

ParoReal Kit *Echinococcus multilocularis*

Manual



For veterinary use only

REF	DVEP00111, DVEP00113		100
REF	DVEP00151, DVEP00153		50



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1. Product description

ParoReal Kit *Echinococcus multilocularis* is a real-time PCR assay for detection of *E. multilocularis* DNA. This test was developed and validated for the ABI PRISM® 7500 (Fast) instrument (Thermo Fisher Scientific), LightCycler® 480 (Roche) and Mx3005P® (Agilent) but is also suitable for other real-time PCR instruments. This test allows the rapid and sensitive detection of DNA of *E. multilocularis* from samples purified from biopsies (e.g. with the QIAamp DNA Mini Kit) or from feces (e.g. with the QIAamp DNA Stool Mini Kit).

DNA extraction: We recommend to include a freeze-and-thaw step before digestion with proteinase: Freeze reaction tube in liquid nitrogen, at -80°C, or in an alcohol dry ice bath (liquid nitrogen is more effective), then incubate for 90 seconds at 95°-100°. Repeat these steps three times. Finally incubate for 10 minutes at 95°-100° and chill on ice before continuing with the extraction protocol.

Important: Intestine and fecal samples should be stored at -80°C for at least seven days to reduce the risk of laboratory infection by inactivating any *Echinococcus* oncospheres and other infective materials.

ParoReal Kit *Echinococcus multilocularis* detects the mitochondrial ND1 gene of *E. multilocularis*. A probe-specific amplification-curve at 530 nm (FAM channel) indicates the amplification of *E. multilocularis* specific DNA. An internal positive control system for detection in VIC/HEX channel, (554 nm, order no. DVEP00111 or DVEP00151) or Cy5 channel (667 nm; order no. DVEP00113 or DVEP00153) excludes false-negative interpretation of results due to inhibition of real-time PCR (see 8. Interpretation of PCR-data).

When using PCR-platforms not validated by ingenetix, an evaluation of the multiplex-PCR is recommended. Please be aware that some PCR-platforms have to be calibrated with the corresponding dye before performing multiplex-PCR.

BactoReal®, MycoReal, ParoReal and ViroReal® Kits are optimized to run under the same thermal cycling conditions. RNA and DNA material can be analysed in one run.

2. Pathogen information

Echinococcus multilocularis is a cyclophyllid tapeworm causing echinococcosis, a disease that affects many canid species including wolves, coyotes, foxes, jackals and domesticated dogs. Humans can also contract this disease. *Echinococcus multilocularis* requires two types of hosts to mature properly. It is transmitted to intermediate hosts via the ingestion of eggs in infected food. The eggs travel to the lungs, liver, and other internal organs where they develop into multilocular cysts. Finally, *Echinococcus multilocularis* is transmitted to definitive hosts by means of eating infected, cyst-containing organs. There it becomes attached to the tissues and grows.

References:

Stieger C., Hegglin D., Schwarzenbach G., Mathis A., and Deplazes P. 2002. Spatial and temporal aspects of urban transmission of *Echinococcus multilocularis*. *Parasitology*, 124:631–640.

3. Principle of real-time PCR

A specific DNA sequence of the pathogen genome is amplified and the generated PCR-product is detected by an oligonucleotide-probe labelled with a fluorescent dye. This technology allows for a sequence-specific detection of PCR amplicates.

4. General Precautions

- Always include a negative control per PCR-run (water instead of sample).
- Optional: for valid interpretation of results, a negative control should be included during DNA-extraction (for example extraction of water instead of sample material), in order to exclude false-positive results due to contamination with *E. multilocularis* DNA during extraction.
- Be careful when handling the positive control.
- 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 workspace.
- Periodically decontaminate benches and devices.
- Use sterile pipette tips with filters.
- Thaw all components thoroughly at room temperature before starting an assay. When thawed, mix the components and centrifuge briefly.
- For MSDS, see www.ingenetix.com.

