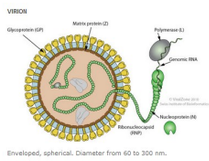
INTENDED USE

The Human Anti-Lymphocytic Choriomeningitis Virus (**LCMV**) IgG ELISA Kit is an immunoassay suitable for detecting and quantifying IgG antibody activity specific for LCMV nuclear protein (NP) antigen in serum or plasma. Other biological fluids, including tissue culture medium, may be validated for use. The assay is for research use only (RUO) and is not intended nor validated for diagnosing LCM virus disease. Reagents contain no virus or viral antigens.

GENERAL INFORMATION



LCMV, an enveloped RNA arenavirus, is rare among laboratory animals, but is readily transmissible to lab workers. Infected mice generally do not present clinical signs. LCMV infection may be diagnosed by ELISA, measuring rapidly rising antibody titers (8-12 days after infection) to LCMV antigen. Mice infected with LCMV are not suitable for animal research due to suppression of cellular immunity, increased sensitivity to viruses and endotoxins, and inhibition of tumor induction or transplantation. Besides infecting animals, LCMV may also contaminate cell lines, transplantable tumors and other biological products; these should be tested by mouse antibody production (MAP), using ELISA to detect anti-LCMV after immunization.

RecombiVirus™ ELISAs are 2nd generation immunoassays using purified recombinant, antigenic proteins of animal viruses. The ADI Human LCMV IgG ELISA is designed with high sensitivity for the detection of antibodies derived from vaccination or natural LCMV infection.

PRINCIPLE OF THE TEST

The Human Anti-LCMV IgG ELISA kit is based on the binding of Human anti-LCMV IgG in samples to LCMV antigen immobilized on the microwells, and anti- LCMV IgG antibody is detected by anti-Human IgG-HRP conjugate. After a washing step, chromogenic substrate (TMB) is added and color (blue) is developed by, which is directly proportional to the amount of anti-LCMV IgG present in the sample. Stopping Solution is added to terminate the reaction (blue converts to yellow), and A450nm is then measured using an ELISA reader. The presence of Human IgG antibody in samples is determined relative to Anti-LCMV IgG Controls.

PRODUCT SPECIFICATIONS

Specificity
Purified recombinant LCMV nuclear protein is used as antigen; thus the assay is specific for antibodies directed to LCMV NP. The Antibody-HRP conjugate reacts specifically with Human IgG class antibodies; IgA, IgM and IgE antibody would not be measured above background signals.

Assay Sensitivity
The LCMV antigen coating level, HRP conjugate concentration, and Low NSB Sample Diluent are optimized to differentiate anti-LCMV IgG from background (non-antibody) signal with Human serum samples diluted 1:100.

KIT CONTENTS

The microtiter well plate and all other reagents, if unopened, are stable at 2-8^{o}C until the expiration date printed on the box label. Stabilities of the working solutions are indicated under Reagent Preparation.

To Be Reconstituted: Store as indicated.

Component	Preparation Instructions
Wash Solution Concentrate (100x) Cat. No. WB-100, 10ml	Dilute the entire volume 10ml + 990ml with distilled or deionized water into a clean stock bottle. Label as **Working Wash Solution** and store at ambient temperature until kit is used entirely.
Sample Diluent Concentrate (20x) Cat. No. SD-20T, 10ml	Dilute the entire volume, 10ml + 190ml with distilled or deionized water into a clean stock bottle. Label as **Working Sample Diluent** and store at 2-8ºC until the kit lot expires or is used up.
Anti-Human IgG-HRP Conjugate Concentrate (100x) Part: H-HuG.112, 0.15ml	Peroxidase conjugated anti-Human IgG in buffer with detergents and antimicrobial as stabilizers. Dilute fresh as needed; 10ul of concentrate to 1ml of **Working Sample Diluent** is sufficient for 1 8-well strip. Use within the working day and discard. Return 100X to 2-8° C storage.

Ready For Use: Store as indicated on labels.

Component	Part	Amt	Contents
LCMV Ag Microwell Strip Plate	300201	8-well strips (12)	Coated with LCMV VP1 antigen, and post-coated with stabilizers.
Anti-LCMV Sensitivity Control	300202	0.65 ml	**Low** level Anti-LCMV, in buffer with detergents and antimicrobial.
Anti-LCMV Positive Control	300203	0.65 ml	**High** level Anti-LCMV, in buffer with detergents and antimicrobial.
Low NSB Sample Diluent	TBTm	30 ml	Buffer with protein, detergents and anti-microbial. Use as is for sample dilution
TMB Substrate	80091	12 ml	Chromogenic substrate for HRP containing TMB and peroxide.
Stop Solution	80101	12 ml	Dilute sulfuric acid.

