BIO/DATA CORPORATION

AN ISO 13485 REGISTERED COMPANY

AGG/PAK™ 5 Combo Kit

REF 107650

Platelet Aggregation Reagent Combination Kit

IVD

2°C 8°C

INSTRUCTIONS FOR USE

ENGLISH - EN

PRODUCT DESCRIPTION

AGG/PAK™ 5 is a Platelet Aggregation Reagent Combination Kit containing ADP (Adenosine-5'-Diphosphate), Arachidonic Acid (Sodium Arachidonate), Collagen (Soluble Calf Skin, Type 1), Epinephrine (Adrenaline), and Ristocetin (Ristocetin A Sulfate) Reagents.

ADP Reagent is a lyophilized preparation of Adenosine-5'-Diphosphate. It is an essential component in platelet aggregation. ADP acts as an agonist or activator, binding to platelet receptors and triggering a series of biochemical events that lead to platelet activation and aggregation.

Arachidonic Acid Reagent is a lyophilized preparation of the Sodium Salt of Arachidonic Acid. It is an essential fatty acid present in the granules of platelets and on the platelet membrane. It is processed in multiple steps and converted to Thromboxane A_2 (TX A_2). Arachidonic Acid Reagent induces platelet activation and aggregation.

Collagen Reagent is a lyophilized preparation of Soluble Calf Skin (Type 1). Collagen Reagent induces platelet shape change and activates platelets. The activated platelets then release thrombotic compounds from their granules, which serve to recruit additional platelets to an injury site.

Epinephrine Reagent is a stabilized and lyophilized preparation of L-Adrenaline that activates the GP IIa adreno receptor causing platelet aggregation without shape change. Although it can enhance the response of platelets to other agonists, Epinephrine Reagent is a weak (reversible) agonist. It may or may not elicit a response in healthy people.

Ristocetin Reagent is a lyophilized preparation of Ristocetin A Sulfate, a glycopeptide of unknown chemical structure which has been isolated from Nocardia lurida. Ristocetin contains in excess of 90% Ristocetin A.

AGG/PAK™ 5 Combo Kit has been optimized for use with Light Transmission Aggregometers. It may also be used with other turbidometric or impedance analyzers, and flow cytometers.

INTENDED PURPOSE

AGG/PAK™ 5 Combo Kit is a convenience kit containing a combination of routine platelet aggregation reagents used to elicit aggregation and / or agglutination responses in Platelet Rich Plasma (PRP). The Kit includes ADP, Arachidonic Acid, Collagen, Epinephrine, and Ristocetin.

DETECTION / MEASUREMENT

AGG/PAK™ 5 Combo Kit Reagents are used, in conjunction with other diluents and control samples, to measure changes of the light transmission in a Platelet Rich Plasma (PRP) test sample.

PRODUCT FUNCTION

AGG/PAK™ 5 Combo Kit provides insight into different aspects of platelet function / quality. This Kit aids in accessing various acquired and inherited platelet disorders or the efficacy of anti-platelet therapies.

SPECIFIC INFORMATION PROVIDED

AGG/PAK™ 5 Combo Kit Reagents are not intended for the detection of a specific disorder, condition, or risk factor.

ADP Reagent plays a pivotal role in platelet activation and aggregation. When ADP binds to specific receptors on the platelet surface, such as P2Y1 and P2Y12, it initiates intracellular signaling cascades. This activation induces rapid changes in platelet shape and the release of calcium ions through P2Y1 receptors, while P2Y12 activation sustains the response, ensuring stable aggregation. ADP Reagent is utilized to stimulate platelet activation and aggregation precisely by interacting with these ADP receptors. By observing platelet aggregation in response to ADP, clinicians can assess platelet function / quality related to abnormalities in platelet activation and aggregation. This process is crucial for understanding clot formation dynamics and evaluating the efficacy of anti-platelet therapies in preventing thrombotic events. ADP prompts the release of secondary mediators like Thromboxane A_2 (TX A_2), further amplifying platelet activation and aggregation.

Arachidonic Acid Reagent initiates platelet activation and aggregation through the arachidonic acid pathway. Upon binding to platelet surface receptors, arachidonic acid undergoes enzymatic conversion to Thromboxane A_2 (TX A_2), facilitating intracellular signaling cascades. This prompts rapid changes in platelet shape and calcium ion release, crucial for stable aggregation. Observing platelet aggregation in response to Arachidonic Acid Reagent allows clinicians to assess and evaluate platelet function / quality, abnormalities, and anti-platelet therapies. Arachidonic Acid Reagent's induction of secondary mediators like Thromboxane A_2 (TX A_2) amplifies platelet activation.