5. Contents of the Kit

5.1. ParoReal Kit *Echinococcus multilocularis* order no. DVEP00111 or DVEP00151

Labelling	Content	Amount		Storage
		DVEP00111	DVEP00151	
<i>Echinococcus multilocularis</i> Assay Mix (green cap)	Primer and probe (FAM) for detection of <i>E. multilocularis</i>	2 x 50 µl	1 x 50 µl	-20°C
CR-1 Assay Mix (yellow cap)	Primer, probe (VIC/HEX) and target for detection of IPC	2 x 50 µl	1 x 50 µl	-20°C
<i>Echinococcus multilocularis</i> Positive Control (red cap)	Control-DNA (approx. 10,000 target copies/µl)	1 x 25 µl	1 x 25 µl	-20°C
DNA Reaction Mix (white cap) [#]	Reaction Mix	2 x 500 µl	1 x 500 µl	-20°C until first use, then at +4°C
Water (blue cap)	Water	1 x 1000 µl	1 x 1000 µl	-20°C to +4°C

[#]DNA Reaction Mix contains uracil-N glycosylase (UNG)

5.2. ParoReal Kit *Echinococcus multilocularis* order no. DVEP00113 or DVEP00153

Labelling	Content	Amount		Storage
		DVEP00113	DVEP00153	
<i>Echinococcus multilocularis</i> Assay Mix (green cap)	Primer and probe (FAM) for detection of <i>E. multilocularis</i>	2 x 50 µl	1 x 50 µl	-20°C
CR-3 Assay Mix (yellow cap)	Primer, probe (Cy5) and target for detection of IPC	2 x 50 µl	1 x 50 µl	-20°C
<i>Echinococcus multilocularis</i> Positive Control (red cap)	Control-DNA (approx. 10,000 target copies/µl)	1 x 25 µl	1 x 25 µl	-20°C
DNA Reaction Mix (white cap) [#]	Reaction Mix	2 x 500 µl	1 x 500 µl	-20°C until first use, then at +4°C
Water (blue cap)	Water	1 x 1000 µl	1 x 1000 µl	-20°C to +4°C

[#]DNA Reaction Mix contains uracil-N glycosylase (UNG)

The components of ParoReal Kit *Echinococcus multilocularis* are stable until the expiry date stated on the label. Repeated thawing and freezing should be avoided. Please protect kit components from light.

6. Additionally required materials and devices

- Reagents and devices for DNA-extraction
- PCR-grade water
- Disposable powder-free gloves
- Pipettes (adjustable)
- Sterile pipette tips with filters
- Vortex mixer
- Desktop centrifuge with rotor for 2 ml reaction tubes
- Real-time PCR instrument which is able to detect and differentiate fluorescence in FAM and VIC/HEX or Cy5 channel
- Appropriate 96 well reaction plates or reaction tubes with corresponding (optical) closing material

7. Preparation of real-time PCR

Please make sure that at least one negative control (water, blue cap), as well as one positive control (red cap) and one extraction negative control (optional, recommended) are included per PCR run.

Ingenetix highly recommends performing PCR analyses in duplicates, which increases the probability of detection of the pathogen and facilitates interpretation of results.

7.1. Pipetting scheme

		Per sample
Preparation of Master Mix (mix well)	Water*	3.0 µl
	DNA Reaction Mix (2x)	10.0 µl
	<i>Echinococcus multilocularis</i> Assay Mix	1.0 µl
	CR Assay Mix	1.0 µl
	Total volume Master Mix	15.0 µl
Preparation of PCR	Master Mix	15.0 µl
	Sample*	5.0 µl
	Total volume	20.0 µl

*1-8 µl of the sample can be used. When using an amount other than 5 µl of the sample, the amount of H₂O has to be changed accordingly.

Positive Control: As positive control use 1 µl of the *Echinococcus multilocularis* Positive Control + 4 µl H₂O. Optional: a 1:10 dilution of the positive control can be used and defined as second standard value (approx. 1000 target copies/µl).

7.2. Programming of the temperature profile

Please find further information on programming the real-time PCR instrument in the respective operator's manual. Please be aware that some PCR-platforms have to be calibrated with the corresponding dye before performing multiplex-PCR.

Select dyes: FAM-TAMRA for detection of *Echinococcus multilocularis*
Cy5-NONE (CR-3 Assay Mix) or VIC-TAMRA (CR-1 Assay Mix) for detection of IPC

Select reference dye (passive reference): ROX

Sample Volume: 20 µl

Temperature Profile:

Program 1	Program 2	Program 3
Cycles: 1 Analysis: None	Cycles: 1 Analysis: None	Cycles: 45 Analysis: Quantification Acquisition at 60°
50°C 2 min*	95°C 20 sec	95°C 5 sec 60°C 1 min

For ABI PRISM® 7500:
Ramp speed: Without "fast cycling" parameter

For LightCycler® 480 instrument:
Detection format: 2 Color Hydrolysis Probe
(dyes see above)

***Note:** If viral RNA should be also detected in the same PCR run, program 1 has to be prolonged to 15 min at 50°C. This temperature profile can be used for all BactoReal®, MycoReal®, ParoReal®, and ViroReal® kits for the detection of DNA or RNA.

