Human Terminal Complement Complex (TCC)

HK328

Edition 12-23

ELISA KIT
PRODUCT INFORMATION & MANUAL

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

info@hycultbiotech.com ● www.hycultbiotech.com

Note that this user protocol is not lot-specific and is representative for the current specifications of this product. Please consult the vial label and the Certificate of Analysis for information on specific lots. Also note that shipping conditions may differ from storage conditions.

For research use only. Not for use in or on humans or animals or for diagnostics. It is the responsibility of the user to comply with all local/state and federal rules in the use of this product. Hycult Biotech is not responsible for any patent infringements that might result from the use or derivation of this product.

TABLE OF CONTENTS

Page

1. Intended use 2
2. Introduction 2
3. Kit features 2
4. Protocol overview 3
5. Kit components and storage instructions 4
6. Warnings and precautions 5
7. Sample preparation 6
8. Reagent preparation 7
9. ELISA protocol 9
10. Interpretation of results 10
11. Technical hints 10
12. Quality control 11
13. Performance characteristics 11
14. Troubleshooting 12
15. References 13

1. INTENDED USE

The human terminal complement complex (TCC) ELISA kit is to be used for the in vitro quantitative determination of human TCC in plasma, urine, cerebrospinal fluid, joint fluid and cell culture supernatant 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

Harnessing the power of the complement system, the Terminal Complement Complex (TCC), also known as the Membrane Attack Complex (MAC), stands as a crucial player in our body's defense mechanism. When the classical, lectin, and alternative pathways unite, they give rise to the C5 convertase, which sets the stage for the TCC's formation. Unlike earlier stages that depend on enzymatic action, the TCC forms through a cascade of conformational shifts, beginning with C6 and culminating in the pivotal C7 binding, which fundamentally changes the complex's structure.

The TCC is characterized by unique neoantigens, distinct markers that emerge in both the cellular MAC and the fluid-phase SC5b-9 complex. These markers are absent in the individual native components, marking the TCC's presence as a sign of active complement engagement. Typically, TCC levels in human plasma are negligible, yet an increase signals an immune response, offering a window into the system's response to pathogenic threats. By monitoring TCC levels, we gain invaluable insights into immune system activity, providing a strategic advantage in both diagnostic and therapeutic realms.

3. KIT FEATURES

- Working time of 3½ hours.
- Minimum concentration which can be measured is 8.2 mAU/ml.
- Measurable concentration range of 8.2 to 2000 mAU/ml.
- Working volume of 100 µl/well.

Cross-reactivity

Cross reactant	Reactivity
Rabbit	Strong
Pig	Strong
Monkey (cynomolgus)	Strong
Mouse	Negative
Rat	Negative
Horse	Negative

