Instructions for Use

Giardia lamblia Antigen (Stool) ELISA

IVD

CE

REF **EIA-3477**

Σ **96**

DRG Instruments GmbH, Germany
Frauenbergstraße. 18, D-35039 Marburg
Phone: +49 (0)6421-1700 0, Fax: +49 (0)6421-1700 50
Website: www.drg-diagnostics.de
E-mail: drg@drg-diagnostics.de

Distributed by:

DRG International, Inc., USA
841 Mountain Ave., Springfield, NJ 07081
Phone: (973) 564-7555, Fax: (973) 564-7556
Website: www.drg-international.com
E-mail: corp@drg-international.com

Version 7.0 *(Rev. 08/20)*
Effective, August 2020

Please use only the valid version of the Instructions for Use provided with the kit.
Verwenden Sie nur die jeweils gültige, im Testkit enthaltene, Gebrauchsanweisung.
Si prega di usare la versione valida delle istruzioni per l'uso a disposizione con il kit.
Por favor, se usa solo la version valida de la metodico técnico incluido aqui en el kit.

Table of Contents

1 INTENDED USE

This ELISA is an *in vitro* immunoassay for the qualitative determination of *Giardia* antigen in fecal specimens.

2 SUMMARY AND EXPLANATION

Giardia lamblia is the protozoan parasite responsible for the disease giardiasis. Symptoms of acute giardiasis include diarrhea, nausea, weight loss, malabsorption, abdominal cramps, flatulence and anemia.[1] The disease may manifest itself as an acute, chronic or as an asymptomatic infection. Giardiasis is the most prevalent parasitic disease in the United States and is responsible for an estimated 100 million mild infections and 1 million severe infections each year.[9]

The mode of transmission of *Giardia* is through fecal-oral ingestion of cysts. Epidemics of giardiasis have been documented in day care centers and by drinking contaminated water.[1,2] Day care centers may be directly or indirectly responsible for 45% of diagnosed *Giardia* infections in the United States.[4] One study found 54% of the children at a day care center were infected.[1]

Diagnosis of giardiasis has been done through a number of invasive and non-invasive techniques. Of the non-invasive techniques, microscopic examination of stools has been the most common. However, this method relies on an experienced technician and subsequent observation of intact organisms. Because of the historically low proficiency of correct microscopic examinations and intermittent excretion of organisms, alternative diagnostic methods have been investigated.[3,5,6,10,11]

One important alternative has been the development of an antigen capture enzyme linked immunosorbent assay (ELISA) for use with stools. These tests have shown comparable sensitivity to experienced microscopic examinations, are fairly simple to perform and do not require the observation of intact organisms.[5,6,7,12]

3 PRINCIPLE OF PROCEDURE

During the first incubation, *Giardia* specific antigen present in the stool specimens are captured by monoclonal antibodies attached to the microwells. The wells are incubated and washed before anti-*Giardia* polyclonal antibodies conjugated to horseradish peroxidase are added. The enzyme conjugate will “sandwich” any antigen bound to the wells. After washings to remove unbound enzyme, a chromogen is added which develops a blue color in the presence of the enzyme complex. The stop solution ends the reaction and turns the blue color to yellow. If no antigen is captured, or if there is an insufficient level of antigen, no colored reaction will take place.

4 REAGENTS

Item	Description	Symbol
Test Strips	Microwells containing anti-*Giardia* monoclonal antibodies: 96 test wells in a test strip holder.	MT PLATE
Enzyme Conjugate	One (1) bottle containing 11 mL of anti-*Giardia* polyclonal antibodies conjugated to horseradish peroxidase with preservative.	CONJ
Positive Control	One (1) vial containing 2 mL of a diluted *Giardia* positive antigen formalinized stool supernatant.	CONTROL +
Negative Control	One (1) vial containing 2 mL of dilution buffer.	CONTROL –
Chromogen	One (1) bottle containing 11 mL of tetramethylbenzidine (TMB) and peroxide.	SUBS TMB
Wash Concentrate (20X)	Two (2) bottles containing 25 mL of concentrated buffer with detergent and thimerosal.	WASH BUF
Dilution Buffer	Four (4) bottles containing 30 mL of a buffered protein solution with thimerosal.	SPECM DIL
Stop Solution	One (1) bottle containing 11 mL of 5% phosphoric acid solution.	SOLN