Collagen Reagent initiates platelet activation and aggregation. Upon binding glycoprotein receptors on the platelet surface, particularly glycoprotein VI (GP VI), Collagen sets off intracellular signaling cascades. This triggers rapid changes in platelet shape and the release of calcium ions through GP VI receptors, with sustained activation facilitated by integrin α2β1, ensuring stable aggregation. Utilized to precisely stimulate platelet activation and aggregation, Collagen Reagent interacts with these receptors, providing a means for clinicians to assess platelet function / quality and disorders linked to collagen-induced platelet activation abnormalities. This process is vital for comprehending clot formation dynamics and evaluating the efficacy of anti-platelet therapies inhibiting thrombotic events. Collagen prompts the release of secondary mediators, further amplifying platelet activation and aggregation.

Epinephrine Reagent plays a pivotal role in platelet activation and aggregation. Upon binding to specific receptors on the platelet surface, particularly α2-adrenergic receptors, epinephrine initiates intracellular signaling cascades. This cascade induces rapid changes in platelet shape and triggers the release of calcium ions, crucially mediated through α2-adrenergic receptor activation. The sustained response, essential for stable aggregation, is facilitated by α2-adrenergic receptor activation. Epinephrine Reagent is instrumental in precisely stimulating platelet activation and aggregation by interacting with these adrenergic receptors. Observing platelet aggregation in response to Epinephrine Reagent allows clinicians to assess and evaluate platelet function / quality and disorders associated with abnormalities in platelet activation and aggregation. This process is pivotal for comprehending clot formation dynamics and evaluating the effectiveness of anti-platelet therapies in preventing thrombotic events. Epinephrine prompts the release of secondary mediators, further amplifying platelet activation and aggregation.

Ristocetin Reagent is a distinctive platelet reagent employed in the realm of Ristocetin Induced Platelet Aggregation (RIPA) testing. Ristocetin interacts with von Willebrand Factor (vWF), a critical plasma protein involved in platelet adhesion and aggregation processes. Ristocetin prompts a conformational shift in vWF, exposing binding sites for platelet glycoprotein Ib (GP Ib). Consequently, platelet GP Ib receptors engage with vWF, initiating platelet adhesion. This initial adherence primes platelets for aggregation. In instances lacking von Willebrand Factor (vWF) or related platelet function disorders, Ristocetin Induced Platelet Aggregation proceeds to a limited extent due to platelets' incapacity to aggregate effectively. Consequently, RIPA testing furnishes invaluable insights into platelet function / quality and vWF activity, thereby aiding in the characterization of von Willebrand Disease (vWD) and associated bleeding disorders. This testing method plays a vital role in evaluating platelet function / quality accurately.

AUTOMATION

AGG/PAK™ 5 Combo Kit Reagents are intended for use in semi-automated and automated Light Transmission Platelet Aggregometers. These reagents may also be used with other turbidometric or impedance analyzers, and flow cytometers.

QUALITY / QUANTITY

There are no primary standards for the AGG/PAK™ 5 Combo Kit Reagents. The responses to these reagents are concentration dependent. A known normal donor should be tested with each new lot of AGG/PAK™ 5 Combo Kit Reagents. Standards organizations classify ADP, Arachidonic Acid, Collagen, Epinephrine, and Ristocetin induced platelet aggregation as semi-quantitative or semi-qualitative.

AGG/PAK™ 5 Combo Kit comes packaged as 1 x 0.5 mL vial of ADP Reagent, 1 x 0.5 mL vial of Arachidonic Acid Reagent, 1 x 0.5 mL vial of Collagen Reagent, 1 x 0.5 mL vial of Epinephrine Reagent, and 1 x 0.5 mL vial of Ristocetin Reagent. The working concentration of ADP is 200 µM, Arachidonic Acid is 5 mg / mL, Collagen is 1.9 mg / mL, Epinephrine is 100 µM, and Ristocetin is 15 mg / mL.

SPECIMEN TYPE

The test specimen is prepared from sodium citrate anti-coagulated whole blood. The test sample is Platelet Rich Plasma (PRP). The test blank is Platelet Poor Plasma (PPP).