Materials Required But Not Provided:

- Pipettors and pipettes that deliver 100ul and 1-10ml. A multi-channel pipettor is recommended.
- Disposable glass or plastic 5-15ml tubes for diluting samples and Anti-Human IgG HRP Concentrate.
- Graduated cylinder to dilute Wash Concentrate; 0.2 to 1L.
- Stock bottle to store diluted Wash Solution; 0.2 to 1L.
- Distilled or deionized water to dilute reagent concentrates.
- Microwell plate reader at 450 nm wavelength.

ASSAY DESIGN AND SET-UP

Sample Collection and Handling

Serum and other biological fluids may be used as samples with proper dilution to avoid solution matrix interference. For **serum**, collect blood by venipuncture, allow clotting, and separate the serum by centrifugation at room temperature. For other samples, clarify the sample by centrifugation and/or filtration prior to dilution in Sample Diluent. If samples will not be assayed immediately, store refrigerated for up to a few weeks, or frozen for long-term storage.

Antibody Stability

Initial dilution of serum into **Working Sample Diluent** (WSD) is recommended to stabilize antibody activity. This enhances reproducible sampling, and stabilizes the antibody activity for years, stored refrigerated or frozen. Further dilution into **Low NSB Sample Diluent** (LNSD), which provides the lowest assay background, should be at least 10 times the initial dilution and performed the same day as the assay.
Example:
Initial (1/5): **10**ul serum + **40**ul WSD [or 0.1ml + 0.4ml]
Further (1/100): **10**ul initial (1/5) + **190** ul LNSD

Assay Design
Review Calculation of Results (p5-7) and Limits of the Assay (above) before proceeding:

- Select the proper sample dilutions accounting for expected potency of positives and minimizing non-specific binding (NSB) and other matrix effects; for example, net signal for non-immune samples should be lower than the **Sensitivity Control**. This is usually 1/100 or greater dilution for human sera with normal levels of IgG and IgM.
- Run a Sample Diluent **Blank**. This signal is an indicator of proper assay performance, especially of washing efficacy, and is used for net OD calculations, if required. Blank OD should be <0.3.
- Run the **Positive** and **Sensitivity Controls**, which validate that the assay was performed to specifications: the **Positive** Control should give a high signal (>1.5 OD); the **Sensitivity** Control should give a low signal which can be used to discriminate at the Positive/Negative threshold (see Interpretation of Results, p. 5).

Plate Set-up
Bring all reagents to room temperature (18-30° C) equilibration (at least 30 minutes).

- Determine the number of wells for the assay run. Duplicates are recommended, including 4 Control wells and 2 wells for each sample and internal control to be assayed.
- Remove the appropriate number of microwell strips from the pouch and return unused strips to the pouch. Reseal the pouch and store refrigerated.
- Remove the appropriate number of microwell strips from the pouch and return unused strips to the pouch. Reseal the pouch and store refrigerated.

- Add 200-300ul Working Wash Solution to each well and let stand for about 5 minutes. Aspirate or dump the liquid and pat dry on a paper towel before sample addition.

Assay Procedure

ALL STEPS ARE PERFORMED AT ROOM TEMPERATURE. After each reagent addition, gently tap the plate to mix the well contents prior to beginning incubation.

1. 1st Incubation [100ul – 60 min; 4 washes]

- Add 100ul of sample diluent (blank) calibrators, samples and controls each to pre-determined wells.
- Tap the plate gently to mix reagents and incubate for 60 minutes.
- Wash wells 4 times and pat dry on fresh paper towels. As an alternative, an automatic plate washer may be used. Improper washes may lead to falsely elevated signals and poor reproducibility.

2. 2nd Incubation [100ul – 30 min; 5 washes]

- Add 100ul of diluted Anti-Human IgG HRP to each well.
- Incubate for 30 minutes.
- Wash wells 5 times as in step 2.

3. Substrate Incubation [100ul – 15 min]

- Add 100ul TMB Substrate to each well. The liquid in the wells will begin to turn blue.
- Incubate for 15 minutes in the dark, e.g., place in a drawer or closet.

