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Giardia intestinalis End-Point RT-PCR Kit Product Insert

Product# EP43800

Intended Use

Norgen's *Giardia intestinalis* End-Point RT-PCR Kit is designed for the detection of *Giardia intestinalis* specific RNA based on the use of end-point RT-PCR technology. This kit is designed for research use only and not for use in diagnostic procedures.

Background Information

Giardiasis is a disease of the small bowel caused by the protozoan parasite *Giardia intestinalis* (syn.duodenalis or lamblia). *Giardia* is one of the most common intestinal parasites in the world, and occursat very high prevalence rates in places with poor water sanitation. Individuals become infected through ingesting or coming into contact with contaminated water, food or soil. It can also be spread through the faecal-oral route due to poor hygiene practices, which makes it common in day-care centers. *G. intestinalis* lives inside the intestines of infected humans or other animals including cats, dogs, birds, cows, beaver and deer. Symptoms of infection include diarrhea, malaise, excessive gas, bloating, nausea, diminished interest in food, possible vomiting and weight loss.

Product Description

Norgen's *Giardia intestinalis* End-Point RT-PCR Kit is designed for the detection of *Giardia intestinalis* specific RNA based on the use of end-point RT-PCR technology. This kit is designed for research use only and not for use in diagnostic procedures. The kit includes Master Mix and primers for the specific amplification of a 238 bp region of the *Giardia intestinalis* genome, as well as a positive control and a negative control to confirm the integrity of the kit reagents. In addition, the kit contains loading dye and a DNA ladder to facilitate analysis of the results.

The detection of *Giardia intestinalis* specific RNA is based on end-point RT-PCR technology, utilizing Reverse transcription polymerase chain reaction (RT-PCR) for the amplification of specific *Giardia intestinalis* RNA sequences. For analysis of the RT-PCR data, the RT-PCR reaction is loaded on an agarose RNA gel along with the provided DNA ladder for qualitative analysis.

Norgen's *Giardia intestinalis* End-Point RT-PCR Kit was developed and validated to be used with the following PCR instruments:

- Qiagen Rotor-Gene Q
- BioRad CFX96 Touch™ Real-Time PCR Detection System

Kit Components

Component	Product # EP43800 (24 preps)
MDx 2X RT-PCR Master Mix	350 µL
Giardia Primer Mix	70 µL
Giardia Positive Control	50 µL
Nuclease-Free Water	1.25 mL
Loading Dye	100 µL
DNA Ladder	100 µL
Product Insert	1

Storage Conditions and Product Stability

- All kit components should be stored at -20°C upon arrival
- Repeated thawing and freezing (> 2 x) of the Master Mix and Positive Control should be avoided, as this may affect the performance of the assay. If the reagents are to be used only intermittently, they should be frozen in aliquots.
- All reagents can be stored for 1 year at -20°C without showing any reduction in performance.

Customer-Supplied Reagents and Equipment

- Appropriate End-point PCR Instrument
- RNA Purification Kit
    - The kit is compatible with all RNA purification kits that yield high quality, inhibitor-free RNA
    - **Recommended Purification Kit:** Norgen's Water RNA/DNA Purification Kit - 0.45 µm and 0.22 µm (Cat. 26450, 26400)
- Disposable powder-free gloves
- Benchtop microcentrifuge
- Micropipettors
- Sterile pipette tips with filters
- PCR tubes
- Vortex mixer
- Agarose gel electrophoresis apparatus
- UV transilluminator with suitable gel documentation system
- PCR reaction preparation station (Optional)

Quality Control

In accordance with Norgen's ISO 9001 and ISO 13485-certified Quality Management System, each lot of Norgen's *Giardia intestinalis* End-Point RT-PCR Kit is tested against predetermined specifications to ensure consistent product quality.

Warnings and Precautions

- Norgen's *Giardia intestinalis* End-Point RT-PCR Kit is intended for research purposes only. It is not intended for diagnostic use.
- Follow universal precautions. All specimens should be considered as potentially infectious and handled accordingly.
- Ensure that a suitable lab coat, disposable gloves and protective goggles are worn when handling specimens and kit reagents.
- Use sterile pipette tips with filters. Use proper pipetting techniques and maintain the same pipetting pattern throughout the procedure to ensure optimal and reproducible values.
- As contamination of specimens or reagents can produce erroneous results, it is essential to use aseptic techniques. Pipette and handle reagents carefully to avoid mixing of the samples.
- Do not use supplies and equipment across the dedicated areas of i) specimen extraction, ii) reaction set-up and iii) amplification/detection. No cross-movement should be allowed between the different areas. Personal protective equipment, such as laboratory coats and disposable gloves, should be area specific.
- Store and extract positive material (specimens, controls and amplicons) separately from all other reagents and add it to the reaction mix in a spatially separated facility.

