Human FHR-4

HK3006

Edition 10-25

ELISA KIT
PRODUCT INFORMATION & MANUAL

Read carefully prior to starting procedures!
For use in laboratory research only
Not for clinical or diagnostic use



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Please note that the user protocol provided is not specific to any particular lot and represents the general specifications for this product. We advise consulting the vial label and the Certificate of Analysis for information regarding specific lots. Additionally, be informed that shipping conditions for this product may differ from its recommended storage conditions.

This product is intended solely for research purposes and is not approved for human or animal use, or for diagnostic procedures. Users must adhere to all applicable local, state, and federal regulations when utilizing this product. Hycult Biotech disclaims any liability for patent infringements that may arise from the use or adaptation of this product.

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1. INTENDED USE

The human FHR-4 ELISA kit is to be used for the *in vitro* quantitative determination of FHR-4 in serum and plasma samples. This kit is intended for laboratory research use only and is not for use in diagnostic or therapeutic procedures.

The analysis should be performed by trained laboratory professionals.

2. INTRODUCTION

Human full-length Complement Factor H-related protein 4 (FHR-4) is a glycoprotein that is part of the complement regulatory protein family. It is synthesized and secreted primarily by the liver, as well as immune cells such as monocytes, macrophages, and dendritic cells. Unique among the FHR proteins, FHR-4 has two splice variants: FHR-4A, a longer protein with an approximate molecular weight of 86 kDa composed of 9 short consensus repeats (SCR) domains, and FHR-4B, a shorter protein of around 42 kDa with 5 SCR domains. The ELISA recognizes both variants, FHR-4A and FHR-4B.

Structurally, FHR-4 shares homology with Complement Factor H (CFH), a key regulator within the complement system. FHR-4 operates within the complement regulatory network, particularly affecting the alternative pathway (AP) of the complement system. It binds C3b, thereby participating in the regulation of AP activation. FHR-4 also plays a role in the opsonization of necrotic cells, facilitating the binding and recruitment of CRP.

Elevated systemic levels of FHR-4 have been strongly associated with age-related macular degeneration (AMD). However, studies have also reported inconclusive or contradictory results regarding the involvement of FHR-4 in AMD. This ambiguity highlights the need for further research to clarify FHR-4's role in AMD and potentially other diseases. FHR-4's unique structural properties and its diverse biological functions emphasize its significance in the complement system and its potential as a target for therapeutic interventions.

FHR-4 can be measured with our HK3006 assay, designed to precisely quantify this intriguing glycoprotein.

3. KIT FEATURES

- Working time of 1¼ hours.
- Minimum concentration which can be measured is 0.16 ng/ml.
- Measurable concentration range of 0.16 to 10 ng/ml.
- Working volume of 100 µl/well.

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Cross-reactivity

Potential cross-reacting proteins detected in the Human FHR-4 ELISA:

Cross reactant	Reactivity
FH (native)	Negative
FHR-1 (recombinant)	Negative
FHR-2 (recombinant)	Negative
FHR-3 (recombinant)	Negative
FHR-4A (recombinant)	Positive
FHR-4B (recombinant)	Positive
FHR-5 (recombinant)	Negative

Table 1

Potential cross-reactive species detected in the Human FHR-4 ELISA:

Cross reactant	Reactivity
Monkey (non-human primate)	Positive
Rat	Negative
Mouse	Negative
Pig	Negative

Table 2

Cross-reactivity for other species or proteins/peptides has not been tested.