Table 1

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

4. PROTOCOL OVERVIEW

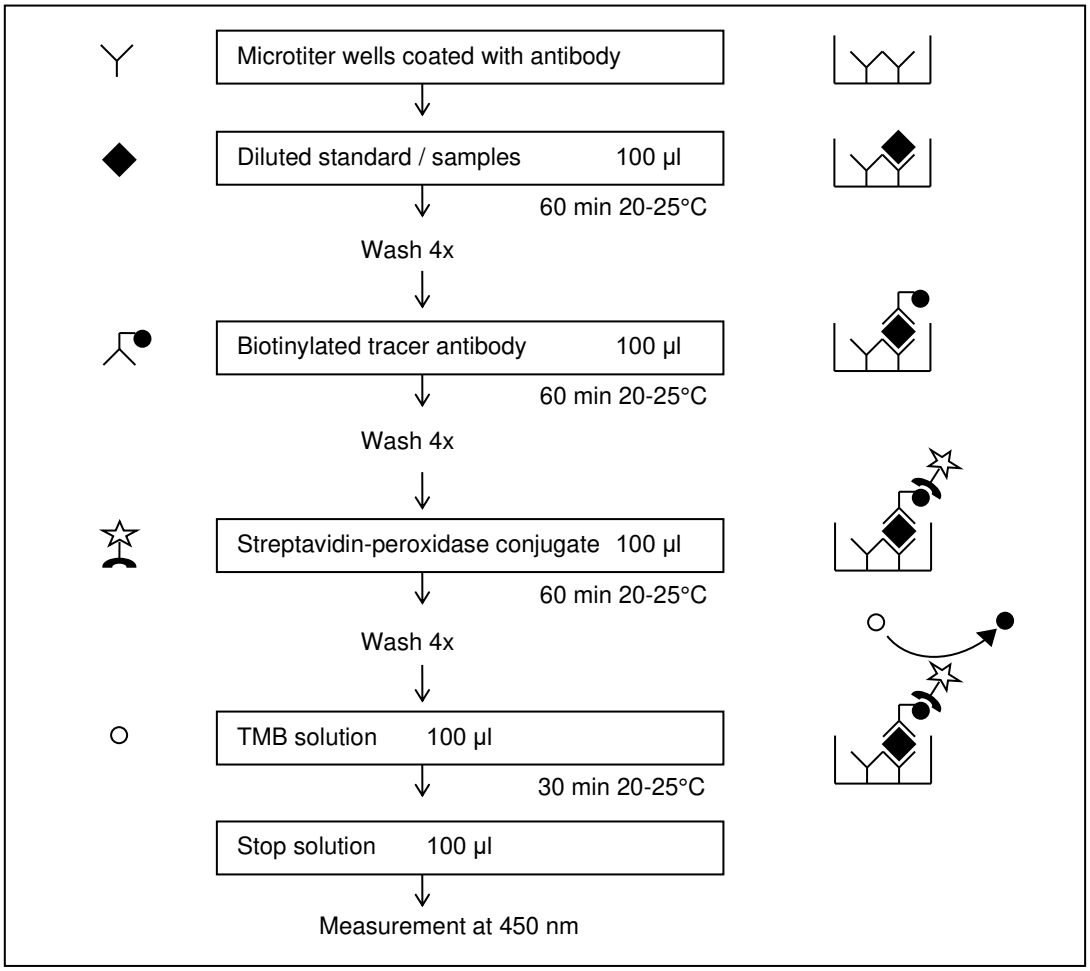

Figure 1

- The human terminal complement complex (TCC) ELISA is a ready-to-use solid-phase enzyme-linked immunosorbent assay based on the sandwich principle with a working time of 3½ hours.
- 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 TCC
- Biotinylated tracer antibody will bind to captured human TCC.
- Streptavidin-peroxidase conjugate will bind to the biotinylated tracer antibody.
- Streptavidin-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 TCC standards (log).
- The human TCC concentration of samples, which are run concurrently with the standards, can be determined from the standard curve.

5. KIT COMPONENTS AND STORAGE INSTRUCTIONS

Kit component	Cat.#	Quantity HK328-01	Quantity HK328-02	Color code
Wash/dilution buffer 20x	WBDB56	1 vial (60 ml)	1 vial (60 ml)	Colorless
Sample dilution buffer 10x	SDB54	1 vial (15 ml)	1 vial (15 ml)	Colorless
Standard		2 vials, lyophilized	4 vials, lyophilized	White
Tracer, biotinylated		1 vial, 1 ml lyophilized	2 vials, 1 ml lyophilized	White
Streptavidin-peroxidase 100x	CON03	1 tube, 0.25 ml in solution	1 tube, 0.25 ml in solution	Brown
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		2	2	

Table 2

- 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 tracer in lyophilized form and the streptavidin-peroxidase in concentrated solution are 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.
- Once reconstituted the standard is stable for 1 hour at room temperature.
- Once reconstituted the tracer is stable for one month if stored at 2 - 8°C.
- The streptavidin-peroxidase can only be stored in concentrated solution and is not stable when stored diluted.
- 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.

6. WARNINGS AND PRECAUTIONS

- For research use only, not for diagnostic or therapeutic use.
- This kit should only be used by qualified laboratory staff.
- Do not under any circumstances add sodium azide as preservative to any of the components.
- Do not use kit components beyond the expiration date.
- Do not mix reagents from different kits and lots. The reagents have been standardized as a unit for a given lot. Use only the reagents supplied by the manufacturer.
- The assay has been optimized for the indicated standard range. Do not change the standard range.
- Open vials carefully: vials are under vacuum.
- It is advised to spin down streptavidin-peroxidase tubes before use.
- Do not ingest any of the kit components.
- Kit reagents contain 2-chloroacetamide as a preservative. 2-Chloroacetamide is harmful in contact with skin and toxic if swallowed. In case of accident or if you feel unwell, seek medical advice immediately.
- The TMB substrate is light sensitive, keep away from bright light. The solution should be colorless until use.
- The stop solution contains 2% oxalic acid and can cause irritation or burns to respiratory system, skin and eyes. Direct contact with skin and eyes should be strictly avoided. If contact occurs, rinse immediately with plenty of water and seek medical advice.
- Incubation times, incubation temperature and pipetting volumes other than those specified may give erroneous results.
- Do not reuse microwells or pour reagents back into their bottles once dispensed.
- Handle all biological samples as potentially hazardous and capable of transmitting diseases.
- Hemolyzed, hyperlipemic, heat-treated or contaminated samples may give erroneous results.
- Use polypropylene tubes for preparation of standard and samples. Do not use polystyrene tubes or sample plates.
- The standard is of human origin. It has been tested for various viruses and found negative. Since no test method can offer complete assurance that infectious agents are absent, this reagent should be handled as any potentially infectious human serum or blood specimen. Handle all materials in contact with this reagent according to guide-lines for prevention of transmission of blood-borne infections.

