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CE
IVD

Epinephrine

REF AG002K

R 3 x 0.5 µmol

Epinephrine for platelet aggregation tests

English, last revision: 06-2021

INTENDED USE:

For *in vitro* diagnostic use. Measurement of platelet aggregation.

SUMMARY AND EXPLANATION:

Screening for thrombocytopathy, whether systemic (e.g.: Glanzmann thrombasthenia, Bernard-Soulier syndrome, gray platelet syndrome, etc.) or acquired (myelodysplastic syndrome, myeloproliferative disorder, multiple myeloma, Waldenström disease, liver or kidney failure, etc.).
Biological monitoring of anti-platelet therapy such as aspirin, NSAIDS, thienopyridines, abciximab or other glycoprotein IIb/IIIa (GPIIbIIIa) inhibitors.

PRINCIPLE:

When added to platelet-rich plasma (PRP), epinephrine binds to the α_2-adrinergic receptors on the platelet surface, inducing an initial wave of reversible aggregation. This primary aggregation leads to exposure of fibrinogen receptors and inhibition of adenylate cyclase activity. A second wave of aggregation, clearly distinct from the first, is triggered by ADP release from δ granules and by thromboxane A_2 synthesis. Epinephrine is considered to be a weak agonist as the effects it produces are partial and reversible[1,2].

REAGENTS:

R **Epinephrine**: lyophilized, contains Tris, epinephrine hydrogen tartrate and stabilizing agents.
3 x 0.5 µmol vials.

WARNINGS AND PRECAUTIONS:

- Biological products must be handled with all necessary precautions and considered as being potentially infectious.
- Waste should be disposed of in accordance with applicable local regulations.
- Handle the reagents with care to avoid contamination during use. If possible, avoid reagent evaporation during use by limiting the liquid-air exchange surface.
- To preserve reagent stability, seal the vials after use with their respective caps.
- Aging studies, conducted over a 3-week period at 30 °C, show that the reagents can be shipped at room temperature over a short period of time, without degradation.
- To ensure optimum test results, we recommend testing the specimens and controls in succession and without interruption.
- Toxic product. This product must be handle with all necessary precautions, wearing appropriate laboratory clothing, safety glasses and gloves. Product contact with skin and ingestion must be avoided. See the MSDS for further information.
- For *in vitro* diagnostic use.

H301: Toxic if swallowed.

REAGENT PREPARATION AND STABILITY:

The reagents are lyophilized under a vacuum in their vials. To avoid any product loss when opening the vial, gently remove the freeze-drying stopper.

R **Epinephrine**
For use with the aggregometer:
Reconstitute the contents of each vial with **exactly 0.5 mL distilled water**, shake vigorously until fully dissolved. Allow the reagent to stabilize for 30 min. at room temperature (18-25 °C), shaking occasionally.
Homogenize the reagent prior to use.

For use with the analyzer:
Reconstitute the contents of each vial with **exactly 0.625 mL distilled water**, shake vigorously until fully dissolved. Allow the reagent to stabilize for 30 min. at room temperature (18-25 °C), shaking occasionally.
Homogenize the reagent prior to use.

Reagent stability after reconstitution, excluding any contamination or evaporation, and stored in the original vial, is of:

- **7 days** at 2-8 °C.
- **24 hours** at room temperature (18-25 °C).
- **2 months** frozen at -20 °C or less*

*Thaw only once, as rapidly as possible at 37 °C, adapting the incubation period to the volume of reagent. The stability of the thawed reagent should be checked under laboratory work conditions.

STORAGE CONDITIONS:

Unopened reagents should be stored at 2-8 °C in their original packaging. Under these conditions, they can be used until the expiry date printed on the kit.

REAGENTS AND MATERIALS REQUIRED BUT NOT PROVIDED:

Reagents:

- Distilled water.
- Saline solution (0.9% NaCl).

Materials:

- Light transmission Aggregometer.
- Sysmex CS-series analyzer and associated consumables.
- Calibrated pipettes.

SPECIMEN COLLECTION AND PREPARATION :

Specimens should be prepared and stored in accordance with applicable local guidelines (for the United States, see the CLSI guidelines for further information concerning specimen collection, handling and storage). When screening for thrombocytopathy, patients must not have received any medication known to affect platelet function (e.g.: aspirin) during the previous 10 days. Patients should avoid fatty foods, coffee and dairy products at least 12 hours before collection[4].

- Specimens:

Human plasma obtained from anticoagulated blood (trisodium citrate).

- Collection:

The blood (9 volumes) should be carefully collected onto the trisodium citrate anticoagulant (1 volume) (0.109 M) by clean venipuncture. Discard the first tube. Cover and gently invert 4 to 5 times to mix. **Keep the specimens at room temperature** (~18 to 25 °C). Do not use CTAD tubes for collection.

- Centrifugation:

Preparation of platelet-rich plasma (PRP) and platelet-poor plasma (PPP°:

1) Prepare the PRP by centrifuging the blood specimens onto citrate at 150 x g for 10 minutes at room temperature (18-25 °C).
2) Examine the plasma: if any red blood cells are left, re-centrifuge at 150 x g for 5 additional minutes.
3) Using a plastic pipette, identify and carefully remove the platelet layer without touching the PRBC (leukocytes and red blood cells) and transfer to an identified tube (PRP). **Seal and store at room temperature**.
4) Prepare the PPP by centrifuging the remaining blood specimen at 2000-2500 x g for 15 minutes. Examine the PPP for haemolysis, then transfer to a plastic tube identified 'PPP'. **Seal and store at room temperature**.
5) See ISTH guidelines for the PRP platelet count[5].

