INTENDED USE

The Monkey anti-dsDNA IgG ELISA Kit is an immunoassay suitable for quantifying or titering IgG antibody activity specific for double-stranded DNA in serum or plasma. Other biological fluids, including tissue culture medium, may be validated for use. For research use only, not for therapeutic use.

GENERAL INFORMATION

Antibodies reactive with autologous nuclear components, such as DNA and histones, can represent an autoimmune basis for pathological conditions such as systemic lupus erythematosis (**SLE**) in humans, and in mice homozygous for the lymphoproliferation spontaneous mutation (Fas^{lpr}), a systemic autoimmunity with massive lymphadenopathy associated with proliferation of aberrant T cells, arthritis and immune complex glomerulonephritis. These conditions include elevated levels of anti-dsDNA and other anti-nuclear antibodies (ANA) which often increase as the animal ages. Also, the expanded use in the drug industry of biological modifiers has been associated with production of autoantibodies, of which mice, and possibly also other hosts such as humans and monkeys, are susceptible. A prototype disease in mice is lupus caused by the drug minocycline, with elevated anti-dsDNA among other autoantibodies and pathological conditions. Recent investigations have focused on the role of innate immune mechanisms, responding to the damage-associated molecular patterns of dying cells, as underlying cause of the anti-dsDNA type autoimmunity; these may be induced by drugs, including vaccines and adjuvants, with aging, or with other conditions.

PRINCIPLE OF THE TEST

The Monkey anti-dsDNA IgG ELISA kit is based on the binding of monkey anti-dsDNA IgG in samples to dsDNA coated on the plate, and anti-dsDNA antibody is detected by anti-monkey IgG-specific antibody-HRP conjugate. After a washing step, chromogenic substrate (TMB) is added and color (blue) is developed, which is directly proportional to the amount of antibody present in the sample. Stopping Solution is added to terminate the reaction, and A450nm is then measured using an ELISA reader. The activity and/or concentration of antibody in samples is calculated relative to supplied calibrators.

PRODUCT SPECIFICATIONS

Specificity

Purified dsDNA is used to coat the microwells; thus the assay is specific for antibodies directed to dsDNA. The anti-Monkey IgG HRP conjugate reacts specifically with monkey IgG subclass antibodies that bind to dsDNA on the plate. IgA, IgM, IgE and other IgG subclass antibodies would not be measured above background signals.

Assay Sensitivity

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

Calibrator Values

The calibrators are dilutions of antibody reactive to dsDNA. Values are assigned as arbitrary anti-DNA activity units (see Limits of the Assay).

KIT CONTENTS

The microtiter well plate and all other reagents, if unopened, are stable at 2-8°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 2-8°C until the kit lot expires or is used up.
Anti-Monkey IgG-HRP Conjugate Concentrate (100x) Part: H-MkG.612, 0.15ml	Peroxidase conjugated anti-Monkey IgG in buffer with protein, detergents and antimicrobial as stabilizers. Dilute fresh as needed; 10ul of concentrate to 1ml of **Working Sample Diluent (WSD)** 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
dsDNA Microwell Strip Plate	5101	8-well strips (12)	Coated with dsDNA, and post-coated with stabilizers.
Anti-DNA Calibrators			
10 U/ml 25 U/ml 50 U/ml 100 U/ml	5125B 5125C 5125D 5125E	0.65 ml 0.65 ml 0.65 ml 0.65 ml	Four (4) vials, each containing anti-DNA levels in arbitrary activity Units; diluted in buffer with protein, detergents and antimicrobial as stabilizers.
Monkey Anti-dsDNA IgG Positive Control	670-100-PC	0.65 ml	Monkey serum with reactivity to dsDNA; diluted in buffer with protein, detergents and antimicrobial as stabilizers.
Low NSB Sample Diluent (LNSD) Reduces non-specific binding	TBTm **Not** for HRP dilution.	30 ml	Buffer with protein, detergents and antimicrobial as stabilizers. Use as is for sample dilution. See **Assay Design**, page 3.
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-Monkey IgG HRP Concentrate.
- 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. If samples will not be assayed immediately, store refrigerated for up to a few weeks, or frozen for long-term storage.