Note: If your microplate reader does not register optical density (OD) above 2.0, incubate for less time, or read OD at 405-410 nm (results are valid).

4. Stop Step [Stop: 100ul]

- Add 100ul of Stop Solution to each well.
- Tap gently to mix. The enzyme reaction will stop; liquid in the wells will turn yellow.

5. Absorbance Reading

- Use any commercially available microplate reader capable of reading at 450nm wavelength. Use a program suitable for obtaining OD readings, and data calculations if available.
- Read absorbance of the entire plate at 450nm using a single wavelength within 30 minutes after Stop Solution addition. If available, program to subtract OD at 630nm to normalize well background.

PRECAUTIONS AND SAFETY INSTRUCTIONS

Controls, Sample Diluent, and Antibody HRP contain bromonitrodioxane (BND: 0.05%, w/v). Stop Solution contains dilute sulfuric acid. Follow good laboratory practices, and avoid ingestion or contact of any reagent with skin, eyes or mucous membranes. All reagents may be disposed of down a drain with copious amounts of water. MSDS for TMB, sulfuric acid and BND can be requested or obtained from the ADI website: http://4adi.com/commerce/info/showpage.jsp?page_id=1060&category_id=2430&visit=10

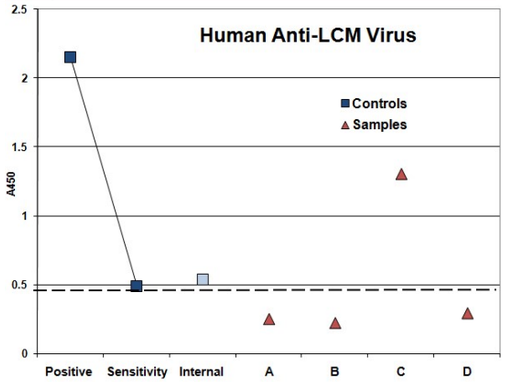
INTERPRETATION OF RESULTS

A. Antibody Activity Threshold Index

Compare Samples to **Sensitivity Control** or **Internal Control**

= Positive/Negative Cut-off.

Example:



Results

The **sensitivity** of the assay to detect anti-LCMV IgG, from either natural infection or immunization, is controlled so that the **Sensitivity Control** represents a threshold OD for most true positives in human serum diluted in the Low NSB Sample Diluent at 1:100 or greater. Visual inspection of the data in the above graph shows the following:

Positive Control – clearly positive, shows the OD range of the assay; high value indicates optimal sensitivity of the assay.

Sensitivity Control – a 'Cut-off' line has been drawn to indicate a threshold distinguishing between **Positive/Negative**. The is not a clear-cut threshold, rather a low OD area that could represent either low positives or high background negatives.

Internal Control – a true positive from an infected individual that represents the lab's experience in distinguishing low positive from negative samples (not provided). This should be run in each assay to supplement the Sensitivity Control for Positive/Negative discrimination purposes.

Samples A,B,C,D – 3 samples (A, B, D) are negative: below the threshold; 1 sample (C) is positive: clearly above the threshold.

The Sensitivity Control can be used to calculate a **Threshold Index** that numerically discriminates Positive/Negative, as follows:

- Divide each Sample net OD by the Sensitivity Control net OD. Values above 1.0 are a measure of **Positive** Antibody Activity; below 1.0 are **Negative** for antibody.

INTERPRETATION OF RESULTS (cont)

B. Positive Index

Experimental sample values may be expressed relative to the values of Control or Non-immune samples, by calculation of a **Positive Index**. One typical method is as follows:

1. Calculate the net OD mean + 2 SD of the Control/Non-immune samples = **Positive Index**.

2. Divide each sample net OD by the Positive Index. Values above 1.0 are a measure of **Positive** Antibody Activity; below 1.0 are **Negative** for antibody.

A sample value would be **Positive** if significantly above the value of the pre-immune serum sample or a suitably determined non-immune panel or pool of samples, tested at the same sample dilution.

This calculation also **quantifies** the positive Antibody Activity level, assigning a higher value to samples with higher Antibody Activity, and vice versa.

