

# Human Hepatitis E Virus IgM (HEV-IgM) ELISA

## Cat No: K12-9614

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**Principle:**

This is enzyme-linked immunosorbent assay (ELISA) to detect the level of Human HEV-IgM in samples. Addition of controls or sample to Microtitre well which is pre-coated with HEV IgM Anti-human monoclonal antibody, if HEV-IgM present, it will bind to the HEV IgM monoclonal anti-human antibody coated on plate during incubation. After washing addition of HRP conjugate to form immune complex. Unbound HRP conjugate will get removed by washing step after incubation. Then addition of Substrate A and B, develops blue color during incubation period and reaction will get stop after addition of stop solution with development of yellow color. The concentration of the Human HEV-IgM of sample is directly proportional to the yellow color developed in well and will be positively correlated.

**Intended Use:**

The Kit is used to assay the level of Human Hepatitis E Virus IgM in human serum and plasma samples. The Kit is For Laboratory / Research Use Only.

**Materials provided in the kit:**

1. Anti-Human Hepatitis E Virus IgM Coated Microtitre Plate (96 wells) – 1 no
2. Positive Control – 1 ml
3. Negative Control – 1 ml
4. HRP Conjugate– 11 ml
5. Sample diluent– 11 ml
6. (40X) Wash Buffer – 20 ml
7. TMB Substrate A– 7 ml
8. TMB Substrate B – 7 ml
9. Stop Solution – 6 ml
10. Instruction Manual

**Materials to be provided by the End-User:**

1. Microplate Reader able to measure absorbance at 450 nm.
2. Adjustable pipettes to measure volumes ranging from 50 ul to 1000 ul.
3. Deionized (DI) water.
4. Wash bottle or automated microplate washer.
5. Graph paper or software for data analysis.
6. Tubes to prepare standard/sample dilutions.
7. Timer.
8. Absorbent paper.
9. Incubator

**Storage Information:**

1. All reagents should be stored at 2°C to 8°C.
2. All the reagents and wash solutions are stable until the expiration date of the kit.
3. 30 minutes prior before use, bring all components to room temperature (18-25°C). Store all the components of the kit at its appropriate storage condition after use.
4. The Substrate is light-sensitive and should be protected from direct sunlight or UV sources.

**Health Hazard Warnings:**

1. Reagents that contain preservatives may be harmful if ingested, inhaled or absorbed through the skin. Refer to the MSDS online for details.
2. To reduce the likelihood of blood-borne transmission of infectious agents, handle all samples in accordance with NCCLS regulations.

**Specimen Collection and Handling:**

Specimens should be clear and non-hemolyzed. Samples should be run at a number of dilutions to ensure accurate quantitation.

1. The kit cannot test samples which contain NaN<sub>3</sub>, because NaN<sub>3</sub> inhibits HRP activity.

2. Extract as soon as possible after specimen collection as per relevant procedure. The samples should be tested as soon as possible after the extraction. Alternately the extracted samples can be kept in -20°C. Avoid repeated freeze-thaw cycles.
  3. **Serum-** Coagulate at room temperature for 10-20 minutes; centrifuge for 20-min at 2000-3000 rpm. Remove the supernatant. If precipitation appears, re-centrifuge.
  4. **Plasma-** Use EDTA or citrate plasma as an anticoagulant, mix for 10-20 minutes; centrifuge for 20-min at the 2000-3000 rpm. Remove the supernatant. If precipitation appears, re-centrifuge.
- Note:** Grossly hemolyzed samples are not suitable for use in this assay.

**Reagent Preparation (all reagents should be diluted immediately prior to use):**

1. Bring all reagents to Room Temperature prior to use.
2. To make 1X Wash Solution, add 10 ml of 40X Wash Buffer in 390 ml of DI water.