ADP, Arachidonic Acid, Collagen, Epinephrine, and Ristocetin Reagents may be used with human or animal Platelet Rich Plasma (PRP) for routine platelet aggregation tests. Results are based on the concentration, extent, and rate of aggregation compared to a Platelet Poor Plasma (PPP) blank.

TESTING POPULATION

- Human: For ADP, Arachidonic Acid, and Collagen the prevalence of platelet disorders is global and may vary by race, ethnicity, blood type, and other factors. The incidence is variable. For Epinephrine, the prevalence of abnormal Epinephrine Reagent aggregation is 16 – 20% in healthy people. It is global and may vary by race, ethnicity, blood type, and other factors. The incidence is variable. For Ristocetin, the prevalence of von Willebrand platelet disorders is global and may vary by race, ethnicity, blood type, and other factors. The incidence is ~2%.
- Anti-Platelet Drugs: For ADP, the prevalence and incidence are variable. 4% of the population over the age of 40 take Anti-Platelet Drugs, other than Aspirin. 33% (For Adults > 40); 16% Dual Anti-Platelet Therapy (DAPT); and 8% Anti-Platelet Therapy (APT). For Arachidonic Acid, the prevalence of abnormal Arachidonic

Acid Reagent aggregation, contingent on estimated Aspirin usage, reaches up to one third of the population. Both Clopidogrel and the combination of Clopidogrel with Aspirin can influence Arachidonic Acid-induced platelet aggregation. The incidence is variable. For Collagen, the prevalence of abnormal Collagen Reagent aggregation, contingent on estimated Aspirin usage, reaches up to one third of the population. Both Clopidogrel and the combination of Clopidogrel with Aspirin can influence Collagen-induced platelet aggregation. The incidence is variable. For Epinephrine, the prevalence and incidence are variable. The varying response rates to Epinephrine have been noted across different populations. Studies have demonstrated that Dual Anti-Platelet Therapy and Aspirin can influence Epinephrine-induced platelet aggregation. For Ristocetin, the prevalence and incidence are variable. BTK inhibitors and vancomycin are known to decrease RIPA outcomes. A recently developed anti-platelet glycoprotein (GP) Ib monoclonal antibody (moAB) labeled as OP-FI, along with a thoroughly studied anti-GBIb MoAB known as AP-1, completely eliminating platelet agglutination induced by Ristocetin.

- Inherited Platelet Disorders: For ADP, the prevalence and incidence are variable. There are 60 types; 75 Known Genes; Frequency 5/1000; Estimated 1-2% of the population. For Arachidonic Acid and Collagen, the prevalence and incidence are variable. There are 60 types of inherited platelet disorders that affect approximately 0.3% of the population. Certain inherited platelet defects, such as Glanzmann's Thrombasthenia and Storage Pool Disease, show no response to Arachidonic Acid or Collagen Reagents. For Epinephrine, the prevalence of abnormal epinephrine response in people varies with the defect. The incidence is variable. For Ristocetin, the prevalence and incidence are variable. Platelets derived from individuals with Bernard-Soulier Syndrome do not agglutinate when exposed to Ristocetin. In contrast to von Willebrand Disease, the levels of von Willebrand Factor activity and von Willebrand antigen remain within normal ranges.
- Animal: For ADP, Arachidonic Acid, Collagen, Epinephrine, and Ristocetin, the prevalence and incidence are species dependent.

IN VITRO DIAGNOSTIC

AGG/PAK™ 5 Combo Kit contents are in vitro diagnostic reagents intended for Professional Laboratory Use Only. These Reagents are not intended for injection or ingestion.

INTENDED USER

AGG/PAK™ 5 Combo Kit Reagents are intended for Professional Laboratory Use by qualified personnel.

TEST PRINCIPLE

When introduced to a stirred, 37°C Platelet Rich Plasma (PRP) test sample, exogenous Reagents such as ADP, Arachidonic Acid, Collagen, Epinephrine, and Ristocetin stimulate platelets, prompting them to undergo shape change and aggregate. This initial aggregation is called primary aggregation and is reversible. However, normal platelets possess the ability to release endogenous ADP from their granules, leading to a secondary, irreversible wave of aggregation. The Light Transmission Platelet Aggregometer effectively captures these changes by displaying parameters such as lag phase, shape change, and the rate and extent of aggregation over a predetermined testing period.