Example:

	Assay Net OD		Calculated Antibody Activity	
Sample	Control	Exptl	Control	Exptl
1	0.248	**P** 2.212	0.79	**7.04**
2	0.290	**S** 0.452	0.92	**1.44**
3	0.186	**I** 0.541	0.59	**1.72**
4	0.276	**U** 0.212	0.88	0.68
5	0.161	**U** 0.122	0.51	0.39
6	0.173	**N** 1.491	0.55	**4.75**
7	0.153	**N** 0.694	0.48	**2.21**
8	0.211	**N** 1.487	0.67	**4.74**
9	0.145	**N** 0.546	0.46	**1.74**
10	0.110	**U** 0.263	0.35	0.84
Mean	0.195			
SD	0.0595			
Mean +2 SD	**0.314**	= **Positive Index**		

Results

Experimental Samples are represented as follows:

P – Positive Control

S – Sensitivity Control

I – Internal Control; lab's threshold positive serum

U – Uninfected human sample

N – Naturally infected human samples.

INTERPRETATION OF RESULTS (cont)

C. Titers from Sample Dilution Curves

The titer of elevated antibody activity calculated from a dilution curve of each sample is recommended as the most accurate quantitative method. Best precision can be obtained using the following guidelines:

1. Use an OD value Index in the mid-range of the assay (2.0 – 0.5 OD); this provides the best sensitivity and reproducibility for comparing experimental groups and replicates. An arbitrary 1.0 OD is commonly used.
2. Prepare serial dilutions of each sample to provide a series that will produce signals higher and lower than the selected index. With accurate diluting, duplicates may not be required if at least 4 dilutions are run per sample.
3. A 5-fold dilution scheme is useful to efficiently cover a wide range which produces ODs both above and below 1.0 OD. The dilution scheme can be tightened to 3-fold or 2-fold for more precise comparative data.
4. The Positive and Sensitivity Control values can be used to normalize inter-assay values.

Calculations

1. On a log scale of inverse of Sample Dilution as the x-axis, plot the OD values of the two dilutions of each positive sample having ODs above and below the OD value of the Index (arbitrary or selected Calibrator).
2. From a point-to-point line drawn between the two sample ODs, read the dilution value (x-axis) corresponding to the OD of the selected Index
   = IgG Antibody Activity Units

Note:

- The sensitivity of the assay may be increased to perhaps convert a borderline sample to a positive by using a lower dilution of the sample, e.g., 1/50. The values of negatives may increase, so an alternative threshold should be established using known negatives to develop a **Positive Index** (page 6), or by using known **Internal Controls** as discriminator for a **Threshold Control** (instead of the kit Sensitivity Control)

Limits of the Assay

- The assay detects and quantifies IgG antibodies directed to the major capsid protein VP1. It may be possible for an individual to have Lymphocytic Choriomeningitis Virus infection without producing antibodies specific to VP1.
- Anti-LCMV antibody levels of an infected individual may be below detection threshold related to the time course of the infection, e.g., too early for positive titer development.

LCMV Infection in Humans

Infection in house mouse populations may vary by geographic location, though it is estimated that 5% of house mice throughout the United States carry LCMV and are able to transmit virus for the duration of their lives without showing any sign of illness. Humans are more likely to contract LCMV from house mice, but infections from pet rodents have also been reported. LCMV infections in humans have been reported in Europe, the Americas, Australia, and Japan, and may occur wherever infected rodent hosts of the virus are found. Several serologic studies conducted in urban areas have shown that the prevalence of LCMV antibodies in human populations range from 2% to 5%.

Instruction Manual No. M-AE-300240-1

Recombivirus™ Human Anti-Lymphocytic Choriomeningitis Virus (LCMV) IgG

ELISA Kit Cat. #. AE-300240-1

For Quantitation of Anti-LCMV VP1 IgG in Serum or Plasma

For research use only, not for diagnostic or therapeutic use.

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ELISA Kit Components	Amount	Part
LCMV Antigen Coated Strip Plate	8-well strips (12)	300201
Anti-LCMV Sensitivity Control	0.65 ml	300202
Anti-LCMV Positive Control	0.65 ml	300203
Anti-Human IgG HRP Conjugate (100X)	0.15 ml	H-HuG.112
Sample Diluent (20x)	10 ml	SD20T
Low NSB Sample Diluent	30 ml	TBTm
Wash Solution Concentrate (100X)	10 ml	WB-100
TMB Substrate	12 ml	80091
Stop Solution	12 ml	80101
Product Manual	1 ea	M-AE-300240-1