5 WARNINGS/PRECAUTIONS

- **Do not deviate from the specified procedures when performing this assay**. All specimen dilutions, incubation times/temperatures and washings have been optimized for the best performance characteristics. Deviations from the specified procedures may affect the sensitivity and specificity of the assay.
- For In Vitro Diagnostic Use Only.
- Do not interchange reagents between kits with different lot numbers.
- Do not use reagents that are beyond their expiration dates. Expiration dates are on each reagent label. Use of reagents beyond their expiration dates may affect results.
- Unused microwells should be stored in the desiccated pouch to protect them from moisture.
- Do not use solutions if they precipitate or become cloudy.
  Exception: Wash concentrate may precipitate during refrigerated storage, but will dissolve upon warming.
- Do not add azides to the samples or any of the reagents.
- Controls and some reagents contain thimerosal as a preservative, which may be irritating to skin, eyes and mucous membranes. In case of contact, flush eyes or rinse skin with copious amounts of water.
- Treat all reagents and samples as potentially infectious materials. Use care to prevent aerosols and decontaminate any spills of samples.
- Stop solution is a 5% solution of phosphoric acid in water. If spilled on the skin, wash with copious amounts of water. If acid gets into the eyes, wash with copious amounts of water and seek medical attention.
- Persons who are color blind or visually impaired may not be able to read the test visually and should use spectrophotometric readings to interpret results.

6 STORAGE CONDITIONS

Reagents, strips and bottled components should be stored at 2 °C - 8 °C.

Squeeze bottle containing diluted wash buffer may be stored at room temperature (15 °C - 25 °C).

7 PREPARATION

Before use, bring all reagents and samples to room temperature (15 °C - 25 °C) and mix.

(20X) Wash Concentrate may precipitate during refrigerated storage, but will go back into solution when brought to room temperature (15-25°C) and mixed. ***Ensure that (20X) wash concentrate is completely in solution before diluting to working concentration***.

To dilute (20X) wash concentrate to working dilution, remove cap and add contents of one bottle of Wash Concentrate to a squeeze bottle containing 475 mL of DI water. Swirl to mix. Squeeze bottle should have a narrow tip to optimize washings.

8 COLLECTION OF STOOL (FECES)

No modification of collection techniques used for standard microscopic O&P examinations is needed.

Stool samples may be used as unpreserved or frozen, in Cary-Blair Transport Medium or in preservation media of 10% formalin or SAF.

Unpreserved samples should be kept at 2 °C - 8 °C and tested within 24 hours of collection.
Samples that cannot be tested within this time should be frozen at -20 °C or lower until used.
Avoid multiple freeze/thaw cycles.

Formalinized and SAF preserved samples may be kept at room temperature (15-25 ºC) or at 2 °C - 8 °C and tested within 18 months of collection.
DO NOT freeze preserved samples.

Samples in Cary-Blair should be kept at 2 °C - 8 °C or -20 °C and tested within 1 week of collection.
Avoid multiple freeze/thaw cycles.

9 PROCEDURE

9.1 Materials Provided

- *Giardia* lamblia Antigen ELISA Kit (see chapter “REAGENTS“)

9.2 Materials Required But Not Provided

- Transfer Pipettes
- Squeeze bottle for washing strips (narrow tip is recommended)
- Graduated Cylinder
- Reagent grade (DI) water
- Micropipette
- Applicator sticks (recommended) or swabs for sample preparation
- Sample dilution tubes

9.3 Suggested Equipment

ELISA plate reader capable of reading bichromatically at 450/620 - 650 nm.