7. SAMPLE PREPARATION

Collection and handling

Plasma

The blood sample should be collected directly into tubes containing EDTA and cooled to 4°C immediately, the plasma should be separated and stored at 4°C until frozen at - 70°C, which should occur within 8 h. Once stored safely at - 70°C, no significant activation will occur during the first three years. Most reliable results are obtained if EDTA plasma is used.

Urine

Collect urine using normal aseptic techniques. Centrifuge the urine to remove debris (1500xg at 4 °C for 15 min). Transfer urine to a fresh polypropylene tube.

Storage

Store samples below -20°C, preferably at -70°C in polypropylene tubes. Storage at -20°C can affect recovery of human TCC. Use samples within 24 hours after thawing. Avoid multiple freeze-thaw cycles which may cause loss of human TCC activity and give erroneous results.

Do not use hemolyzed, hyperlipemic, heat-treated or contaminated samples.

Dilution procedures

Before performing the assay, samples should be brought to 4°C and mixed gently. Prepare all samples (controls and test samples) prior to starting the assay procedure. Avoid foaming.

Plasma samples

Human TCC can be measured accurately if plasma samples are diluted at least 10x with supplied sample dilution buffer in polypropylene tubes.

Note that most reliable results are obtained with EDTA plasma.

Remark regarding recommended sample dilution

The mentioned dilution for samples is a minimum dilution and should be used as a guideline. The recovery of human TCC 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 human TCC.

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.	10x	Not necessary	25 µl (sample)	225 µl
2.	20x	Not necessary	15 µl (sample)	285 µl
3.	50x	Not necessary	10 µl (sample)	490 µl
4.	100x	Not necessary	10 µl (sample)	990 µl
5.	500x	Recommended: 10x (see nr.1)	10 µl (pre-dilution)	490 µl
6.	1000x	Recommended: 10x (see nr.1)	10 µl (pre-dilution)	990 µl
7.	2000x	Recommended: 20x (see nr.2)	10 µl (pre-dilution)	990 µl
8.	5000x	Recommended: 50x (see nr.3)	10 µl (pre-dilution)	990 µl

Table 3

8. REAGENT PREPARATION

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

Wash/dilution buffer

Prepare wash/dilution buffer by mixing 60 ml of 20x wash/dilution buffer with 1140 ml of distilled or de-ionized water, which is sufficient for 2 x 96 tests. Where less volume is required, prepare the desired volume of wash/dilution buffer by diluting 1 part of the 20x wash/dilution buffer with 19 parts of distilled or de-ionized water. Concentrated wash/dilution buffer may contain crystals. In case the crystals do not disappear at room temperature within 1 hour, concentrated wash/dilution buffer can be warmed up to 37°C. Do not shake the solution.

Sample dilution buffer

Prepare sample dilution buffer by mixing 15 ml of the 10x sample dilution buffer with 135 ml of wash/dilution buffer, which is sufficient for 2 x 96 tests. Where less volume is required, prepare the desired volume of sample dilution buffer by diluting 1 part of the 10x sample dilution buffer with 9 parts of wash/dilution buffer.

Standard solution

The standard is reconstituted by pipetting the amount of sample dilution buffer mentioned on the CoA in the standard vial. Use the standard vial as Tube 1 in Figure *2***Fout! Verwijzingsbron niet gevonden.**. Prepare each TCC standard in polypropylene tubes by serial dilution of the reconstituted standard with sample dilution buffer as shown in Figure *2**. After reconstitution the standard is stable for 1 hour at room temperature and cannot be stored for repeated use.