8. Interpretation of PCR-data

Examples for interpretation of positive reactions are shown in the amplification plots below.

For a valid interpretation, the following criteria must be fulfilled:

	Ct/Cp (FAM channel) <i>E. multilocularis</i> target	Ct/Cp IPC target	Interpretation
Negative control	Negative	36.0 ± 2	Valid
Positive control (undiluted, 1 µl/PCR)	28.0-31.0	36.0 ± 2	Valid
Or: positive control (1:10 diluted, 1 µl/PCR)	31.0-34.0	36.0 ± 2	Valid
Extraction negative control (optional)	Negative	36.0 ± 2	Valid
Negative sample	Negative	36.0 ± 2	Valid
Positive sample	Positive	Positive/Negative	Valid

For analysis of PCR data please proceed as follows:

For analysis of PCR results gained with ParoReal Kit *Echinococcus multilocularis* please select fluorescence display options FAM channel for the *Echinococcus multilocularis* target and VIC/HEX channel (order no. DVEP00111, DVEP00151) or Cy5 channel (order no. DVEP00113, DVEP00153) for the internal positive control target. Samples with a positive Cp or Ct-value are considered positive. Please also check the presence of amplification-curves manually.

8.1. Signal in FAM channel:

→ DNA of *E. multilocularis* was amplified. The sample has to be interpreted as positive.

Echinococcus multilocularis DNA can lead to a reduced or absent fluorescence signal of the internal positive control assay (competition of PCR).

8.2. No signal in FAM channel but signal of the internal positive control:

→ No *E. multilocularis* DNA is detectable in the sample. The sample has to be interpreted as negative.

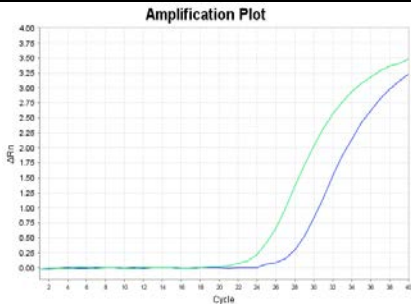
The positive signal of the internal positive control assay excludes a putative PCR inhibition.

8.3. No signals in FAM channel and no signal with internal positive control:

→ No interpretation statement can be made.

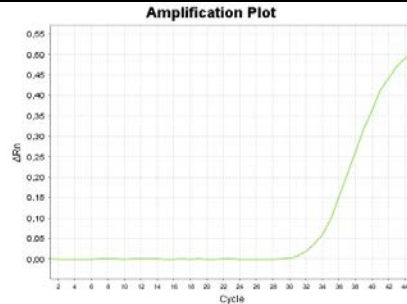
Information about possible sources of error and their solution can be found in 9. Troubleshooting.

Detection of *Echinococcus multilocularis*



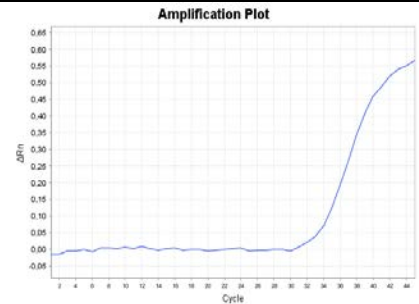
ABI Prism® 7500: FAM channel, 530 nm
1:10 serial dilution of *E. multilocularis* DNA

Detection of internal positive control CR-3

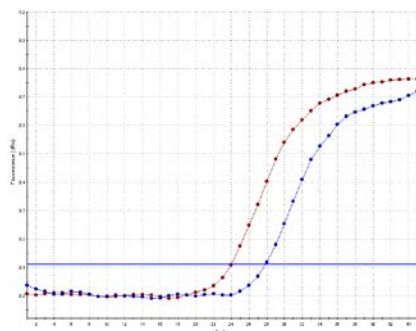


ABI Prism® 7500: Cy5 channel, 667 nm
Internal positive control

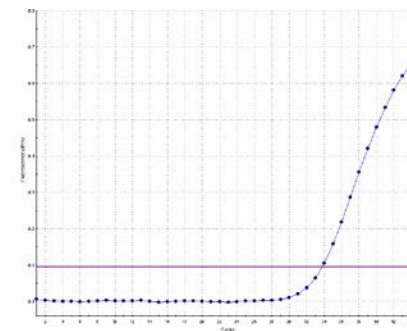
Detection of internal positive control CR-1