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4. PROTOCOL OVERVIEW

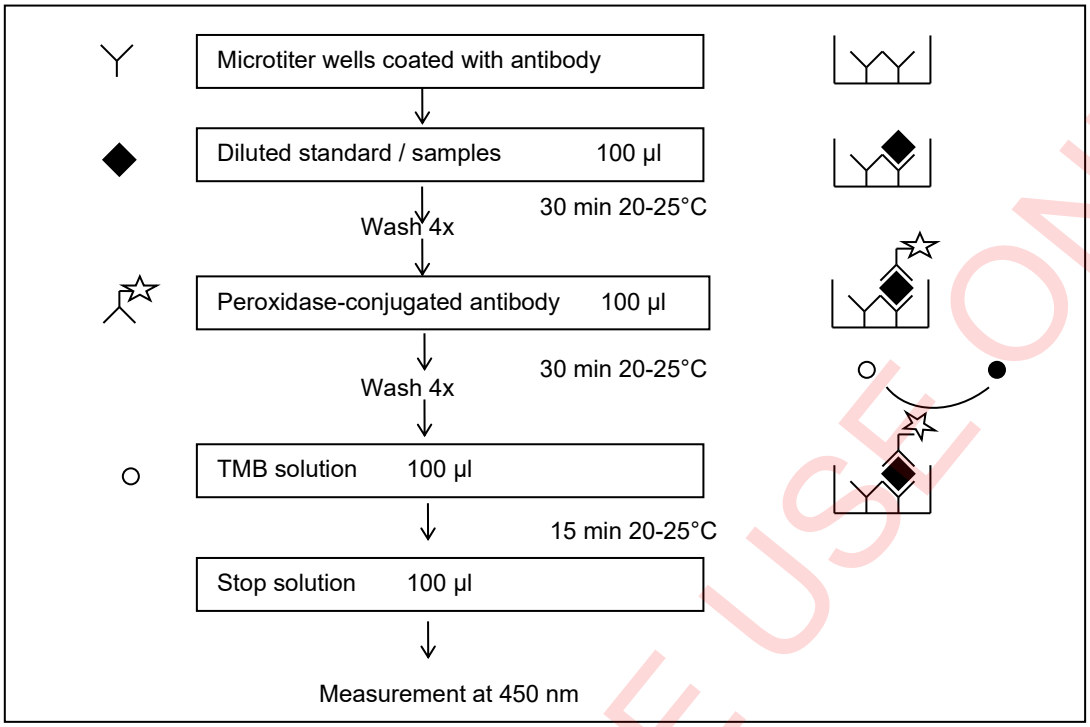


Figure 1

- The human FHR-4 ELISA is a ready-to-use solid-phase enzyme-linked immunosorbent assay based on the sandwich principle with a working time of 1 hour and 15 minutes.
- The efficient format of a plate with twelve disposable 8-well strips allows free choice of batch size for the assay.
- Samples and standards are incubated in microtiter wells coated with antibodies recognizing human FHR-4.
- Peroxidase-conjugated antibody will bind to the captured FHR-4.
- Peroxidase-conjugate will react with the substrate, tetramethylbenzidine (TMB).
- The enzyme reaction is stopped by the addition of oxalic acid.
- The absorbance at 450 nm is measured with a spectrophotometer. A standard curve is obtained by plotting the absorbance (linear) versus the corresponding concentrations of the human FHR-4 standards (log).
- The human FHR-4 concentration of samples, which are run concurrently with the standards, can be determined from the standard curve.

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5. KIT COMPONENTS AND STORAGE INSTRUCTIONS

Kit component	Cat.#	Quantity HK3006-01	Quantity HK3006-02	Color code
Wash buffer 20x	WB21	1 vial (60 ml)	1 vial (60 ml)	Colorless
Dilution buffer 5x	DB78	1 vial (60 ml)	1 vial (60 ml)	Green
Standard		2 vials, lyophilized	4 vials, lyophilized	White
Peroxidase-conjugated antibody		1 vials, 1 ml lyophilized	2 vials, 1 ml lyophilized	Blue
TMB substrate	TMB050/TMB100	1 vial (11 ml)	1 vial (22 ml)	Brown
Stop solution	STOP110	1 vial (22 ml)	1 vial (22 ml)	Red
12 Microtiter strips, pre-coated		1 plate	2 plates	
Certificate of Analysis		1	1	
Manual		1	1	
Data collection sheet		1	2	

Table 3

- Upon receipt, store individual components at 2 - 8°C. Do not freeze.
- Do not use components beyond the expiration date printed on the kit label.
- The standard and detection antibody in lyophilized form is stable until the expiration date indicated on the kit label, if stored at 2 - 8°C.
- The exact amount of the standard is indicated on the label of the vial and the Certificate of Analysis.
- The standard is single use. After reconstitution the standard cannot be stored.
- Upon receipt, foil pouch around the plate should be vacuum-sealed and unpunctured. Any irregularities to aforementioned conditions may influence plate performance in the assay.
- Return unused strips immediately to the foil pouch containing the desiccant pack and reseal along the entire edge of the zip-seal. Quality guaranteed for one month if stored at 2 - 8°C.

