

Not for use in the USA

Calprotectin FLUOROENZYMEIMMUNOASSAY FOR CALPROTECTIN DETERMINATION FOR IN VITRO DIAGNOSTIC USE

DIRECTIONS FOR USE

CONTENTS

EliA uses a modular reagent system. All information needed to understand the use of the EliA tests can be found in the analyte specific DfU and the corresponding EliA Control DfU.

INTENDED USE

EliA Calprotectin is intended for the in vitro quantitative measurement of calprotectin in human stool as an aid in the clinical diagnosis of inflammatory bowel diseases (IBD). EliA Calprotectin is to be used together with the EliA Calprotectin method on the instrument Phadia 100.

SUMMARY AND EXPLANATION OF THE TEST

Calprotectin is a calcium- and zinc-binding protein which is predominantly present in the cytoplasm of cells involved in pathogen defense, such as neutrophil granulocytes, monocytes and macrophages.^{1,2} In neutrophil granulocytes it accounts for as much as 60% of the cytosolic protein. In intestinal inflammation neutrophil granulocytes migrate through the intestinal wall into the intestinal lumen, which leads to an elevated calprotectin level in the stool.³ The level of faecal calprotectin correlates directly with the number of neutrophil granulocytes in the intestinal lumen and is thus specifically elevated in inflammatory bowel diseases (IBD), such as Crohn's disease and ulcerative colitis, and to a much smaller extent in other entities such as neoplasia and polyps. Faecal calprotectin measurement is an easy, non-invasive first line test which clearly differentiates IBD from IBS (irritable bowel syndrome) and other functional disorders. It has been shown to be the most sensitive and most specific test for this discrimination, clearly outperforming blood tests such as CRP or ESR.⁴ Faecal calprotectin correlates with disease activity and is able to predict relapses in IBD.⁵ This makes faecal calprotectin useful for both diagnosis and monitoring of IBD patients.

PRINCIPLES OF THE PROCEDURE

The EliA Calprotectin Wells are coated with monoclonal antibodies to calprotectin. If present in the patient's specimen, calprotectin binds to the coated antibodies. After washing away non-bound components, enzyme-labeled antibodies against human calprotectin (EliA Calprotectin Conjugate) are added to form a calprotectin-conjugate complex. After incubation, non-bound conjugate is washed away and the bound complex is incubated with a Development Solution. After stopping the reaction, the fluorescence in the reaction mixture is measured. The higher the response value, the more calprotectin is present in the specimen. To evaluate test results, the response for patient samples is compared directly to the response for calibrators.

REAGENTS / MATERIAL

The EliA reagents are available as modular packages, each purchased separately. All packages except for the EliA Calprotectin Positive Control 100, the EliA Calprotectin Negative Control 100 and the EliA Stool Extraction Kit are required to carry out an EliA Calprotectin Test.

The EliA Calprotectin Wells are packed in carriers which are stored in sealed aluminium foil bags containing a desiccant.

EliA Calprotectin Test-Specific Reagents

EliA Calprotectin Well (Art. No. 14-5610-01)

Calprotectin Well; short name: cn	coated with monoclonal antibodies to calprotectin	4 carriers (12 wells each); sufficient for 48 determinations	ready for use; store dry at 2-8 °C until expiration date
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EliA Calprotectin Positive Control 100 (Art. No 83-1066-01)

Human calprotectin in PBS containing BSA, detergent and sodium azide (0.095 %); symbol: pos	Control containing human calprotectin	6 single-use vials (0.3 ml each); sufficient for 2 determinations per vial	Ready for use; store at 2-8 °C until expiration date
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EliA Calprotectin Positive Control 100 is prepared from human blood.

EliA Calprotectin Negative Control 100 (Art. No 83-1067-01)

Human calprotectin in PBS containing BSA, detergent and sodium azide (0.095 %); symbol: neg	Control containing human calprotectin	6 single-use vials (0.3 ml each); sufficient for 2 determinations per vial	Ready for use; store at 2-8 °C until expiration date
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EliA Calprotectin Negative Control 100 is prepared from human blood.

EliA Method-Specific Reagents (Phadia 100)

EliA Calprotectin Extraction Buffer (83-1068-01)

Calprotectin Extraction Buffer (orange colored); Tris-buffer containing sodium azide (0.05 %)	6 bottles (117 ml each); sufficient for 6 x 23 extractions	ready for use, shake before using; store at 2-8 °C until expiration date
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EliA Sample Diluent (Art. No 83-1003-01)

Sample Diluent (yellow colored); PBS containing BSA, detergent and sodium azide (0.095 %)	6 vials (9 ml each); sufficient for 6 x 30 dilutions	ready for use; store at 2-8 °C until expiration date
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EliA Calprotectin Conjugate (Art. No 83-1061-01)