- Dispose of unused kit reagents and specimens according to local, provincial or federal regulations.
- Do not substitute or mix reagents from different kit lots or from other manufacturers. Do not use components of the kit that have been stored for more than 1 year.
- The presence of RT-PCR inhibitors may cause false negative or invalid results.
- Potential mutations within the target regions of the *Giardia intestinalis* genome covered by the primers in this kit may result in failure to detect the presence of the pathogen.
- Good laboratory practice is essential for the proper performance of this kit. Ensure that the purity of the kit and reactions is maintained at all times, and closely monitor all reagents for contamination. Do not use any reagents that appear to be contaminated.
- Ensure that appropriate specimen collection, transport, storage and processing techniques are followed for optimal performance of this test.

Instructions for Use

A. Sample Preparation

Purified RNA is the starting material for Norgen's *Giardia intestinalis* End-Point RT-PCR Kit. The quality of the RNA template will have a major impact on the performance of the *Giardia intestinalis* detection test. The user must ensure that the method used for RNA purification is compatible with end-point RT-PCR. We recommend the use of Norgen's **Water RNA/DNA Purification Kit - 0.45 µm and 0.22 µm (Cat. 26450, 26400).** Norgen's Water RNA/DNA Purification Kit - 0.45 µm and 0.22 µm has been fully validated with Norgen's *Giardia intestinalis* End-Point RT-PCR Kit.

If using a different spin column based sample preparation procedure that includes ethanol-based wash buffers is used, a column drying step consisting of centrifugation for 3 minutes at 20,000 x g (~14,000 RPM), using a new collection tube, is highly recommended prior to the elution of the RNA. This will help to prevent the carry-over of any ethanol into the purified RNA, as ethanol is known to be a strong inhibitor of PCR. **Ensure that any traces of ethanol from the sample preparation steps are eliminated prior to the elution of the RNA.**

B. RT-PCR Assay Preparation

Notes:

- Before use, suitable amounts of all PCR components should be completely thawed at room temperature, mixed by gentle vortexing or by pipetting, and centrifuged briefly.
- Work quickly on ice.
- The amount of MDx 2X RT-PCR Master Mix provided is enough for up to 34 RT-PCR reactions (24 sample PCR, 4 positive control PCR and 4 no template control PCR).
- For every RT-PCR run, one reaction containing *Giardia intestinalis* Positive Control and one reaction as no template control must be included for proper interpretation of results.
- The recommended minimum number of RNA samples tested per RT-PCR run is 6.
- To avoid any contamination while preparing the RT-PCR assay, follow the order outlined in Tables 1, 2 and 3 below to prepare the Negative Control, Detection Assay and Positive Control:
    1. Prepare the RT-PCR Negative Control (Table 1)
    2. Prepare the RT-PCR *Giardia intestinalis* Assay (Table 2)
    3. Prepare the RT-PCR Positive Control (Table 3)

- To further avoid contamination, add the components to the PCR tubes in the order shown in the tables below (ie: 1) Nuclease-free water; 2) Master Mix; 3) Primer Mix; and 4) the Sample RNA or Positive Control).

1. For each RT-PCR set, prepare **one** no template control PCR as shown in Table 1 below:

Table 1. RT-PCR Negative Control Preparation

RT-PCR Components	Volume Per PCR Reaction
Nuclease-Free Water	8 µL
MDx 2X RT-PCR Master Mix	10 µL
Giardia intestinalis Primer Mix	2 µL
Total Volume	20 µL

2. Prepare the RT-PCR reaction for sample detection as shown in Table 2 below. The recommended amount of sample RNA to be used is 2.5 µL. However, a volume between 1 and 5 µL of sample RNA may be used as template. Adjust the final volume of the RT-PCR reaction to 20 µL using the Nuclease-Free Water provided.

Table 2. RT-PCR *Giardia intestinalis* Assay Preparation

RT-PCR Components	Volume Per PCR Reaction
Nuclease-Free Water	5.5 µL
MDx 2X RT-PCR Master Mix	10 µL
Giardia Primer Mix	2 µL
Sample RNA	2.5 µL
Total Volume	20 µL

3. For each RT-PCR set, prepare **one** positive control RT-PCR as shown in Table 3 below:

Table 3. RT-PCR Positive Control Preparation

RT-PCR Components	Volume Per PCR Reaction
MDx 2X RT-PCR Master Mix	10 µL
Giardia Primer Mix	2 µL
Giardia Positive Control (PosC)	8 µL
Total Volume	20 µL

C. *Giardia intestinalis* RT-PCR Assay Programming

1. Program the thermocylcer according to the program shown in Table 4 below.
2. Run one step RT-PCR.

Table 4*. Giardia intestinalis* Assay Program

One Step RT-PCR Cycle	Step	Temperature	Duration
Cycle 1	**Step 1**	**50°C**	**30 min**
Cycle 2	**Step 1**	**95°C**	**3 min**
Cycle 3 (40x)	**Step 1**	**94°C**	**15 sec**
	Step 2	**60°C**	**30 sec**
	Step 3	**72°C**	**45 sec**
Cycle 4	**Step 1**	**72°C**	**5 min**
Cycle 5	**Step 1**	**4°C**	**∞**

D. *Giardia intestinalis* RT-PCR Assay Interpretation

- For the analysis of the RT-PCR data, the entire 20 µL RT-PCR reaction should be loaded on a 1X TAE 1.4 % Agarose DNA gel along with 10 µL of Norgen's DNA Ladder (provided).
- The RT-PCR products should be resolved on the 1X TAE, 1.4 % Agarose gel at 150V for 30 minutes (Gel running time will vary depending on an electrophoresis apparatus).