Materials required but not provided

- Calibrated micropipettes and disposable tips.
- Distilled or de-ionized water.
- Plate washer: automatic or manual.
- Polypropylene tubes.
- Calibrated ELISA plate reader capable of measuring absorbance at 450 nm.
- Centrifuge for 1 ml tubes.

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6. WARNINGS AND PRECAUTIONS

- This product is intended for research purposes only and not for use in diagnostic or therapeutic procedures.
- Only qualified personnel trained in laboratory procedures should handle this kit.
- Under no circumstances should sodium azide be added to any component as a preservative.
- Refrain from using kit components beyond their expiration date.
- To ensure accuracy, do not interchange reagents from different kits or lots. Each kit and lot is calibrated as a complete unit; use only the reagents supplied by the manufacturer.
- The assay is specifically optimized for the stated standard range. Alterations to the standard range are not recommended.
- Exercise caution when opening vials as they are under vacuum.
- Avoid ingestion of any kit components.
- The kit reagents include 2-chloroacetamide, a preservative known for its harmful effects upon skin contact and toxicity if ingested. In the event of an accident or discomfort, immediate medical consultation is advised.
- Protect the TMB substrate from intense light exposure; it should remain colourless until utilized.
- The stop solution contains 2% oxalic acid, a substance that can irritate or burn the respiratory system, skin, and eyes. Avoid any direct contact, and in case of exposure, rinse thoroughly with water and seek medical attention.
- Deviations from the specified incubation times, temperatures, or pipetting volumes may result in inaccurate results.
- Once dispensed, avoid reusing microwells or returning reagents to their original bottles.
- Treat all biological samples as potentially hazardous or infectious and handle them under conditions that minimize the risk of disease transmission.
- Be aware that samples that are hemolyzed, hyperlipemic, heat-treated, or contaminated may yield inaccurate results.
- Utilize polypropylene tubes for the preparation of standards and samples, avoiding the use of polystyrene tubes or sample plates.
- The standard is derived from human sources and has been tested for various viruses with negative results. However, as no testing method can guarantee the complete absence of infectious agents, treat this reagent with the same precautions as you would any potentially infectious human serum or blood specimen. Follow established guidelines for preventing the transmission of blood-borne infections when handling materials in contact with this reagent.

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7. SAMPLE PREPARATION

The recommended sample medium is EDTA plasma. All samples should be kept on ice whilst performing the assay.

Collection and handling

Serum and Plasma

Collect blood using normal aseptic techniques. Blood samples should be kept on ice. If serum is used, separate serum from blood after clotting at room temperature within one hour by centrifugation (1,500xg at 4°C for 15 min). Transfer the serum to a fresh polypropylene tube.

If plasma is used, separate plasma from blood within 20 minutes after blood sampling by centrifugation (1,500xg at 4°C for 15 min). Transfer the plasma to a fresh polypropylene tube.

Most reliable results are obtained if EDTA plasma is used.

Storage

Store samples below -20°C, preferably at -70°C in polypropylene tubes. Storage at -20°C can affect recovery of FHR-4. Preferably use samples within 1-2 hours after thawing. Avoid multiple freeze-thaw cycles which may cause loss of FHR-4 activity and give erroneous results. Do not use hemolyzed, hyperlipemic, heat-treated or contaminated samples. Before performing the assay, samples should be mixed gently. Prepare all samples (controls and test samples) to starting the assay procedure. Avoid foaming.

Dilution procedures

Serum or plasma samples

Due to expected high levels of FHR-4 it is advised to apply a 400 – 3200x dilution range for accurate measurement of serum or plasma samples with supplied dilution buffer in polypropylene tubes. This recommended dilution applies to healthy samples, the optimal dilution for diseased samples should be tested. Optimal dilution is dependent on sample quality and expected FHR-4 quantity and should be determined for the specific sample set/study.