Calprotectin Conjugate (blue colored); β-Galactosidase anti-calprotectin (mouse monoclonal antibodies) in PBS containing BSA and sodium azide (0.06 %); symbol: EI-C	6 vials (4.8 ml each); sufficient for 6 x 48 determinations	ready for use; store at 2-8 °C until expiration date DO NOT FREEZE
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EliA Calprotectin Conjugate (Art. No 83-1060-01)

Calprotectin Conjugate (blue colored); β-Galactosidase anti-calprotectin (mouse monoclonal antibodies) in PBS containing BSA and sodium azide (0.06 %); symbol: EI-C	2 vials (4.8 ml each); sufficient for 2 x 48 determinations	ready for use; store at 2-8 °C until expiration date DO NOT FREEZE
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EliA Calprotectin Calibrators (Art. No 83-1058-01)

Human calprotectin (0, 3, 10, 20, 200, 750 ng/ml); in PBS containing BSA, detergent and sodium azide (0.095 %) symbol: Cal-0, Cal-3, Cal-10, Cal-20, Cal-200, Cal-750	6 single-use vials (0.3 ml each); sufficient for one calibration curve	ready for use; store at 2-8 °C until expiration date
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Manufactured from human blood.

EliA Calprotectin Curve Control (Art. No 83-1059-01)

Human calprotectin (20 ng/ml); in PBS containing BSA, detergent and sodium azide (0.095 %) symbol: CC-1	6 single-use vials (0.3 ml each); sufficient for 6 runs	ready for use; store at 2-8 °C until expiration date
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Manufactured from human blood.

EliA Calprotectin Calibrator Well (Art. No 14-5618-01)

Calprotectin Calibrator Well coated with mouse monoclonal antibodies; short name: Ccal	4 carriers (12 wells each); sufficient for 48 determinations	ready for use; store dry at 2-8 °C until expiration date
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EliA Dummy Well (Art. No 14-5510-01)

Dummy Well required by the Phadia 100 System for empty run positions	4 carriers (12 wells each); sufficient for 48 positions	ready for use; store dry at 2-8 °C until expiration date
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EliA Stool Extraction Kit (Art. No 14-5638-01)

Stool extraction tubes pre-filled with 750 µl of EliA Calprotectin Extraction Buffer	50 tubes; sufficient for 50 stool sample extractions	ready for use; store at 2-8 °C until expiration date
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Phadia 100 General Reagents

Development Solution (Art. No. 10-9478-01)

Development Solution 0.01 % 4-Methylumbelliferyl-β-D-galactoside, <0.0010 % preservative**	6 vials (6 ml each); reagents for 6 x 48 determinations	ready for use; store at 2-8 °C until expiration date. DO NOT FREEZE
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Stop Solution (Art. No. 10-9479-01)

Stop Solution 4 % Sodium Carbonate	6 bottles (65 ml each); *reagents for 6 x 240 determinations	ready for use; store at 2-8 °C until expiration date
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* Due to different ImmunoCAP and EliA assay processes, a high residual volume is to be expected.

** Preservative: mixture of 5-chloro-2-methyl-2H-isothiazol-3-one [EC no. 247-500-7] and 2-methyl-2H-isothiazol-3-one [EC no. 220-239-6] (3:1).

Washing Solution (Art. No. 10-9422-01/10-9202-01)

For information see separate Washing Solution package insert.

The expiration date for each of the complete packages is stated on the outer label. However, each component is stable until the date stated on the respective vial label.

Material not provided: purified water, graduated cylinder

WARNINGS AND PRECAUTIONS

- For in vitro diagnostic use.
- Do not use reagents beyond their expiration dates.
- We do not recommend to pool reagents.

- Some of the reagents are manufactured from human blood components. The source materials have been tested by immunoassay for hepatitis B surface antigen, for antibodies to HIV1, HIV2 and hepatitis C virus and found negative. Nevertheless, all recommended precautions for the handling of blood derivatives should be observed. Please refer to Human Health Service (HHS) Publication No. (CDC) 93-8395 or local and national guidelines on laboratory safety procedures.

WARNING! Reagents contain sodium azide (NaN₃) as a preservative. NaN₃ may be toxic if ingested or absorbed by skin or eyes. NaN₃ may react with lead and copper plumbing to form highly explosive metal azides. On disposal, flush with a large volume of water to prevent azide build-up. Please refer to decontamination procedures as outlined by CDC or other local and national guidelines.

Waste Bottle and ImmunoCAP/EliA Well Waste Container may be contaminated by potentially infectious material. Use appropriate safety measures and wear gloves.

Indication of Instability

Phadia 100 Instrument Software has built-in acceptance limits for the calibration curve and the curve control. EliA Wells are moisture sensitive. An activity loss that might occur due to inappropriate handling can be detected using the appropriate EliA Control. For more information see Phadia 100 User's Guide/Reference Manual.

