-axis and draw a best fit curve through the points on the graph. The data may be linearized by plotting the log of the IAA concentrations versus the log of the O.D. and the best fit line can be determined by regression analysis. This procedure will produce an adequate but less precise fit of the data. If samples have been diluted, the concentration read from the standard curve must be multiplied by the dilution factor.

Storage of test kits and instrumentation
1. Unopened test kits should be stored at 2-8°C upon receipt and the microtiter plate should be kept in a sealed bag with desiccants to minimize exposure to damp air. The test kit may be used throughout the expiration date of the kit (six months from the date of manufacture). Refer to the package label for the expiration date.

2. Opened test kits will remain stable until the expiring date shown, provided it is stored as prescribed above.

3. A microtiter plate reader with a bandwidth of 10nm or less and an optical density range of 0-3 OD or greater at 450nm wavelength is acceptable for use in absorbance measurement.

Precaution
The Stop Solution suggested for use with this kit is an acid solution. Wear eye, hand, face, and clothing protection when using this material.