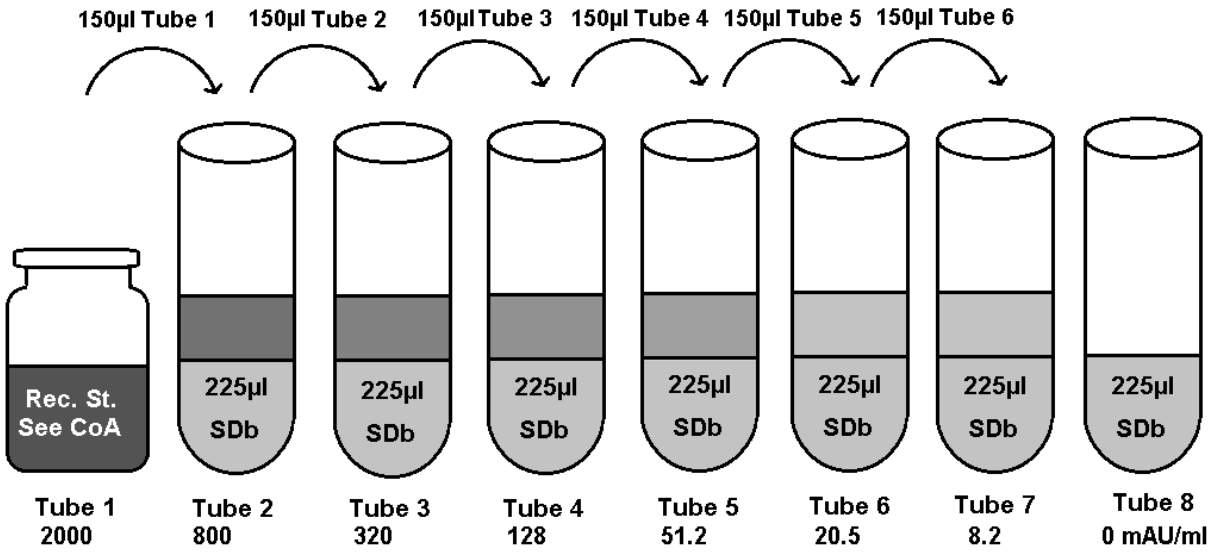

Figure 2

*) CoA: Certificate of Analysis, Rec. St.: Reconstituted standard, SDb: Sample dilution buffer

Tracer solution

The tracer is reconstituted by pipetting of 1 ml distilled or de-ionized water. Dilute the reconstituted 1 ml tracer with 11 ml wash/dilution buffer, which is sufficient for 1 x 96 tests. Where less volume is required, prepare the desired volume of tracer by diluting 1 part of the reconstituted tracer with 11 parts of wash/dilution buffer.

Streptavidin-peroxidase solution

It is advised to spin down streptavidin-peroxidase tubes before use. Prepare the streptavidin-peroxidase solution by mixing 0.25 ml of the 100x streptavidin-peroxidase solution with 24.75 ml wash/dilution buffer, which is sufficient for 2 x 96 tests. In case less volume is required, prepare the desired volume of streptavidin-peroxidase solution by diluting 1 part of the 100x streptavidin-peroxidase solution with 99 parts of wash/dilution buffer.

9. ELISA PROTOCOL

Bring all reagents to room temperature (20 - 25°C) before use. Samples should be thawed on ice and mixed gently. After adding the sample dilution buffer, samples can be brought to room temperature.

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 1 hour 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 tracer 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 1 hour at room temperature.
8. Repeat the wash procedure described in step 5a-e.
9. Add 100 µl of diluted streptavidin-peroxidase 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 1 hour at room temperature.
11. Repeat the wash procedure described in step 5a-e.
12. 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.
13. Cover the tray and incubate the tray for 30 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.
14. Stop the reaction by adding 100 µl of stop solution with the same sequence and timing as used in step 12. Mix solutions in the wells thoroughly by gently swirling the plate. Gently tap the tray to eliminate any air bubbles trapped in the wells.
15. 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.

10. INTERPRETATION OF RESULTS

- Calculate the mean absorbance for each set of duplicate standards, control and samples.
- If individual absorbance values differ by more than 15% from the corresponding mean value, the result is considered suspect and the sample should be retested.
- The mean absorbance of the zero standard should be less than 0.3.
- Create a standard curve using computer software capable of generating a good curve fit. The mean absorbance for each standard concentration is plotted on the vertical (Y) axis versus the corresponding concentration on the horizontal (X) axis (logarithmic scale).
- If samples have been diluted, the concentration read from the standard curve must be multiplied by the dilution factor.
- If the mean absorbance of samples exceeds that of the highest standard concentration, they fall outside the assay's range. Such samples ought to be reanalysed using a greater dilution factor.