Caution: Monkey serum may contain zoonotic, cross-species infectious material. Always wear gloves when handling serum-containing samples, including the standards and controls, and dispose of these samples and containers as biohazard waste.

Antibody Stability & Dilution

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 (1/50): **10**ul initial (1/5) + **90**ul LNSD (1/50)

Assay Design

Review Interpretation of Results (p5-7) 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 **10 U/ml Calibrator**. This is usually 1/100 or greater dilution for monkey serum with normal levels of IgG and IgM.
- Run the Monkey Anti-dsDNA IgG Positive Control; net OD > **0.5**.
- 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 a set of **Calibrators**, which validate that the assay was performed to specifications: **100 U/ml** should give a high signal (>1.5 OD); **10 U/ml** 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 8 Calibrator wells and 2 wells for each sample 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.
- 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.

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 8 Calibrator wells and 2 wells for each sample and 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.
- 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-Monkey 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

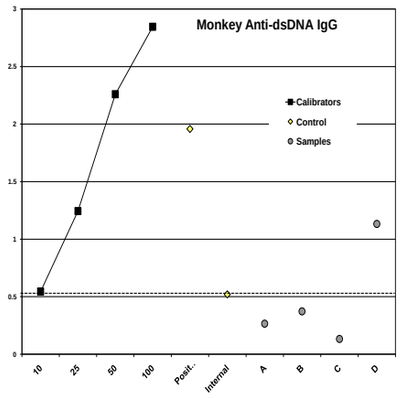
- Use any commercially available microplate reader capable of reading at 450nm wavelength. Use a program suitable for obtaining OD readings, and data calculations if available.
- Read absorbance of the entire plate at 450nm using a single wavelength within 30 minutes after Stop Solution addition. If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

INTERPRETATION OF RESULTS

Method A. Antibody Activity Threshold Index

Compare Samples to **10 U/ml Calibrator** or **Internal Control = Positive/Negative Cut-off**.

Example:



Results

The **sensitivity** of the assay to detect anti-dsDNA IgG, either natural or from immunization, is controlled so that the **10 U/ml Calibrator** represents a threshold OD for most true positives in monkey serum diluted to 1:100 or greater. Visual inspection of the data in the above graph shows the following:

Calibrators – dilution curve of anti-dsDNA antiserum, derived from autoimmunity, shows the OD range of the assay; high value indicates optimal sensitivity of the assay.
10 U/ml: a line has been drawn to indicate a threshold distinguishing between **Positive/Negative**. This is not a clear-cut threshold, rather a low OD area that could represent either low positives or high background negatives.

Positive Control – a monkey serum showing natural reactivity to dsDNA; net OD > **0.5**. This Control can be used to normalize between-assay variation.

Internal Control – a true low positive from an immune animal that represents the lab's experience in distinguishing low positive from negative samples. This should be run in each assay to supplement the 10 U/ml Calibrator for Positive/Negative discrimination purposes.

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

The 10 U/ml Calibrator can be used to calculate a **Threshold Index** that numerically discriminates Positive/Negative:

- Divide each Sample net OD by the 10 U/ml Calibrator net OD. Values above 1.0 are a measure of **Positive** Antibody Activity; below 1.0 are **Negative** for antibody.

INTERPRETATION OF RESULTS (cont.)

Method 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:

Experimental Samples are represented as follows:

C – Calibrator
I – Internal Control; lab's threshold positive serum
E – Experimental sample