**Procedural Notes:**

1. In order to achieve good assay reproducibility and sensitivity, proper washing of the plates to remove excess un-reacted reagents is essential.
2. High Dose Hook Effect may be observed in samples with very high concentrations of Human Hepatitis E Virus IgM. High Dose Hook Effect is due to excess of antibody for very high concentrations of Human Hepatitis E Virus IgM present in the sample. High Dose Hook effect is most likely encountered from samples early in the purification process. If Hook Effect is possible, the samples to be assayed should be diluted with a compatible diluent. Thus if the Human Hepatitis E Virus IgM concentration of the undiluted sample is less than the diluted sample, this may be indicative of the Hook Effect.
3. Avoid assay of Samples containing Sodium Azide (NaN<sub>3</sub>), as it could destroy the HRP activity resulting in under-estimation of the amount of Human Hepatitis E Virus IgM.
4. It is recommended that all Controls and Samples be assayed in duplicates.
5. Maintain a repetitive timing sequence from well to well for all the steps to ensure that the incubation timings are same for each well.
6. If the Substrate has a distinct blue color prior to use it may have been contaminated and use of such substrate can lead to poor sensitivity of the assay.
7. The plates should be read within 30 minutes after adding the Stop Solution.
8. Make a work list in order to identify the location of Controls and Samples.

**Assay Procedure:**

1. Bring all reagents to room temperature prior to use. It is strongly recommended that the Positive Control be run in duplicate or triplicate.
2. Add **100 ul** of **Sample Diluent** in **test wells**.
3. Add **10 ul** of **Sample** in **test wells**. Use the pipette to mix the samples properly in each well.
4. Add **50 ul** of **Negative Control** and **Positive Control** in their respective wells. (Do not add into blank control well)
5. Shake the plate gently for 30 seconds to mix the reagents in the wells. Care should be taken to avoid any spillage.
6. Incubate at **37 °C for 30 minutes**.
7. Aspirate and wash plate 5 times with 300 µl **Wash Buffer (1x)** and blot residual buffer by firmly tapping plate upside down on an absorbent paper. Wipe off any liquid from the bottom outside of the Microtitre wells as any residue can interfere in the reading step. All the washes should be performed similarly.
8. Add **100 ul** of **HRP Conjugate** to each well. (Do not add into blank control well)
9. Incubate at **37 °C for 30 minutes**.
10. Aspirate and wash plate 5 times with 300 µl **Wash Buffer (1x)** and blot residual buffer by firmly tapping plate upside down on an absorbent paper. Wipe off any liquid from the bottom outside of the Microtitre wells as any residue can interfere in the reading step. All the washes should be performed similarly.
11. Add **50 ul** of **Substrate A and Substrate B** into all wells. (Do not add into blank control well)
12. Incubate at **37 °C for 10 minutes**.
13. Add **50 ul** of **Stop Solution** into all wells. (Do not add into blank control well)
14. Calibrate the plate reader with blank control well and read the plate using microwell plate reader at 450 nm

**Precautions:**

Do not mix reagents from different kits or lots. Reagents and/or antibodies from different manufacturers should not be used with this set.

**Performance Characteristics:**

Please note that this validation is performed in our laboratory and will not necessarily be duplicated in your laboratory. This data has been generated to enable the user to get a preview of the assay and the characteristics of the kit and is generic in nature. We recommend that the user performs at the minimum; the spike and recovery assay and the dilutional linearity assay to assure quality results. For a more comprehensive validation, the user may run the protocols as suggested by us herein below to develop the parameters for quality control to be used with the kit.

**Specificity:**

The antibodies used in the kit for capture and detection are specific for human Hepatitis E Virus IgM.

**Interpretation of Results:**

1. It is recommended that each laboratory establish their own criteria for performance of these Research Reagents.
2. In our quality control testing, we use the following criteria:

**Reference Value:**

Negative Control             $\leq 0.1$

Positive Control             $\geq 0.8$

**Note:** the negative control average OD value less than 0.05, 0.05 according to the calculation, higher than 0.05 according to the actual value calculation.

Specimen OD value  $\geq$  cutoff positive for critical value.

Specimen OD value  $<$  cutoff for negative.