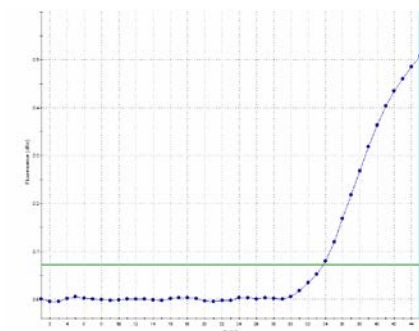
ABI Prism® 7500: VIC channel, 554 nm
Internal positive control



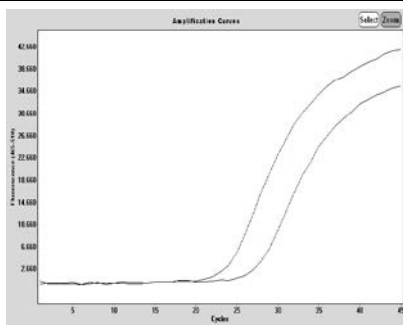
Mx3005P®: FAM channel
1:10 serial dilution of *E. multilocularis* DNA



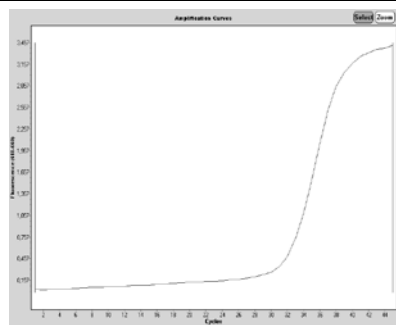
Mx3005P®: CY5 channel
Internal positive control



Mx3005P®: HEX channel
Internal positive control



LightCycler® 480: FAM channel
1:10 serial dilution of *E. multilocularis* DNA



LightCycler® 480: Cy5 channel
Internal positive control

9. Troubleshooting

9.1. No *E. multilocularis* specific signal with positive control:

- Incorrect programming of the temperature profile of the real-time PCR instrument.
→ Compare the temperature profile with the protocol (see 7. Preparation of real-time PCR).
- Incorrect configuration of the PCR reaction.
→ Check your work steps (see 7. Preparation of real-time PCR) and repeat the PCR, if necessary.

9.2. No signal with IPC and no *E. multilocularis* specific signal with sample:

- The PCR reaction was inhibited. No interpretation can be made.
→ Make sure that you use a recommended method for DNA isolation and stick closely to the manufacturer's instructions.
→ If no operating mistakes during extractions can be retraced, it is recommended to repeat the PCR with lower amounts of DNA-eluate (1/5 or 1/10 of sample volume + the adequate amount of H₂O).
- Incorrect PCR conditions.
→ Check the PCR conditions and repeat the PCR, if necessary.

9.3. *Echinococcus multilocularis* specific signal with negative control:

- A contamination occurred during preparation of the PCR.
→ Repeat the PCR with new reagents in replicates.
→ Strictly pipette the positive controls at last.
→ Make sure that work space and instruments are decontaminated at regular intervals.

9.4. *Echinococcus multilocularis* specific signal with negative control of DNA-extraction:

- A contamination occurred during extraction.
→ Repeat the extraction and PCR using new reagents.
→ Make sure that work space and instruments are decontaminated at regular intervals.

10. Specifications

ParoReal Kit *Echinococcus multilocularis* was evaluated with the ABI PRISM® 7500 (Fast) instrument (Thermo Fisher Scientific), with the LightCycler® 480 (Roche) and the Mx3005P® (Agilent). For further validation data please contact ingenetix.

10.1. Analytical sensitivity

The analytical sensitivity is 5 target copies per PCR.

10.2. Analytical specificity

The specificity is ensured by the selection of highly specific primers and probes. The primers and probes were checked for possible homologies to currently published sequences by sequence comparison analyses. This also validated the detection of so far known *E. multilocularis* strains.

11. Annex – symbols



Batch code



Catalogue number



Contains sufficient for <n> tests



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