

# Ovalbumin IgA ELISA Kit (GD40)

Semi-quantitative/qualitative test for serum Ovalbumin IgA antibodies

# Ovalbumin IgG ELISA Kit (GD41)

Semi-quantitative/qualitative test for serum Ovalbumin IgG antibodies  
(96 tests)

For *in vitro* diagnostic use



## 1. Intended use

The Ovalbumin IgA and IgG kits are rapid ELISA methods for the detection of IgA and IgG antibodies to ovalbumin, one of the principal components of eggs. The components of the kit are for *in vitro* diagnostic use only.

## 2. Explanation of the Test

The presence of antibodies to ovalbumin is a common finding in patients with egg intolerance. Both IgG and IgA antibodies may be detected.

Ovalbumin has been implicated in a number of conditions affecting children. In particular, elevated anti-ovalbumin antibodies have been demonstrated in children with cystic fibrosis. Ovalbumin antibodies have also been noted in some forms of kidney disease, and children with insulin dependent diabetes mellitus show an enhanced immune response to both  $\beta$ -lactoglobulin and ovalbumin, a phenomenon that may be related to the development of the disease.

Food allergy-related symptoms usually disappear when egg and egg-based foods have been withdrawn from the patients diet.

## 3. Principle of the test

Diluted serum samples are incubated with ovalbumin immobilised on microtitre wells. After washing away unbound serum components, rabbit anti-human IgA or IgG conjugated to horseradish peroxidase is added to the wells and this binds to surface-bound antibodies in the second incubation. Unbound conjugate is removed by washing, and a solution containing 3,3',5,5'-tetramethylbenzidine (TMB) and enzyme substrate is added to trace specific antibody binding. Addition of Stop Solution terminates the reaction and provides the appropriate pH for colour development. The optical densities of the standards, controls and samples are measured using a microplate reader at 450nm.

## 4. Materials included in the kit

- **Microplate:** 96 wells in 12 X 8 break-apart strips, pre-coated with ovalbumin, with holder in a foil bag with desiccant
- **Reagent 1: Sample Diluent** 150mM Tris-buffered saline, pH 7.2 with antimicrobial agent, 10ml, (blue), concentrate (x15)
- **Reagent 2: Wash Buffer** 100mM Tris-buffered saline with detergent, pH 7.2, 100 ml, concentrate (x10)
- **Reagent 3: Conjugate** rabbit anti-human IgA (yellow) or IgG (red) conjugated to horseradish peroxidase in protein stabilising solution and antimicrobial agent, 12 ml, ready to use
- **Reagent 4: TMB Substrate** aqueous solution of TMB and hydrogen peroxide, 12 ml, ready to use
- **Reagent 5: Stop Solution** 0.25M sulphuric acid, 12 ml, ready to use
- **Standard:** 10 U/ml (IgA or IgG), 1ml of 10mM Tris-buffered saline containing human serum IgA/G antibodies to ovalbumin, ready to use
- **Positive Control:** 1ml of 10mM Tris-buffered saline containing human serum antibodies to ovalbumin, ready to use
- **Negative Control:** 1ml of 10mM Tris-buffered saline containing normal human serum, ready to use
- **Instructions for use**

## 5. Other equipment required

1. Test tubes for dilution • graduated cylinder for preparing wash buffer • precision pipettes and disposable tips to deliver 10 $\mu$ l, 100 $\mu$ l, 1ml • EIA microplate washer or multi-channel pipette or wash bottle • distilled or de-ionised water • absorbent paper • EIA microplate reader with 450nm and optional 620nm reference filter. Alternatively, a suitable automated system may be used.
2. Instrumentation, whether manual or automated, should meet the following criteria: pipettes with better than 3% imprecision with no carry over between pipetting steps; microplate washers should remove 99% of fluid; automated machines should minimise time between washing and adding the next reagent.

## 6. Precautions

### 6.1 Safety Precautions

1. All reagents in this kit are for *in vitro* diagnostic use only.
2. Only experienced laboratory personnel should use this test. The test protocol must be followed strictly.
3. All human source material used in the preparation of standards and controls for this product have been tested and found negative for antibodies to HIV, HbsAg and HCV. No test method, however, can offer complete assurance that infectious agents are absent. Therefore, all reagents containing human material should be handled as if potentially infectious. Operators should wear gloves and protective clothing when handling any patient sera or serum based products.
4. Reagents of this kit contain antimicrobial agents and the TMB Substrate solution contains 3,3',5,5'-tetramethylbenzidine. Avoid contact with the skin and eyes. Rinse immediately with plenty of water if any contact occurs.
5. The Stop Solution contains 0.25M sulphuric acid. Avoid contact with skin and eyes. Rinse immediately with plenty of water if contact occurs.
6. Any liquid that has been brought into contact with potentially infectious material has to be discarded in a container with a disinfectant. Disposal must be performed in accordance with local legislation.