PROCEDURE:

Automated method:
The application for Sysmex CS-series analyzers is available on request. **See the application and precautions specific to each analyzer.**

Aggregometer: Epinephrine dilution:
To evaluate platelet aggregation in response to Epinephrine, this latter is tested at concentrations ranging from 1 to 10 µM (final concentration, in the test). Prepare a sufficient quantity of the following dilutions (10X concentrated) and test them as per the protocol below, starting with the highest concentrations:

"10X" Epinephrine preparation (µM)	100	50	20	10
Epinephrine (µL) (**conc.**)	100 (**1 mM**)	50 (**1 mM**)	200 (**100 µM**)	100 (**100 µM**)
Saline solution (µL)	900	950	800	900
Giving a final concentration in the test (µM)	**10**	**5**	**2**	**1**

Protocol:
The test must be performed within 3 hours of specimen collection.

1. Place a stirrer in each cuvette.
2. Establish the 100% aggregation point with a cuvette containing **360 µL PPP**.
3. Pipette **360 µL** platelet-rich plasma (PRP) into a second cuvette. Incubate for **2 minutes at 37 °C**. Establish the 0% aggregation point with the **PRP**.
4. Add **40 µL epinephrine (10X)** directly into the platelet-rich plasma using a long and fine pipette tip. **Do not inject the epinephrine against the walls of the cuvette**.
5. Allow the aggregation profile to develop for 5 to 10 minutes.

Each laboratory can establish and validate its own test protocol and verify the resulting performance under its own specific working conditions (reagents/instruments/test protocol combination).
The user is responsible for validating any changes and their impact on all results.

QUALITY CONTROL:

The use of quality controls serves to validate method compliance, along with between-test assay homogeneity for a given batch of reagents.
The control should be prepared in the same manner as the specimens. For qualitative platelet aggregation studies, the control may consist of fresh platelet-rich plasma collected from a normal (specified and qualified) donor who has not taken any aspirin or equivalent for the past 10 days and with a history of normal platelet function.
Include the quality controls with each series, as per good laboratory practice, in order to validate the test. A new control should be established, preferably for each test series, and at least for each new reagent batch, or after analyzer maintenance, or when the measured quality control values fall outside the acceptable range for the method.
Each laboratory must define its acceptable ranges and verify the expected performance in its analytical system.

RESULTS:

The patient's detailed history is required to allow a precise interpretation of the test results. In particular, the patient should be questioned concerning his/her recent treatments, as many prescription or over the counter substance can interfere with platelet aggregation. Substances such as caffeine, tobacco, alcohol, vitamin C, etc. may also affect the results. The results should be analysed in light of the patient's clinical context.

LIMITATIONS:

- To ensure optimum test performance and to meet the specifications, the technical instructions validated by HYPHEN BioMed should be followed carefully. The laboratory is responsible for validating any changes made to these instructions for use.
- Any reagent presenting an unusual appearance or showing signs of contamination must be rejected.
- Any plasma displaying a coagulum or showing signs of contamination must be rejected.
- Any suspicious samples or those showing signs of activation must be rejected.

EXPECTED VALUES:

The values expected for each reagent at the various concentrations used to induce platelet aggregation, along with the expected performance, must be verified and established by each laboratory under this latter's specific work conditions.

PERFORMANCE:

Example of maximum, normal and abnormal aggregation (%):

	Normal	Abnormal
Maximum aggregation (%)	92	32

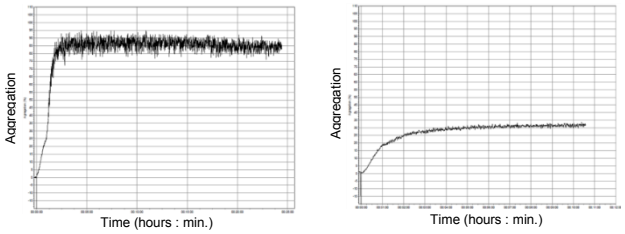

Figure: Example of normal (left) and abnormal (right) aggregation plots with Epinephrine (10 µM).

REFERENCES:

1. Yardumian *et al*., "Laboratory investigation of platelet function: a review of methodology". J Clin Pathol, 39:701-712, 1986.
2. Zhou *et al*., "Platelet aggregation testing in platelet-rich plasma". AM J Clin Pathol, 123:172-183, 2005.
3. Angiolillo *et al*., "Basic principles of platelet biology and clinical implications". Circ J, 74:597-607, 2010.
4. McCabe-White and Jennings, "Platelet protocols: research and clinical laboratory procedure". Academic press London, p 35, 1999.
5. Recommendations for the Standardization of Light Transmission Aggregometry: A consensus of the Working Party from the Platelet Physiology Subcommittee of SSC/ISTH. 2013.

SYMBOLS:

Symbols used and signs listed in the ISO 15223-1 standard, see Symbol definitions document.

Changes compared to previous version