Table 5. Interpretation of Assay Results

Input Type	Target amplification		Interpretation
	***G. intestinalis* Target Band (238 bp)**	**PCR control Band (150 bp)**	
Positive Control	Yes	Yes	Valid
Positive Control	Yes	No	Valid
Negative Control	No	Yes	Valid
Sample	Yes	Yes	Positive
Sample	No	Yes	Negative
Sample	No	No	PCR inhibition
Sample	Yes	No	Positive

For results obtained that are not covered in Table 5 above, please refer to the Frequently Asked Questions.

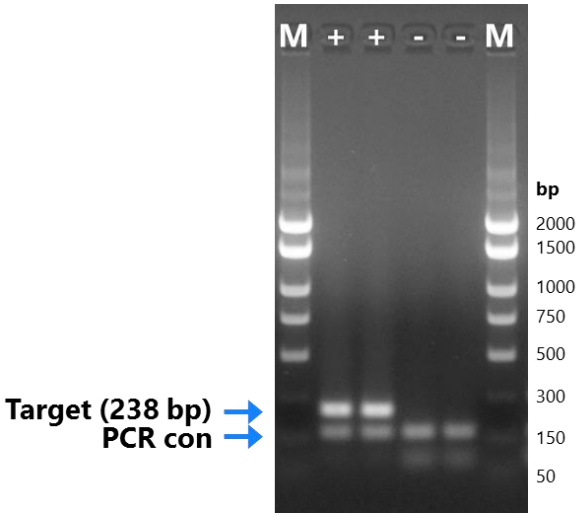

Figure 1: A representative 1X TAE, 1.4 % agarose gel showing the amplification of *G. intestinalis* at different concentrations. The size of the *Giardia intestinalis* target amplicon corresponds to the 238 bp band represented by the provided DNA Marker (M).

E. *Giardia intestinalis* RT-PCR Assay Specificity

The specificity of Norgen's *Giardia intestinalis* End-Point RT-PCR Kit is first and foremost ensured by the selection of the *G.intestinalis*-specific primers, as well as the selection of stringent reaction conditions. The *G. intestinalis* primers were checked for possible homologies to all water related pathogens in GenBank published sequences by sequence comparison analysis.

Frequently Asked Questions

1. How many samples should be included per RT-PCR run?

- Norgen's *Giardia intestinalis* End-Point RT-PCR Kit is designed to test 24 samples. For every 6 samples, a non-template control (Nuclease Free Water) and a Positive Control must be included. It is preferable to collect and test 6 samples at a time.

2. How should it be interpreted if in negative control the *G. intestinalis* RT-PCR control and the *Giardia intestinalis* target showed amplification in a sample?

- The assay has to be repeated. It could happen when there are carryover contamination.

3. How should it be interpreted if only the *Giardia intestinalis* target was amplified in a sample?

- The sample tested should be considered as *Giardia intestinalis* positive. At high *G. intestinalis* input, the *G.intestinalis* amplicon will be predominant and thus the *G.intestinalis* PCR control may not amplify as they compete for PCR resources.

Related Products	Product #
Giardia intestinalis Primers and Control Set	EP43810
Water RNA/DNA Purification Kit (0.22 µm)	26400
Water RNA/DNA Purification Kit (0.45 µm)	26450

Technical Support

Contact our Technical Support Team between the hours of 8:30 and 5:30 (Eastern Standard Time) at (905) 227-8848 or Toll Free at 1-866-667-4362.

Technical support can also be obtained from our website (www.norgenbiotek.com) or through email at techsupport@norgenbiotek.com.

Product Use Restriction

Norgen's *Giardia intestinalis* End-Point RT-PCR Kit is designed for the detection of *G. intestinalis* specific RNA based on the use of end-point RT-PCR technology. This kit is designed for research use only and not for use in diagnostic procedures.

Norgen's *Giardia intestinalis* End-Point RT-PCR Kit is intended for use by professional users such as technicians and biologists experienced and trained in molecular biological techniques including PCR.

Good laboratory practice is essential for the proper performance of this kit. Ensure that the purity of the kit and reactions is maintained at all times, and closely monitor all reagents for contamination. Do not use any reagents that appear to be contaminated.

Ensure that appropriate specimen collection, transport, storage and processing techniques are followed for optimal performance of this test.

The presence of PCR inhibitors may cause false negative or invalid results.

Potential mutations within the target regions of the *G. intestinalis* genome covered by the primers in this kit may result in failure to detect the presence of the pathogen.

The respective user is liable for any and all damages resulting from application of Norgen's *Giardia intestinalis* End-Point RT-PCR Kit for use deviating from the intended use as specified in the user manual.

All products sold by Norgen Biotek are subjected to extensive quality control procedures and are warranted to perform as described when used correctly. Any problems should be reported immediately. The kit contents are for laboratory use only, and they must be stored in the laboratory and must not be used for purposes other than intended. The kit contents are unfit for consumption.

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