### 6.2 Technical Precautions

1. Strips and solutions should not be used if the foil bag is damaged or liquids have leaked.
2. Allow all reagents and the microplate to reach room temperature before use. Ensure that the microplate foil bag containing any unused strips is well sealed and contains the desiccant to avoid moisture. Store at 2 – 8°C after use.
3. The sample diluent X15 concentrate contains 0.09% sodium azide as preservative. Prepare sufficient working strength diluent for the assay run. However, if the working strength diluent is to be stored for more than 1 week, add sodium azide (0.9g/L). Store unused sample diluent concentrate and dilute sample diluent at 2 – 8°C.
4. Include the Positive and Negative Control in every test run to monitor for reagent stability and correct assay performance.
5. Strictly observe the indicated incubation times and temperature.
6. When automating, consider excess volumes required for setting up the instrument and dead volume of robot pipette
7. Ensure that no cross-contamination occurs between wells. Keep all pipettes and other equipment used for Conjugate completely separate from the TMB Substrate reagent.
8. When pipetting Conjugate or TMB Substrate, aliquots for the required numbers of wells should be taken to avoid multiple entry of pipette tips into the reagent bottles. Never pour unused reagents back into the original bottles.
9. Do not allow microwells to dry between incubation steps.
10. Strictly follow the described wash procedure. Insufficient washing may cause high background signal.
11. Avoid direct sunlight and exposure to heat sources during all incubation steps.
12. Replace colour-coded caps on their correct vials to avoid cross-contamination
13. It is important to dispense all samples and controls into the wells without delay. Therefore ensure that all samples are ready to dispense.

## 7. Shelf life and storage conditions

On arrival, store the kit at 2 – 8°C. Once opened the kit is stable for 3 months (or until its expiry date if less than 3 months). Do not use kits beyond their expiry date. Do not freeze any kit component. The diluted

Wash Buffer and Sample Diluent (see Technical Precautions) have a shelf life of 3 months if stored in a closed bottle at 2 – 8°C.

## 8. Specimen collection and storage

Serum or plasma samples may be used and should be stored at -20°C for long-term storage. Frozen samples must be mixed well after thawing and prior to testing. Repeated freezing and thawing can affect results. Addition of preservatives to the serum sample may adversely affect the results. Microbially contaminated, heat-treated or specimens containing particulate matter should not be used. Grossly haemolysed, icteric or lipaemic specimens should be avoided.

## 9. Preparation of reagents

1. Dilute the Sample Diluent (**Reagent 1**) 1:14 in distilled water to make sufficient buffer for the assay run.
2. Dilute the Wash Buffer (**Reagent 2**) 1: 9 in distilled water to make sufficient buffer for the assay run e.g. add 50ml wash buffer concentrate to 450ml water.

## 10. Assay Procedure

1. Dilute patient samples 1:100 in diluted Sample Diluent (e.g. 10µl serum plus 1 ml diluent).
2. Assemble the number of strips required for the assay.
3. For qualitative assays, dispense 100 µl of the 10 U/ml standard, 100 µl positive and negative controls and 100 µl of each diluted sample into appropriate wells. For semi-quantitative assays, dispense also 100 µl of diluted sample diluent as the 0 U/ml standard.
4. Incubate for **30** minutes at room temperature.
5. After 30 minutes, decant or aspirate the well contents and wash the wells 3 times using automated washing or the manual wash procedure (see below). Careful washing is the key to good results. **Do not allow the wells to dry out.**

### Manual Wash Procedure:

Empty the wells by inversion. Using a multi-channel pipette or wash bottle, fill the wells with wash buffer. Empty by inversion and blot the wells on absorbent paper. Repeat this wash process 2 more times.

6. Dispense 100µl of Conjugate (**Reagent 3**) into each well. Incubate the wells for **30** minutes at room temperature.
7. After 30 minutes, discard the well contents and carefully wash the wells 4 times with Wash Buffer. Ensure that the wells are empty but do not allow to dry out.
8. Using a repeating dispenser, rapidly dispense 100µl of TMB Substrate (**Reagent 4**) into each well. Incubate the plate for **10** minutes.
9. Add 100µl of Stop Solution (**Reagent 5**) to each well. To allow equal reaction times, the Stop Solution should be added to the wells in the same order as the TMB Substrate.
10. Read the optical density (OD) of each well at 450nm in a microplate reader within 10 minutes. A 620nm filter may be used as a reference wavelength.

## 11. Quality control

Quality control data is supplied on the lot-specific QC certificate included in the kit.