9.4 Test Procedure

9.4.1 Procedural Notes

- All incubations are to be done at room temperature (15 °C - 25 °C)
- Ensure all samples and reagents are at room temperature (15 °C - 25 °C) before use. Frozen samples must be thawed completely before use.
- All dilutions of stools must be made with the Dilution Buffer provided. Do not use dilution buffer from a kit with a different lot number.
- If needed, prepared samples can be centrifuged at 2000 - 3000 *g* for 5 - 10 minutes. Ensure supernatant is clear before use.
- When running the assay, try to avoid the formation of bubbles in the wells. Bubbles may affect overall performance and reading of end results. Slapping the wells out on a clean absorbent towel after each wash step should help to minimize bubbles in the wells.
- Controls must be included each time the kit is run. Controls are provided ready to use. DO NOT dilute further.
- **Unpreserved and Preserved specimens have different testing procedures. See below for specific instructions on how to run the assay using each procedure.**

9.4.2 Preserved Specimen Procedure

1. **For samples in SAF, 10% Formalin or Cary-Blair,** mix contents thoroughly inside container. No further processing is required.
2. Break off the required number of wells needed (number of samples plus 2 for controls) and place in holder.
3. Using a micropipette, add **100 µL** of negative control to well # 1 and **100 µL** of positive control to well # 2.
4. Using a micropipette, add **50 µL** of Dilution Buffer to each sample well. **DO NOT add Dilution Buffer to control wells.**
5. Add **50 µL** of sample to each sample well with Dilution Buffer.
6. Incubate for **60 minutes** at room temperature (15 °C - 25 °C), then wash.***** After last wash, slap the wells out on a clean absorbent towel to remove excess wash buffer.
7. Add **2 drops** of Enzyme Conjugate to each well.
8. Incubate for **30 minutes** at room temperature (15 °C - 25 °C), then wash.***** After last wash, slap the wells out on a clean absorbent towel to remove excess wash buffer.
9. Add **2 drops** of Chromogen to each well.
10. Incubate for **10 minutes** at room temperature (15 °C - 25 °C).
11. Add **2 drops** of Stop Solution to each well. Mix wells by gently tapping the side of the strip holder with index finger for approximately **15 seconds**. Read reaction within **5 minutes** after adding stop solution.
12. Read results visually or using an ELISA plate reader (see instructions below).

9.4.3 Unpreserved Specimen Procedure:

1. Prepare sample dilutions in tubes using **0.7 mL** of Dilution Buffer and **0.1 g**, about the size of a small pea, of fecal sample using an applicator stick. Mix thoroughly before using
   -IF USING SWABS, add **1 mL** of dilution buffer to dilution tube. Coat the swab with a thin layer of specimen and mix into dilution buffer, expressing as much fluid as possible. Mix thoroughly before using
2. **For watery unpreserved specimens**, mix contents then add **0.1 mL** of sample to **0.7 mL** of Dilution Buffer in dilution tubes. Mix thoroughly before using.
3. Break off the required number of wells needed (number of samples plus 2 for controls) and place in holder.
4. Using a micropipette, add **100 µL** of negative control to well # 1.
5. Using a micropipette, add **100 µL** of positive control to well # 2.
6. Add **100 µL** of diluted sample to each well.
7. Incubate for **60 minutes** at room temperature (15 °C - 25 °C), then wash.*****
   After last wash, slap the wells out on a clean absorbent towel to remove excess wash buffer.
8. Add **2 drops** of Enzyme Conjugate to each well.
9. Incubate for **30 minutes** at room temperature (15 °C - 25 °C), then wash.*****
   After last wash, slap the wells out on a clean absorbent towel to remove excess wash buffer.
10. Add **2 drops** of Chromogen to each well.
11. Incubate for **10 minutes** at room temperature (15 °C - 25 °C).
12. Add **2 drops** of Stop Solution to each well. Mix wells by gently tapping the side of the strip holder with index finger for approximately **15 seconds**. Read reaction within **5 minutes** after adding stop solution.
13. Read results visually or using an ELISA plate reader (see instructions below).

**** Washings consist of vigorously filling each well to overflowing and decanting contents five (5) separate times. When possible, avoid formation of bubbles in the wells as this may affect the end results.***

10 QUALITY CONTROL

The positive and negative control must be included each time the assay is run. The use of a positive and negative control allows easy validation of kit stability.

Negative control should appear colorless when read visually and should read less than 0.08 OD when read at a dual wavelength of 450/620 - 650 nm.