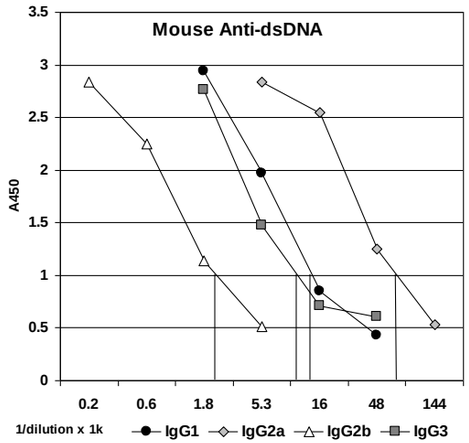
Results

	Assay Net OD		Calculated Antibody Activity	
Sample	Control	Exptl	Control	Exptl
1	0.325	2.281 **C**	0.75	**5.29**
2	0.272	1.581 **C**	0.63	**3.67**
3	0.133	0.998 **C**	0.31	**2.32**
4	0.194	0.453 **C**	0.45	**1.05**
5	0.289	0.767 **E**	0.67	**1.78**
6	0.319	0.982 **E**	0.74	**2.28**
7	0.332	0.401 **I**	0.77	0.93
8	0.291	0.351 **E**	0.68	0.81
9	0.402	0.325 **E**	0.93	0.75
10	0.253	0.16 **E**	0.59	0.37
Mean	0.281			
SD	0.075			
Mean +2 SD	**0.431**	= **Positive Index**		

Controls: All are Negative (<1.0) for antibody activity.
Calibrators: Ranking from 100 – 1000 U/ml = 1.05 – 5.29.
Experimental: Two (2) are Positive (>1.0); 4 are Negative.

INTERPRETATION OF RESULTS (cont.)

Method C. Antibody Titer & Specificity
Dilutions of an antiserum pool from LPR+ mice, displaying anti-dsDNA autoimmunity, were assayed using conjugates specific for the various IgG subclasses. Titers were calculated as inverse of the dilution that produced a **1.0 OD** in the assay.



Results

IgG1 Subclass: Titer: **13.5 k**
IgG2a Subclass: Titer: **70.0 k**
IgG2b Subclass: Titer: **2.3 k**
IgG3 Subclass: Titer: **10.4 k**

The IgG immune response was primarily of the IgG2a subclass.

Note: the various subclass-specific HRP conjugates in the kits are adjusted to have equivalent potency for detecting the respective IgG subclass as adsorbed on a microwell. Thus, the difference in subclass titers (as above) are not due to differences in HRP conjugate potencies, rather difference in the actual anti-dsDNA activity of each IgG subclass. The Total IgG titer would be an average of the subclass titers.

LIMITATIONS OF THE ASSAY

Quantitation of Antibody in a Sample
The ELISA measures anti-dsDNA activity, a combination of antibody concentration and avidity for the dsDNA antigen. Antibodies with similar anti- dsDNA activities (assay signals) may have substantially different total IgG concentrations, due to differences in avidity. The quantitation or activity of the samples should be appropriately expressed in activity Units (titer), rather than mass units of IgG (e.g., ug/ml).

Calibrator Curve Quantitation
To quantitate antibody activity from a calibrator curve (such as provided with the kit), the dilution curve of the samples must be parallel to the calibrator curve, to avoid different values being obtained from different regions of the curve. Antibodies that are not matched in dsDNA avidity will often have non-parallel dilution curves. In these cases, antibody activity is best expressed as a titer relative to a reference positive such as the 25 U/ml Calibrator, or another Calibrator in the kit (see Calculation of Results).

Instruction Manual No. M-670-100-DNM

Monkey Anti-dsDNA IgG ELISA Kit

Catalog # 670-100-DNM

For Quantitation of anti-dsDNA (double-stranded) IgG in Serum, Plasma or Other Biological Fluids

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

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ELISA Kit Components	Amount	Part
dsDNA Coated Microwell Strip Plate	8-well strips 12)	5101
Monkey Anti-dsDNA Positive Control	0.65 ml	670-100PC
Anti-DNA Calibrator 10 U/ml	0.65 ml	5125B
Anti-DNA Calibrator 25 U/ml	0.65 ml	5125C
Anti-DNA Calibrator 50 U/ml	0.65 ml	5125D
Anti-DNA Calibrator 100 U/ml	0.65 ml	5125E
Anti-Monkey IgG HRP Conjugate (100X)	0.15 ml	H-MkG.612
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	670-100-DNM