Comment regarding recommended sample dilution

The mentioned dilution for samples is a minimum dilution and should be used as a guideline. The recovery of FHR-4 from an undiluted sample is not 100% and may vary from sample to sample. When testing less diluted samples it is advisable to run recovery experiments to determine the influence of the matrix on the detection of FHR-4.

Do not use polystyrene tubes or sample plates for preparation or dilution of the samples.

Guideline for dilution of samples

Please see table 3 for recommended sample dilutions. Volumes are based on a total volume of at least 230 µl of diluted sample, which is sufficient for one sample in duplicate in the ELISA. For dilution of samples we recommend to use at least 10 µl of sample.

	Dilution	Pre-dilution	Amount of sample or pre-dilution required	Amount of dilution buffer required
1.	100x	Not necessary	10 µl (sample)	990 µl
2.	400x	Recommended: 100x (see nr.1)	75 µl (pre-dilution)	225 µl
3.	800x	Recommended: 100x (see nr.1)	50 µl (pre-dilution)	350 µl
4.	1200x	Recommended: 100x (see nr.1)	50 µl (pre-dilution)	550 µl
5.	1600x	Recommended: 100x (see nr.1)	25 µl (pre-dilution)	375 µl
6.	2000x	Recommended: 100x (see nr.1)	25 µl (pre-dilution)	475 µl
7.	2500x	Recommended: 100x (see nr.1)	10 µl (pre-dilution)	240 µl
8.	3200x	Recommended: 100x (see nr.1)	10 µl (pre-dilution)	310 µl

Table 4

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8. REAGENT PREPARATION

Allow all the reagents to equilibrate to room temperature (20 – 25°C) prior to use. Return to proper storage conditions immediately after use.

Wash buffer

Prepare wash buffer by mixing 60 ml of 20x wash buffer with 1140 ml of distilled or de-ionized water, which is sufficient for 2 x 96 tests. In case less volume is required, prepare the desired volume of wash buffer by diluting 1 part of the 20x wash buffer with 19 parts of distilled or de-ionized water.

Dilution buffer

Prepare dilution buffer by mixing 60 ml of the 5x dilution buffer with 240 ml of distilled or de-ionized water, which is sufficient for 2 x 96 tests. In case less volume is required, prepare the desired volume of dilution buffer by diluting 1 part of the 5x dilution buffer with 4 parts of distilled or de-ionized water. Concentrated dilution buffer may contain crystals. In case the crystals do not disappear at room temperature within one hour, concentrated dilution buffer can be warmed up to 37°C. Do not shake the solution.

Standard solution

The standard is reconstituted by pipetting the amount of dilution buffer mentioned on the CoA in the standard vial. Use the standard vial as Tube 1 in Figure 2. Prepare each FHR-4 standard in polypropylene tubes by serial dilution of the reconstituted standard with dilution buffer as shown in Figure 2*. After reconstitution the standard cannot be stored for repeated use.

