
Please use only the valid version of the package insert provided with the kit.

Intended Use

For the quantitative determination of serum antibody response to diphtheria toxoid.

Summary

Diphtheria is an acute communicable disease, caused by *Corynebacterium diphtheriae*. The signs and symptoms of infection are a pharyngeal membrane, sore throat, dysphasia, malaise, headache, and nausea. Death may result from respiratory obstruction by the membrane or myocarditis from the toxin.

Although diphtheria is still a serious problem in many underdeveloped countries, active immunizations in many developed countries have helped to decrease the number of reported cases of diphtheria infection. Recent epidemics in eastern Europe and Russia, combined with low levels of protective diphtheria antitoxin (DAT) in adult populations, have caused concern that outbreaks of diphtheria could occur in developed countries. A study in northern Europe reported findings of 26% of the surveyed population being below the minimum protective level of 0.01 IU/ml.

A number of methods are available for evaluating the DAT levels in body fluids. Passive hemagglutination (PHA) is widely used, but has been found to be often discrepant, rendering interpretation of the PHA test very risky for the individual patient. The use of enzyme-linked immunosorbent assays for determining DAT levels has been evaluated as simple to perform, economical, and precise. Thus the ELISA is a very practical method for seroepidemiological purposes.

Principle of Procedure

The micro test wells are coated with diphtheria toxoid antigen. During the first incubation with the diluted patients' sera, any antibodies which are reactive with the antigen will bind to the coated wells. After washing to remove the rest of the sample, the Enzyme Conjugate is added. If antibodies have been bound to the wells, the Enzyme Conjugate will then bind to these antibodies. After another series of washes, a chromogen (tetramethylbenzidine or TMB) is added. If the Enzyme Conjugate is present, the peroxidase will catalyze a reaction that consumes the peroxide and turns the chromogen from clear to blue. Addition of the Stop Solution ends the reaction and turns the blue color to a bright yellow color. The reaction may then be read with an ELISA reader.

Reagents

Item	Description	Symbol
Test Strips	Microwells containing diphtheria toxoid antigens - 96 wells in a test strip holder.	MT PLATE
Enzyme Conjugate	One (1) bottle containing 11 ml of Protein A conjugated to peroxidase.	CONJ
Standards	Four (4) vials containing 1 ml of diluted positive human serum.	CAL
Chromogen	One (1) bottle containing 11 ml of the chromogen tetramethylbenzidine (TMB).	SUBS TMB
Wash Concentrate (20X)	One (1) bottle containing 25 ml of concentrated buffer and surfactant.	WASH BUF
Dilution Buffer	Two (2) bottles containing 30 ml of buffered protein solution.	SPECM DIL
Stop Solution	One (1) bottle containing 11 ml of 0.73 M phosphoric acid.	SOLN

Precautions

Do not use solutions if they precipitate or become cloudy. Wash concentrate may show crystallization upon storage at 2 – 8 °C. Crystallization will disappear after dilution to working strength.

Do not use serum that may have supported microbial growth, or is cloudy due to high lipid content. Samples high in lipids should be clarified before use.

Treat all sera as if capable of being infectious. Standards have been tested and found negative for Hepatitis B surface antigen and for the antibody to HIV by required test methods. This product should be used under appropriate safety conditions that would be used for any potentially infectious agent.

Do not add azides to the samples or any of the reagents.

Storage Conditions

Reagents, strips and bottled components:

Store between 2 – 8 °C.

Squeeze bottle containing diluted wash buffer may be stored at room temperature.

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Preparation

Wash Buffer - Remove cap and add contents of bottle to 475 ml of reagent grade water. Place diluted wash buffer into a squeeze bottle with a narrow tip opening.

Note: Washings consist of filling to the top of each well, shaking out the contents and refilling.

Avoid generating bubbles in the wells during the washing steps.

Collection And Preparation Of Serum

Coagulate blood and remove serum. Serological specimens should be collected under aseptic conditions. Hemolysis is avoided through prompt separation of the serum from the clot.

Serum should be stored at 2-8 °C if it is to be analyzed within a few days.

Serum may be held for 3 to 6 months at -20 °C or lower.

Lipemic and strongly hemolytic serum should be avoided.

Do not heat inactivate serum and avoid repeated freezing and thawing of samples.

Test samples:

Make a 1:100 and a 1:1,000 dilution of patients' sera using the dilution buffer.

Procedure**Materials Provided**

Diphtheria Toxoid Serology Microwell ELISA kit

Materials Required But Not Provided

- Pipettes
- Squeeze bottle for washing strips (narrow tip is recommended)
- Reagent grade water and graduated cylinder
- Tubes for sample dilution
- Absorbent paper
- ELISA plate reader with a 450 nm and a 650 to 620 nm filter

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Performance of Test

1. Break off number of wells needed (four for calibrators plus number of samples) and place in strip holder.
2. Add 100 µl of each calibrator to wells 1-4, then add 100 µl of the diluted test samples to the remaining wells.
Note: Standards are supplied prediluted. Do not dilute further.
3. Incubate at room temperature (15 to 25 °C) for 10 minutes.
4. Shake out contents and wash 3 times with the diluted wash buffer.
5. Add 2 drops of Enzyme Conjugate to each well.
6. Incubate at room temperature for 5 minutes.
7. Shake out contents and wash 3 times with wash buffer, then rinse once with DI water. Slap wells against paper towels to remove excess moisture.
8. Add 2 drops of the Chromogen to every well. Mix by gently tapping strip holder.
9. Incubate at room temperature for 5 minutes.
10. Add 2 drops of the Stop Solution and mix by tapping strip holder.

Reading of Results

ELISA Reader: Zero reader on air. Set for bichromatic readings at 450/650-620 nm.

Test Limitations

This assay determines the relative amount of DAT antibodies in serum. It cannot be used to diagnose active disease or conclusively determine immune/non-immune status.

Troubleshooting

Negative control has excessive color after development.

Reason: inadequate washings.

Correction: wash more vigorously. Remove excessive liquid from the wells by tapping against an absorbent towel. Do not allow test wells to dry out.

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Interpretation of Results

Construct a standard curve using the absorbance (OD) results of the four controls and the controls' International Units (IU) included in the kit. All graphs should be on log-log 10 paper: Y axis for absorbance and X axis for IU's. Plot the control coordinates and determine the best fit line. Using the absorbance data and the standard curve as a guide, determine the approximate IU for each sample.

Once the IU value has been determined by the graph, multiply this number by the dilution factor of the sample.

Example:

Sample "A" has an absorbance of 0.4 OD units at a 1:100 serum dilution.

This OD value corresponds to an IU value of 0.008 IU/ml.

Thus the sample has a DAT value of 0.8 IU/ml (0.008 x 100 dilution).

REFERENCES

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2. Gupta, Rajesh K., et al. "Diphtheria Antitoxin Levels in US Blood and Plasma Donors." *J Infect. Dis.* June 1996; 173. Pp. 1493-7.
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