INSTRUMENT

The Phadia 100 Instrument processes all steps of the test and prints results automatically after the test is completed. For further information regarding test set-up, instrumentation and software etc. see Phadia 100 User's Guide/Reference Manual.

SPECIMEN COLLECTION, HANDLING AND PREPARATION

The procedure can be performed with human stool specimens. Avoid repeated freezing and thawing. Samples should be stored in aliquots at -20 °C (-4 °F) or below for repeated measurements.

The stool samples can be extracted by two different methods:

A) Stool extraction using the EliA Stool Extraction Kit (order no. 14-5638-01, 50 tubes). The extraction tubes are pre-filled with 750 µl of EliA Calprotectin Extraction Buffer.

Extraction procedure:

1. Unscrew the tube's cap by turning the upper, light blue part of cap to the left and pull out the light blue rod.
2. Insert the light blue rod into the stool sample. Be sure that the four notches at the lower part of the rod are completely covered with stool.
3. Insert the rod back into the tube carefully. Excess material will be stripped off, and a defined amount of stool sample will remain in the notches.
4. Lock the tube firmly by turning the light blue part of the cap to the right.
5. Homogenize the stool sample completely using a vortex mixer. Afterwards incubate for 10 minutes. Make sure that no stool sample stays in the notches. In case of very solid stool samples it may help to soak the sample in the tube for 10 min before dissolving it.
6. Unscrew the complete cap by turning the lower, dark blue part of the cap to the left. Discard complete cap and rod.
7. Transfer the homogenate to an Eppendorf tube and centrifuge for 5 minutes at 3000 x g.
8. Transfer the supernatant to a fresh tube.

The supernatant is the raw sample used for testing. If the EliA Calprotectin test cannot be performed immediately after sample extraction, the extract should be frozen at $\leq -20^{\circ}\text{C}$. The extract can be stored at $\leq -20^{\circ}\text{C}$ for max. 3 months. Storage in the fridge is not recommended, not even overnight, as this will lead to decreased calprotectin concentrations.

B) Stool extraction using conventional stool extraction devices which are not pre-filled with extraction buffer. We recommend the "Faecal sample preparation kit" by Roche Diagnostics for stool extraction. This kit is available through Thermo Fisher Scientific (order no. 14-5619-01, 50 tubes).

Extraction procedure:

1. Weigh the empty extraction device.
2. Transfer approximately 100 mg of homogeneous stool sample to the extraction device.
3. Weigh the transferred amount of stool.
4. Add 50 times the stool weight of EliA Calprotectin Extraction Buffer (e.g. 100 mg stool sample + 5ml buffer).
5. Lock the tube firmly.
6. Homogenize the sample completely using a vortex mixer. Afterwards incubate for 10 minutes.
7. Transfer 1-2ml of the homogenate to an Eppendorf tube and centrifuge for 5 minutes at 3000 x g.
8. Transfer the supernatant to a fresh tube.

The supernatant is the raw sample used for testing. If the EliA Calprotectin test cannot be performed immediately after sample extraction, the extract should be frozen at $\leq -20^{\circ}\text{C}$. The extract can be stored at $\leq -20^{\circ}\text{C}$ for max. 3 months. Storage in the fridge is not recommended, not even overnight, as this will lead to decreased calprotectin concentrations.

Sample Dilution

Samples must be diluted with EliA Sample Diluent. A 1:100 dilution of the samples is required for the EliA Calprotectin Test. Samples can be diluted manually, but instrument dilution is recommended and is a default setting in Phadia 100 Instrument Software.

PROCEDURE

Handling of EliA Calprotectin Well

Prior to opening the foil bag, equilibrate to room temperature. For stability reasons the carriers have to be put back in the desiccant-containing foil bag directly after dispensing the wells. Because it is important to store the wells in dry conditions at 2-8 °C, the bag must be properly resealed. Shelf-life after first opening: 9 months, if not limited by expiry date stated on the carrier and foil bag.

Lot-specific code of EliA Calprotectin Well

Make sure to enter the lot-specific code of the EliA Calprotectin Well. This code is stated on the carrier and foil bag as **Code**, and it is encoded within the barcode of the foil bag. Preferably use a barcode reader.

Lot-specific code of EliA Calprotectin Calibrator Well

Make sure to enter the lot-specific code of the EliA Calprotectin Calibrator Well. This code is stated on the carrier and foil bag as **Code**, and it is encoded within the barcode of the foil bag. Preferably use a barcode reader.

Lot specific code of EliA Calprotectin Conjugate

Make sure to enter the lot-specific Calibration Code of the Calprotectin Conjugate given on the box and the vial as **CalCode**, and encoded within the barcode of the Calprotectin Conjugate. Preferably use a barcode reader to enter the Calibration Code.