11. TECHNICAL HINTS

- User should be trained and familiar with ELISA assays and test procedure.
- If you are not familiar with the ELISA technique it is recommended to perform a pilot assay prior to evaluation of your samples. Perform the assay with a standard curve only following the instructions.
- Improper or insufficient washing at any stage of the procedure will result in either false positive or false negative results. Completely empty wells before dispensing wash buffer, fill with wash buffer as indicated for each cycle and do not allow wells to sit uncovered or dry for extended periods.
- Since exact conditions may vary from assay to assay, a standard curve must be established for every run. Samples should be referred to the standard curve prepared on the same plate.
- Do not mix reagents from different batches, or other reagents and strips. Remainders should not be mixed with contents of freshly opened vials.
- Each time the kit is used, fresh dilutions of standard, sample, tracer, streptavidin-peroxidase and buffers should be made.
- Caps and vials are not interchangeable. Caps should be replaced on the corresponding vials.
- To avoid cross-contaminations, change pipette tips between reagent additions of each standard, between sample additions, and between reagent additions. Also, use separate reservoirs for each reagent.
- Waste disposal should be performed according to your laboratory regulations.

Technical support

Do not hesitate to contact our technical support team at support@hycultbiotech.com for inquiries and technical support regarding the human TCC ELISA.

Hycult Biotech, Frontstraat 2a, 5405 PB Uden, the Netherlands

T: +31 (0)413 251 335, F: +31 (0)413 248 353

12. QUALITY CONTROL

The Certificate of Analysis included in this kit is lot-specific and is to be used to verify results obtained by your laboratory. The absorption values provided on the certificate of analysis are to be used as a guideline only. The results obtained by your laboratory may differ.

This assay is designed to eliminate interference by soluble receptors, binding proteins, and other factors present in biological samples. Until all factors have been tested in the immunoassay, the possibility of interference cannot be excluded.

For optimal performance of this kit, it is advised to work according to good laboratory practice.

13. PERFORMANCE CHARACTERISTICS

Precision and reproducibility

The intra-assay precision and reproducibility was determined with four plasma samples that were tested in duplicate.

Plasma sample (n=4)	TCC mAU/ml (min-max)	CV %
S1	4554 (4530-4577)	0.7
S2	3320 (3257-3382)	2.7
S3	1649311 (1637646-1660975)	1.0
S4	1121029 (1109446-1132612)	1.5

Table 4

To determine batch-to-batch variation, four different internally validated plasma samples have been applied in plates of four different batches and used as an internal control.

Plasma sample (n=4)	TCC mAu/ml (min-max)	CV %
S1	4693 (4410-5016)	7.9
S2	4091 (3751-4292)	5.7
S3	1618293 (1581228-1685696)	2.9
S4	1270044 (1223966-1307530)	3.0

Table 5

14. TROUBLESHOOTING

Warranty claims and complaints in respect of deficiencies must be logged before expiry date of the product. A written complaint containing lot number of the product and the generated data can be sent to support@hycultbiotech.com.

Suggestions summarized below in Table 6 can be used as guideline in case of unexpected 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 6

15. REFERENCES

1. Mollnes, T et al; Quantification of the terminal complement complex in human plasma by an enzyme-linked immunosorbent assay based on monoclonal antibodies against a neoantigen of the complex. Scand J Immunol 1985, *22*: 197
2. Mollnes, T et al; Monoclonal antibodies recognizing a neoantigen of poly(C9) detect the human terminal complement complex in tissue and plasma. Scand J Immunol 1985, *22*: 183
3. Fiane, M et al; Mechanism of complement activation and its role in the inflammatory response after thoracoabdominal aortic aneurysm repair. Circulation 2003, *108*: 849
4. Savage, D et al; Complement abnormalities in acquired lipodystrophy revisited. J Clin Endocrinol Metab 2009, *94*: 10
5. Granslo, H et al; Arginine catabolic mobile element is associated with low antibiotic resistance and low pathogenicity in Staphylococcus epidermidis from neonates. Pediatr Res 2010, *68:* 237
6. Fredheim, E et al; Staphylococcus epidermidis polysaccharide intercellular adhesin activates complement. FEMS Immunol Med Microbiol 2011, *63:* 269
7. Lundahl, J et al; IL-8 from local subcutaneous wounds regulates CD11b activation. Basic Immunology 2011
8. Stahl, A et al; Complement activation on platelet-leukocyte complexes and microparticles in enterohemorrhagic Escherichia coli–induced hemolytic uremic syndrome. Blood 2011, *117*
9. Lee, B; Examining inflammatory mechanisms and potential cytoprotective therapeutics in animal models of Shiga toxin induced kidney injury. Boston University 2014
10. Ingram, G et al; Systemic complement profiling in multiple sclerosis as a biomarker of disease state. Mult Scler 2016, *18:* 1401