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# Human Hepatitis E Virus IgM (HEV-IgM) ELISA

## ASSAY PROCEDURE

1	Bring all reagents to room temperature before use.		
2	Pipette Sample Diluent		100 ul
	Sample	10 ul	
3	Pipette Negative and Positive Control	50ul	
4	Incubate 30 minutes (37°C)		
6	Wash 1X Wash Buffer Decant, 5 x 300 ul		
7	Pipette HRP Conjugate	100 ul	100 ul
8	Incubate 30 minutes (37°C)		
9	Wash 1X Wash Buffer Decant, 5 x 300 ul		
10	Pipette Substrate (A)	50 ul	50 ul
11	Pipette Substrate (B)	50 ul	50 ul
12	Incubate in the dark 10 minutes (37°C)		
13	Pipette Stop Solution	50 ul	50 ul
14	Measure 450 within 15 mins		

**Troubleshooting:**

<b>Problem</b>	<b>Possible cause</b>	<b>Investigation/Actions</b>
High Absorbances	<ol style="list-style-type: none"> <li>1. Cross-contamination from other specimens</li> <li>2. Insufficient or inefficient washing or reading</li> <li>3. Wavelength of filter not correct.</li> <li>4. High assay background.</li> <li>5. Contaminated TMB</li> <li>6. Incubation time too long or incubation temperature too high.</li> <li>7. Incorrect dilution of serum</li> </ol>	<ul style="list-style-type: none"> <li>&gt; Repeat assay taking care when washing and pipetting.</li> <li>&gt; Check washer efficiency</li> <li>&gt; Check that the wavelength is 450nm. If a dual wavelength spectrophotometer is available, set the reference filter between 600-650 nm.</li> <li>&gt; Repeat assay and include a well that contains only sample diluent or sample absorbent (i.e. a blank well).</li> <li>&gt; Check that TMB is colorless or faint blue.</li> <li>&gt; Check incubation time and temperature.</li> <li>&gt; Check incubator is at the correct temperature.</li> <li>&gt; Repeat assay, ensuring correct serum dilution is used.</li> </ul>
Low Absorbances	<ol style="list-style-type: none"> <li>1. Incubation time too short or incubation temperature too low.</li> <li>2. Incorrect dilution or pipetting of sera</li> <li>3. Incorrect filter wavelength.</li> <li>4. Contaminated Conjugate solution.</li> <li>5. Kit has expired.</li> <li>6. Air blank reading high.</li> <li>7. Incorrect storage of kit.</li> <li>8. Kit reagents not equilibrated at room temperature</li> <li>9. Incorrect reagents used.</li> <li>10. Over washing of plate (e.g. inclusion of a long soak step).</li> </ol>	<ul style="list-style-type: none"> <li>&gt; Ensure time and temperature of assay incubation are correct.</li> <li>&gt; Check incubator is set at the correct temperature.</li> <li>&gt; Repeat assay ensuring correct dilutions and volumes are used.</li> <li>&gt; Ensure controls are sufficiently mixed.</li> <li>&gt; Check the wavelength is set at 450nm. If a dual wavelength spectrophotometer is available, set the reference filter between 600-650nm.</li> <li>&gt; Dispense conjugate directly from the bottle using clean pipette tip; avoid transferring Conjugate to another container if possible.</li> <li>&gt; Do not return unused Conjugate to bottle.</li> <li>&gt; Ensure all pipettes and probes used to dispense the Conjugates are clean and free from serum, detergent and bleach.</li> <li>&gt; Check expiration date of kit and do not use if expired. Investigate causes of high background absorbance.</li> <li>&gt; Ensure kit is stored at 2-8°C, plate is sealed in foil pouch and desiccant sachet is blue/purple.</li> <li>&gt; Allow sufficient time for reagents to equilibrate to room temperature prior to assay.</li> <li>&gt; Check the reagents used match those listed on the specification sheet.</li> <li>&gt; Repeat assay using recommended wash procedure.</li> </ul>