For Epinephrine, hyper-reactivity may be demonstrated. If so, the Sticky Platelet Procedure should be followed for confirmation. Not all healthy people will respond to Epinephrine Reagent.

CALIBRATORS AND CONTROLS

There are no calibrators or controls required for the AGG/PAK™ 5 Combo Kit. A known donor sample should be tested with each lot of ADP, Arachidonic Acid, Collagen, Epinephrine, and Ristocetin Reagents. Responses are concentration dependent.

REAGENT LIMITATIONS

AGG/PAK™ 5 Combo Kit Reagents will perform as specified when the Instructions for Use are followed. The reagents must be used prior to the expiration date printed on each vial.

REAGENTS PROVIDED

REF 107650: 1 vial of ADP Reagent (0.5 mL)
1 vial of Arachidonic Acid Reagent (0.5 mL)
1 vial of Collagen Reagent (0.5 mL)
1 vial of Epinephrine Reagent (0.5 mL)
1 vial of Ristocetin Reagent (0.5 mL)

REAGENTS AND MATERIALS REQUIRED BUT NOT PROVIDED

- Purified Water (Distilled, Deionized, Reagent Grade), pH 5.3 – 7.2 for reconstitution
- TRIS Buffered Saline (TBS) or 0.85% physiological saline for dilutions

NOTE: USING BLOOD BANK SALINE WILL CAUSE ERRONEOUS RESULTS.

MATERIALS AND ACCESSORIES

- Platelet Aggregometer *(Follow the Manufacturer's Instructions for Use)*
- Centrifuge
- Electronic Pipette
- Pipette Tips ②
- Aggregometer Test Tubes *(Siliconized)* ②
- Aggregometer Stir Bars *(Plastic Coated)* ②
- Plastic Sample Tubes and Caps *(for Dilutions)* ②

NOTE: DISPOSABLE ITEMS SUCH AS TEST TUBES, STIR BARS, SAMPLE TUBES, AND CAPS ARE FOR ONE TIME USE ONLY

STORAGE AND STABILITY

ADP, Arachidonic Acid, Collagen, Epinephrine, and Ristocetin Reagents do not require temperature protection during shipment.

Upon receipt, store ADP, Arachidonic Acid, Collagen, Epinephrine, and Ristocetin Reagents at 2 – 8° C in their original packaging.

Reconstituted ADP, Collagen, and Epinephrine Reagents are stable for 30 days when stored in their tightly capped, original containers at 2 – 8° C.

Reconstituted Ristocetin Reagent is stable for 7 days, when stored in its tightly capped, original container at 2 – 8° C.

Reconstituted Arachidonic Acid Reagents are stable for 24 hours, when stored in their tightly capped, original containers at 2 – 8° C.

Dilutions containing ADP Reagent are stable for 2 hours at room temperature.

STERILITY

NON STERILE

AGG/PAK™ 5 Combo Kit Reagents are not sterile products. Be careful not to contaminate the product when pipetting the reconstituted or aliquoted reagents.

WARNINGS AND PRECAUTIONS

Wear PPE in accordance with laboratory policies and practices when handling ADP, Arachidonic Acid, Collagen, Epinephrine, and Ristocetin Reagents.

Follow standard precautions when preparing test specimens and samples.

Handle ADP, Arachidonic Acid, Collagen, Epinephrine, and Ristocetin Reagents with care to avoid contamination during use.

Avoid reagent evaporation by limiting air – liquid exchange surfaces.

To ensure optimum test results, a known donor control sample should be run consecutively, without interruption.

To preserve reagent stability, store remaining reagents in their tightly capped, original containers.

Dispose of post-test materials in accordance with applicable regulations and laboratory policies.

NOTE TO USER: ANY SERIOUS INCIDENT THAT OCCURS IN RELATION TO THIS PRODUCT SHALL BE REPORTED TO THE MANUFACTURER AND THE COMPETENT AUTHORITY OF THE MEMBER STATE IN WHICH THE USER AND / OR PATIENT ARE ESTABLISHED.

INFECTIOUS MATERIAL STATUS

AGG/PAK™ 5 Combo Kit Reagents do not contain any infectious materials. Test specimens and samples must be considered infectious and should be handled as if capable of transmitting infection. After testing, test specimens and samples must be disposed of in compliance with applicable regulations and laboratory policies.