Controls are intended to monitor for substantial reagent failure.

Any well positive by spectrophotometer but without visible colour should be cleaned on the underside and re-read. If OD values below zero are observed, the wavelengths used should be verified, the reader re-blanked to air and the measurements repeated.

## 12. Interpretation of Results

## Semi-Quantitative results

An index greater than 1.00 indicates a positive sample.

$$\text{Ovalbumin-IgA/IgG index} = \frac{\text{OD of Sample} - \text{OD of 0 U/ml standard}}{\text{OD of 10 U/ml standard} - \text{OD of 0 U/ml standard}}$$

## Qualitative results

Compare the ODs of the patient samples with that of the 10 U/ml standard. Samples with ODs less than the 10 U/ml standard are negative. Samples with ODs greater than the 10 U/ml standard are positive for ovalbumin IgA/IgG antibodies

## 13. Limitations of the Procedure

Ovalbumin IgA/IgG ELISA results should be used in conjunction with other test results and overall clinical presentation.

## 14. Assay Characteristics

Within Assay Imprecision < 5%

Between Assay Imprecision < 12%

### **Method Summary**

- Dilute sera 1:100 with sample diluent (**Reagent 1**).
- For qualitative assays, dispense 100µl of 10 U/ml standard, controls and diluted sample into microplate wells. For semi-quantitative assays, dispense also 100µl sample diluent as the 0 U/ml standard
- Incubate at room temperature **30** minutes.
- *Wash the wells three times.*
- Dispense 100µl of Conjugate (**Reagent 3**) into each well.
- Incubate at room temperature **30** minutes.
- *Wash the wells four times.*
- Add 100µl of TMB Substrate (**Reagent 4**) to each well.
- Incubate at room temperature **10** minutes
- Add 100µl Stop Solution (**Reagent 5**) to each well.
- Read OD at 450nm within 10 minutes.

## Further reading

- James, M. (1999) Towards an understanding of allergy and *in-vitro* testing. *Nat Med J 2* (4): 7-15
- Wood, R.K. *et al* (1998) Reported food intolerance and respiratory symptoms in young adults. *Eur Respir J 11*:151-155
- Barnes, R.M.R. (1995) IgG and IgA antibodies to dietary antigens in food allergy and intolerance. *Clin Exp Allergy 25* S1:7-9
- MacDonald, T.T. (1995) Evidence for cell-mediated hypersensitivity as an important pathogenic mechanism in food intolerance. *Clin Exp Allergy 25* S1:10-13
- Edwards, A.M. (1995) Food-allergic disease. *Clin Exp Allergy 25* S1:16-19
- Carter, C *et al* (1995) Dietary treatment of food allergy and intolerance. *Clin Exp Allergy 25* S1:34-42
- Ferguson, A. (1992) Definitions of food intolerance and food allergy: Consensus and controversy. *J Pediatr 121*:S7-S11
- Welsh, C.J. *et al* (1986) Comparison of the arthritogenic properties of dietary cow's milk, egg albumin and soya milk in experimental animals. *Int Arch Allergy Appl Immunol 80*(2):192-9
- Nanda, R. *et al* (1988) Food intolerance and irritable bowel syndrome. The Gastroenterology Unit, Radcliff Infirmary Oxford
- McDonald, P.J. *et al* (1984) Food protein-induced enterocolitis: Altered antibody response to ingested antigen. *Pedia Res 18* (8):751-755
- Dannaeus, A. *et al* (1977) Estimation of IgG, IgA and IgE antibodies to food antigens in children with food allergy and atopic dermatitis. *Acta Paediatr Scand 66*:31-37
- Iacono, G. *et al* (1998) Persistent cow's milk protein intolerance in infants: the changing faces of the same disease. *Clin Exp Allergy 28*:817-823

Levy, F.S. *et al* (1996) Delayed-type hypersensitivity to cow's milk protein in Melkersson-Rosenthal syndrome: coincidence or pathogenic role? *Dermatology* 192(2):99-102

Campbell, D.E. *et al* (1987) Indirect enzyme-linked immunosorbent assay for the measurement of human immunoglobulins E and G to purified cow's milk proteins: applications in diagnosis of cow's milk allergy. *J Clin Microbiol* 25(11):2114-9

Hankard, G.F. *et al* Increased TIA1-expressing intrathelial lymphocytes in cow's milk protein intolerance *J Pediatr Gastroenterol Nutr* 25(1):79-83

Shakib, F. *et al* (1986) Study of IgG sub-class antibodies in patients with milk intolerance. *Clin Allergy* 16(5):451-8

Lucarelli, S. *et al* (1995) Food allergy and infantile autism. *Panminerva Med* 37(3):137-41