Positive control should be a clearly visible yellow color and read at greater than 0.5 OD when read at a dual wavelength of 450/620 - 650 nm.

11 RESULTS

11.1 Interpretation of Results - Visual

Positive: Any sample well that is obviously more yellow than the negative control well.

Negative: Any sample well that is not obviously more yellow than the negative control well.

NOTE: The negative control, as well as some samples, may show some slight color. A sample well must be obviously darker than the negative control well to be called a positive result.

11.2 Interpretation of Results - ELISA Reader

Zero reader on air. ***Read all wells using a bichromatic reading with filters at 450 nm and 620 - 650 nm.***

Positive: Absorbance reading of 0.08 OD and above indicates the sample contains *Giardia* antigen.

Negative: Absorbance reading less than 0.08 OD indicates the sample does not contain detectable levels of *Giardia* antigen.

12 LIMITATION OF PROCEDURE

- Test results should be used as an aid in diagnosis and should not be interpreted as diagnostic by themselves.
- DO NOT concentrate stool samples. Assay will not give accurate results on a concentrated sample.
- A negative result can occur from an antigen level lower than the detection limits of this assay. Multiple samples over time may be indicated for those patients that are suspected of being positive for *Giardia*.

13 EXPECTED VALUES

Normal healthy individuals should be free of Giardia and should test negative.

A positive reaction indicates that the patient is shedding detectable amounts of Giardia antigen.

Certain populations, such as children in day care settings, have shown higher rates of infection with Giardia than the normal population. Please refer to the Summary section for references.

14 PERFORMANCE CHARACTERISTICS

Study 1:

A study was performed with the *Giardia* assay EIA-3477 using fresh/frozen specimens, specimens preserved in 10% Formalin and SAF and specimens in Carey-Blair Transport Media. There were a total of 90 specimens used in the study that were identified positive or negative for *Giardia* by microscopy. Of the 90 specimens, 26 were determined to be positive for *Giardia* and 64 were negative for *Giardia.* The results from the study are shown in the following table.

		Microscopy	
		+	-
EIA-3477	+	26	0
	-	0	64

Sensitivity: 100% (26/26)

Specificity: 100% (64/64)

Study 2:

A study was performed comparing the *Giardia* assay EIA-3477 with another commercially available ELISA. The study was performed using fresh/frozen specimens and specimens preserved in 10% Formalin and SAF. There were a total of 86 specimens used in the study that were identified either positive or negative for *Giardia* by microscopy. Of the 86 specimens, 22 were identified positive for *Giardia* and 64 were negative for *Giardia.* The results from the study are shown in the following table.

		EIA-3477	
		+	-
Other Commercial ELISA	+	22	0
	-	0	64

Positive Agreement: 100% (22/22)

Negative Agreement: 100% (64/64)

Reproducibility

The intra-assay (well to well) CV was calculated using 4 positive and 4 negative samples assayed 24 times in a single run. The mean CV was 3.67% with the highest being 6.18%.

The inter-assay (run to run) CV was calculated using 4 positive and 4 negative samples assayed on three separate days. The mean CV was 4.08% with the highest being 11.61%.

Cross Reactivity

No cross-reactions were seen with the following organisms:

Entamoeba hartmanni, Endolimax nana, Entamoeba histolytica/dispar*, Entamoeba coli, Blastocystis hominis, Dientamoeba fragili*s, *Chilomastix mesnili, Strongyloides stercoralis, Cryptosporidium, Ascaris lumbricoides, Enterobius vermicularis, Diphyllobothrium* species, *Hymenolepis nana, Clonorchis sinensis, Enteromonas hominis, Trichuris trichiura, Iodamoeba buetschlii,* Hookworm, *Schistosoma mansoni,* Rotavirus, *Taenia* eggs, *Fasciola* eggs, *Isospora belli, Entamoeba polecki*, Adenovirus*, &* 33 bacterial species (list available on request).

15 TROUBLESHOOTING

Problem*:* 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.