Volumes per determination

Reagent volumes per determination

Calibrator	90 μl
EliA Calprotectin Conjugate	90 μl
Development Solution	90 μl
Stop Solution	200 μl

Sample volumes per determination

Manual dilution:	90 μl of diluted sample
Instrument dilution (1:100):	22 μl of non diluted sample

For tube-specific dead volumes see Phadia 100 User's Guide/Reference Manual.

Reagent volumes per run

Washing Solution	1 l*
Rinse Solution	1 l*

* The residual volume depends on the number of samples and dilution method used.

Procedural comments

- From one sample diluted by the instrument (1:100), up to 11 determinations can be made.
- When using software default, samples are run in single determination.
- Washing Solution must be at room temperature when used.
- Total time is 2.5 hours for one test run processing 48 wells.
- Incubations are automatically performed at 37 °C (98.6 °F).

CALIBRATION AND REFERENCE MATERIAL

The calibration curve is obtained with EliA Calprotectin Calibrators which are run in duplicate. The curve is stored and subsequent tests are evaluated against the stored curve using only the EliA Calprotectin Curve Control (run in duplicate).

A new calibration curve must be run when:

- the last calibration was made more than one month ago or
- a new lot of EliA Calprotectin Conjugate is introduced or
- when the EliA Calprotectin Curve Control is outside the specified limits (defined in Phadia 100 Instrument Software).

There are no international standards for calprotectin. Results are given in mg/kg.

QUALITY CONTROL

Record Keeping

It is good laboratory practice to record the lot numbers of the components used, the dates when they were first opened and remaining volumes.

Control Specimens

Good laboratory practice requires that quality control specimens should be included in every run. Any material used should be assayed repeatedly to establish mean values and acceptance ranges. EliA Controls are available from Phadia for the quality control of the measurements.

CALCULATION AND INTERPRETATION OF RESULTS

Presentation of Results

Phadia 100 measures calprotectin concentrations in ng/ml. By using a conversion factor given by the lot-specific code of the EliA Calprotectin Well, the results are automatically converted to mg/kg.

Interpretation of Test Results

The ranges (negative, positive) recommended for the evaluation of the results are given in the table below.

Test	Unit	negative	positive
EliA Calprotectin	mg/kg	≤ 50	> 50

Good laboratory practice requires that each laboratory establishes its own range of expected values.

LIMITATIONS

A definitive clinical diagnosis should not be based on the results of a single diagnostic method, but should only be made by the physician after all clinical and laboratory findings have been evaluated.

EXPECTED VALUES

Calprotectin is positive in a certain percentage of the normal population, strongly depending on age. While 11 % of children have been reported to be positive⁶, it is 25 % of subjects between 50 and 70 years of age⁷. Expected values may vary depending on the population tested.

Results Obtained for Healthy Subjects

The frequency distribution for calprotectin was investigated in a group of apparently healthy subjects equally distributed by age and gender, using stool samples from a Caucasian population. The results are given in the table below.

Test	Unit	No. of samples	Mean value	95%-percentile	99%-percentile
EliA Calprotectin	mg/kg	85	<15.0	27.3	43.6

PERFORMANCE CHARACTERISTICS

Measuring Range

The measuring range (detection limit, upper limit) for EliA Calprotectin is from 15.0 to ≥ 3000 mg/kg. No hook effects could be observed for concentrations up to 6 fold above the measuring ranges.

Only values above the Detection Limit can be regarded as valid results. The upper limit of the reported results can vary due to a lot-specific conversion from ng/ml to mg/kg. Results above the upper limit are reported as “above”.

Specificity

The EliA Calprotectin Test permits the determination of human calprotectin as described in section “Reagents”.

Precision

To determine the precision of the assay, the variability was assessed in studies with 21 runs by examining the samples in 84 replicates over 7 days in 3 instruments with a calibration curve in each run. The statistical evaluation was performed by Analysis of Variance. The results are given in the table below.

Test	Sample	Unit	Mean value	Coefficients of variation (%)	
				Intra-Run	Inter-Run
EliA Calprotectin	1	mg/kg	71.3	4.2	6.6
	2	mg/kg	197.9	2.8	6.5
	3	mg/kg	568.2	3.2	7.3

WARRANTY

The performance data presented here was obtained using the procedure indicated. Any change or modification in the procedure not recommended by Phadia AB may affect the results, in which event Phadia AB disclaims all warranties expressed, implied or statutory, including the implied warranty of merchantability and fitness for use.

Phadia AB and its authorized distributors, in such event, shall not be liable for damages, indirect or consequential.

REFERENCES

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 LOT	Batch code		Contains x determinations
	Biological Risk		Read Directions for Use
	Store at 2-8°C/35-46°F		Manufactured by
	Expiration date		Do not reuse in a second run
 IVD	For <i>in vitro</i> diagnostic use		

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