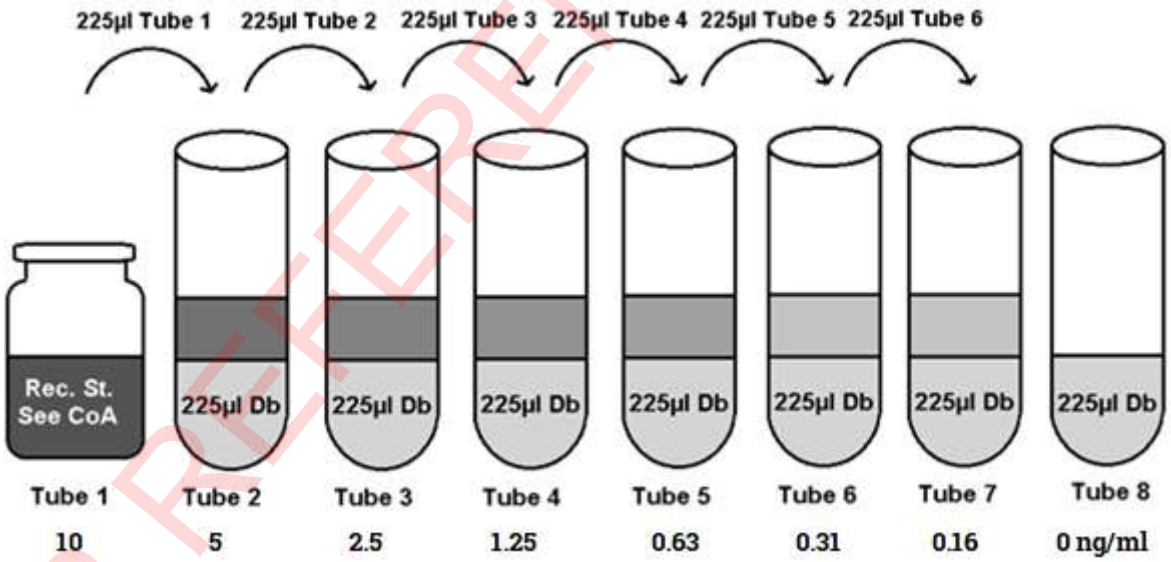


Figure 2

*) CoA: Certificate of Analysis, St: Standard, Db: Dilution buffer

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Peroxidase-conjugated antibody

The peroxidase-conjugated antibody is reconstituted by pipetting 1 ml distilled or de-ionized water. Please note that, although the conjugate may appear cloudy after reconstitution, this has no effect on the test. Dilute the reconstituted 1 ml detection antibody with 11 ml dilution buffer, which is sufficient for 1 x 96 tests. In case less volume is required, prepare the desired volume of peroxidase-conjugated antibody by diluting 1 part of the reconstituted vial with 11 parts of dilution buffer.

9. ELISA PROTOCOL

Bring all reagents to room temperature (20 - 25°C) before use.

1. Determine the number of test wells required, put the necessary microwell strips into the supplied frame, and fill out the data collection sheet. Return the unused strips to the storage bag with desiccant, seal and store at 2 - 8°C.
2. Transfer 100 µl in duplicate of standard, samples, or controls into appropriate wells. Do not touch the side or bottom of the wells.
3. Cover the tray and tap the tray to eliminate any air bubbles. Be careful not to splash liquid onto the cover.
4. Incubate the strips or plate for 30 minutes at room temperature.
5. Wash the plates 4 times with wash buffer using a plate washer or as follows*:
   a. Carefully remove the cover, avoid splashing.
   b. Empty the plate by inverting plate and shaking contents out over the sink, keep inverted and tap dry on a thick layer of tissues.
   c. Add 200 µl of wash buffer to each well, wait 20 seconds, empty the plate as described in 5b.
   d. Repeat the washing procedure 5b/5c three times.
   e. Empty the plate and gently tap on thick layer of tissues.
6. Add 100 µl of diluted peroxidase-conjugated antibody to each well using the same pipetting order as applied in step 2. Do not touch the side or bottom of the wells.
7. Cover the tray and incubate the tray for 30 minutes at room temperature.
8. Repeat the wash procedure described in step 5a-e.
9. Add 100 µl of TMB substrate to each well, using the same pipetting order as applied in step 2. Do not touch the side or bottom of the wells.
10. Cover the tray and incubate the tray for 15 minutes at room temperature. It is advised to control the reaction on the plate regularly. In case of strong development the TMB reaction can be stopped sooner. Avoid exposing the microwell strips to direct sunlight. Covering the plate with aluminum foil is recommended.
11. Stop the reaction by adding 100 µl of stop solution with the same sequence and timing as used in step 9. Mix solutions in the wells thoroughly by gently swirling the plate. Gently tap the tray to eliminate any air bubbles trapped in the wells.
12. Read the plate within 30 minutes after addition of stop solution at 450 nm using a plate reader, following the instructions provided by the instrument's manufacturer.

*) In case plate washer is used, please note: use of a plate washer can result in higher background and decrease in sensitivity. We advise validation of the plate washer with the manual procedure. Make sure the plate washer is used as specified for the manual method.