16 REFERENZES / LITERATURE

1. Black, R. et. al.: Giardiasis in Day-Care Center: Evidence of Person to Person Transmission. *Pediatric*, #60 (4), October 1977, pp. 486-491.
2. Craun, G.: Waterborne Giardiasis in the United States. *Lancet*, August 30, 1986, pp. 513-514.
3. Smith, J.: Identification of Fecal Parasites in the Special Parasitology Survey of the College of American Pathologist. ALCP, Vol. 72 (2) August 1979. pp. 371-373.
4. Kappus, K. and Juranek, D.: *Giardia* in the Well. *JAMA*, March 25, 1988, Vol. 259 (12), pp. 1810.
5. Allison, M.C. et. al.: A Microscopic and Immunodiagnostic Search for Giardiasis in Patients with Gastrointestinal Disorders. *Scan J Gastroenterol*, 1988 #23, pp. 209-212.
6. Nash, T., Herrington, D. and Levine, M.: Usefulness of an Enzyme Linked Immunosorbent Assay for Detection of *Giardia* Antigen in Feces. *J Clin Micro*, July 1987, Vol. 25 (7), pp. 1169-1171.
7. Green, E. Miles, M., and Warhurst, D.: Immunodiagnostic Detection of Giardia Antigen in Faeces by a Rapid Visual Enzyme Linked Immunosorbent Assay. Lancet, Sept. 28, 1985. pp. 691-693.
8. Peters, C. et al.: Prevalence of Enteric Parasites in Homosexual Patients Attending an Outpatient Clinic. *J Clin Micro*, Oct. 1986, Vol. 24 (4), pp. 684-685.
9. Intestinal Protozoa: Cinderellas of Parasitology. *ASM News*, Vol. 52 (10), 1986. pp. 521-522.
10. Burke, J.: Giardiasis in Childhood. *Am J Dis Child*, Nov. 1975, Vol. 129, pp. 1304-1310.
11. Danciger, M. and Lopez, M.: Numbers of *Giardia* in the Feces of Infected Children. *Am J Trop Med Hyg*., Vol. 24 (2), 1975, pp. 237-242.
12. Ungar, B. et. al: Enzyme Linked Immunosorbent Assay for the Detection of *Giardia Lamblia* in Fecal Specimens. *J Infect Dis*., January 1984, Vol. 149 (1), pp. 90-97.

SYMBOLS USED

Symbol	English	Deutsch	Italiano	Español	Français
CE	European Conformity	CE-Konformitäts-kennzeichnung	Conformità europea	Conformidad europea	Conformité normes européennes
	Consult instructions for use	Gebrauchsanweisung beachten	Consultare le istruzioni per l'uso	Consulte las instrucciones de uso	Consulter les instructions d'utilisation
IVD	*In vitro* diagnostic medical device	*In-vitro*-Diagnostikum	Dispositivo medico-diagnostico in vitro	Producto sanitario para diagnóstico In vitro	Dispositif médical de diagnostic in vitro
REF	Catalogue number	Artikelnummer	Numero di Catalogo	Nûmero de catálogo	Référence de catalogue
LOT	Batch code	Chargencode	Codice del lotto	Codigo de lote	Numéro de lot
	Contains sufficient for <n> tests	Ausreichend für <n> Prüfungen	Contenuto sufficiente per "n" saggi	Contenido suficiente para <n> ensayos	Contenu suffisant pour "n" tests
	Temperature limit	Temperaturbegrenzung	Temperatura di conservazione	Temperatura de conservacion	Température de conservation
	Use-by date	Verwendbar bis	Utilizzare prima del	Establa hasta	Utiliser jusque
	Manufacturer	Hersteller	Fabbricante	Fabricante	Fabricant
	Caution	Achtung			
RUO	For research use only	Nur für Forschungszwecke	Solo a scopo di ricerca	Sólo para uso en investigación	Seulement dans le cadre de recherches
Distributed by	Distributed by	Vertreiber	Distributore	Distribuidor	Distributeur
Content	Content	Inhalt	Contenuto	Contenido	Contenu
Volume/No.	Volume / No.	Volumen/Anzahl	Volume/Quantità	Volumen/Número	Volume/Quantité

(13-Aug-2020_ia)