Poor Duplicates	<ol style="list-style-type: none"> <li>1. Poor mixing of samples.</li> <li>2. Poor pipette precision</li> <li>3. Addition of reagents at inconstant timing intervals; reagent addition takes too long, air bubbles when adding reagents.</li> <li>4. Inefficient washing - Wash buffer left in wells, inconsistent washing, inadequate washing.</li> <li>5. Reader not calibrated or warmed up prior to plate reading.</li> <li>6. Optical pathway not clean</li> <li>7. Spillage of liquid from wells</li> <li>8. Serum samples exhibit microbial growth, haemolysis or lipaemia.</li> <li>9. Uneven well volumes due to evaporation.</li> </ol>	<ul style="list-style-type: none"> <li>&gt; Mix reagents gently and equilibrate to room temperature.</li> <li>&gt; Calibration may need to be checked.</li> <li>&gt; Check pipetting technique-change pipette tip for each sample and ensure excess liquid is wiped from the outside of the tip.</li> <li>&gt; Use consistent timing when adding reagents.</li> <li>&gt; Ensure all dilutions are made before commencing addition to plate.</li> <li>&gt; Improve pipetting technique and skill.</li> <li>&gt; Tap out wash buffer after washing.</li> <li>&gt; Check wells are sufficiently and uniformly filled and aspirated when washing.</li> <li>&gt; Check reader precision</li> <li>&gt; Check reader manual to ascertain warm up time of instrument.</li> <li>&gt; Gently wipe bottom of plate.</li> <li>&gt; Check reader light source and detector are clean.</li> <li>&gt; Repeat assay, taking care not to knock the plate or splash liquid</li> <li>&gt; It is not recommended to use serum samples exhibiting microbial growth, haemolysis or lipaemia.</li> <li>&gt; Cover plate with a lid or plate sealer (not provided).</li> </ul>
All wells yellow	<ol style="list-style-type: none"> <li>1. Contaminated TMB.</li> <li>2. Contaminated reagents (e.g. Conjugate, Wash buffer).</li> <li>3. Incorrect dilution of serum.</li> <li>4. Incorrect storage of kit.</li> <li>5. Inefficient washing- Wash buffer left in wells, inconsistent washing, inadequate washing.</li> <li>6. If Conjugate reconstitute is required – Conjugate reconstituted incorrectly.</li> </ol>	<ul style="list-style-type: none"> <li>&gt; Check TMB is colorless or faint blue.</li> <li>&gt; Check reagents for turbidity.</li> <li>&gt; Repeat assay, ensuring correct serum dilution is used.</li> <li>&gt; Ensure kit is stored at 2-8°C, plate is sealed in foil pouch and desiccant sachet is blue / purple.</li> <li>&gt; Tap out wash buffer after washing.</li> <li>&gt; Check wells are sufficiently and uniformly filled and aspirated when washing.</li> <li>&gt; Repeat assay ensuring Conjugate is reconstituted according to assay method.</li> </ul>

All wells negative

1. Test not performed correctly – correct reagents not added or not added in the correct sequence.
  - > Check procedure and check for unused reagents.
  - > Ensure that Stop Solution was not added before Conjugate or TMB.
2. Contaminated Conjugate solution.
  - > Ensure that serum was diluted in correct Sample diluent; e.g. do not use Sample Absorbent for an IgG ELISA.
  - > Dispense Conjugate directly from the bottle using a clean pipette tip; avoid transferring Conjugate to another container if possible.
  - > Do not return unused Conjugate to bottle.
  - > Ensure all pipettes and probes used to dispense the Conjugate are clean and free from serum, detergent and bleach.
  - > Repeat assay using recommended wash procedure.
3. Over- washing of plate (e.g. inclusion of a long soak step).
4. Incorrect storage of kit.
  - > Ensure kit is stored at 2-8°C, plate is sealed in foil pouch and desiccant sachet is blue / purple.
5. Wash Buffer made up with Stop Solution instead of Wash Buffer Concentrate
  - > Ensure Wash Buffer is made up correctly.