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10. INTERPRETATION OF RESULTS

- Determine the average absorbance for each group of duplicate standards, controls, and samples.
- Discrepancies exceeding 15% from the mean absorbance value suggest potential inaccuracies, necessitating sample reanalysis.
- Ensure the mean absorbance of the zero standard does not surpass 0.3.
- Utilize specialized software to construct a standard curve, plotting mean absorbance values (Y-axis) against corresponding concentrations (X-axis) on a logarithmic scale.
- For diluted samples, adjust the concentration derived from the standard curve by the dilution factor.
- Samples yielding an average absorbance higher than that of the maximum standard concentration exceed the assay's scope and must be reanalysed using a greater dilution factor.

11. TECHNICAL HINTS

- Technicians should be proficient and well-versed in ELISA assays and the specific test procedures before initiating the assay.
- For those unfamiliar with ELISA techniques, it is advisable to conduct a preliminary assay with a standard curve to ensure understanding and adherence to the protocol before proceeding with sample evaluations.
- Accurate and thorough washing is critical at all stages of the assay to prevent false positive or negative outcomes. Ensure complete removal of liquids from wells prior to adding wash buffer, adhere strictly to the specified volume for each washing cycle, and avoid allowing the wells to remain uncovered or dry for prolonged periods.
- A standard curve is essential for each assay run due to varying conditions; samples must be evaluated against a standard curve established on the same plate during that session.
- Do not interchange reagents from different kits or batches, including strips, and avoid combining remnants with contents from new vials.
- Prepare fresh dilutions of the standard, samples, biotinylated LPS, streptavidin-peroxidase, and buffers each time the kit is utilized.
- Maintain cap-to-vial correspondence; caps are designed to fit their original vials and should not be swapped.
- Prevent cross-contamination by using new pipette tips for each addition across standards, samples, and reagents, and employ separate reservoirs for each reagent to ensure integrity.
- Dispose of all waste in accordance with the established laboratory safety protocols and regulations.

Technical support

For any questions or technical support related to the ELISA, please feel free to reach out to our technical support team at support@hycultbiotech.com.

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12. QUALITY CONTROL

The Certificate of Analysis accompanying this kit is specific to its lot number, intended to verify the results achieved in your facility. Please note that the absorbance values indicated on the Certificate serve merely as reference points; deviations in outcomes produced by your laboratory are to be expected. Designed to mitigate the impact of soluble receptors, binding proteins, and extraneous variables present in biological samples, this assay aims for precise measurement free from external interferences. Nonetheless, without exhaustive testing of all possible variables, the exclusion of interference cannot be entirely assured.

To ensure the highest efficacy of this kit, implementing good laboratory practices(GLP) is crucial.

13. TROUBLESHOOTING

To ensure the highest level of customer satisfaction and to uphold the integrity of our products, we kindly request that any warranty claims or reports of deficiencies be submitted prior to the product's expiration date. Please include the lot number and relevant experimental data in your written communication, which should be directed to support@hycultbiotech.com for prompt assistance.

The recommendations provided in Table 5 serve as a structured guide for addressing unforeseen outcomes in assay results.

Low absorbance	High absorbance	Poor duplicates	All wells positive	All wells negative	Possible cause
•	•		•	•	Kit materials or reagents are contaminated or expired
•					Incorrect reagents used
•		•	•		Lyophilized reagents are not properly reconstituted
•	•	•	•	•	Incorrect dilutions or pipetting errors
•		•			Improper plastics used for preparation of standard and/or samples
•	•				Improper incubation times or temperature
		•			Especially in case of 37°C incubation: plates are not incubated uniformly
•					Assay performed before reagents had reached room temperature
•	•	•	•	•	Procedure not followed correctly
				•	Omission of a reagent or a step
		•			Poor mixing of samples
	•		•		Low purity of water
	•	•			Strips were kept dry for too long during/after washing
	•	•	•		Inefficient washing
	•	•			Cross-contamination from other samples or positive control
		•	•		TMB solution is not clear or colorless
•	•				Wrong filter in the microtiter reader
	•	•			Air bubbles
		•			Imprecise sealing of the plate after use
•					Wrong storage conditions
•					Lamp in microplate reader is not functioning optimally

Table 5

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