SPECIAL FACILITIES

AGG/PAK™ 5 Combo Kit Reagents do not require the use of special facilities within a laboratory environment.

PREPARATION FOR USE

NOTE: AGG/PAK™ 5 COMBO KIT REAGENTS MUST BE AT ROOM TEMPERATURE (15 – 28° C) PRIOR TO RECONSTITUTION. STORED REAGENTS MUST BE BROUGHT TO ROOM TEMPERATURE PRIOR TO USE.

RECONSTITUTION

The working concentration of reconstituted ADP is 200 µM, Arachidonic Acid Reagent is 5 mg / mL, Collagen is 1.9 mg / mL, Epinephrine is 100 µM, and Ristocetin is 15 mg / mL. All final concentrations are based on adding 25 µL of ADP, Arachidonic Acid, Collagen, Epinephrine, or Ristocetin Reagents to a 225 µL Platelet Rich Plasma (PRP) test sample.

- Reconstitute ADP, Arachidonic Acid, Collagen, Epinephrine, and Ristocetin Reagents with 0.5 mL of Purified Water
- Invert gently to mix

NOTE: ARACHIDONIC ACID AND EPINEPHRINE REAGENTS MAY APPEAR CLOUDY BUT WILL BECOME CLEAR TO PALE YELLOW WITHIN A FEW MINUTES.

- Reconstituted ADP, Arachidonic Acid, Collagen, Epinephrine, and Ristocetin Reagents should be kept capped prior to use

DILUTIONS

For BIPHASIC AGGREGATION

To demonstrate biphasic ADP aggregation, the Platelet Rich Plasma (PRP) may be tested with various dilutions of the reagent. Further dilutions may be made to determine the threshold concentration. The threshold concentration is the lowest concentration that elicits a primary aggregation response.

NOTE: FOR DILUTIONS, USE TRIS BUFFERED SALINE (TBS) OR 0.85% PHYSIOLOGICAL SALINE.

TABLE 1: ADP DILUTION CHART

ADP REAGENT	TRIS BUFFERED SALINE	WORKING CONCENTRATION	FINAL CONCENTRATION
———	———	200 µM	20 µM
125 µM	125 µM	100 µM	10 µM
62 µM	188 µM	50 µM	5 µM
25 µM	225 µM	20 µM	2 µM

PATIENT PREPARATION

Patients should refrain from taking aspirin or using aspirin-containing medications and products, as well as other medications, supplements, or energy drinks known to affect platelet function for 7 – 10 days prior to specimen collection. Ingestion of fatty foods, dairy products, and smoking should be avoided for 12 hours before specimen collection.

NOTE: CONSULTATION WITH A PHYSICIAN IS REQUIRED PRIOR TO MAKING ANY MEDICATION CHANGES.

SPECIMEN COLLECTION

The specimen should be collected with care to avoid stasis, hemolysis, contamination by tissue fluid and exposure to glass. Specimens must be kept at room temperature. Release the tourniquet as soon as blood begins to flow into the collection device.

PRACTICE STANDARD PRECAUTIONS THROUGHOUT THE SPECIMEN COLLECTION, SAMPLE PREPARATION, AND ANALYTICAL PROCESSES. DISPOSE OF SHARPS AND BIOHAZARDOUS WASTE IN ACCORDANCE WITH APPLICABLE REGULATIONS AND LABORATORY POLICIES.

Evacuated Specimen Collection Technique

- Use a 21g or 23g winged needle collection set for specimen collection
- Draw blood into plastic evacuated specimen collection tubes containing 3.2% (0.11 M) sodium citrate anti-coagulant
- Gently mix the specimen collection tube 4 - 5 times by inversion
- Write collection time on the specimen label
- Maintain specimen collection tubes at room temperature
- Remix specimen collection tubes prior to centrifugation

Syringe Collection Technique

- Use a 21g or 23g winged needle collection set for the venipuncture
- Draw 9.0 mL of blood into a plastic syringe, avoiding excess suction
- Clamp the winged needle tubing and disconnect the syringe
- Immediately and gently dispense the blood specimen into a plastic (polypropylene) tube containing 1.0 mL of 0.11 M sodium citrate anti-coagulant. The blood to anticoagulant ratio is 9 parts blood to 1 part anti-coagulant
- Cap the plastic tube
- Gently mix the specimen collection tube 4 - 5 times by inversion
- Write collection time on the specimen label
- Maintain specimen collection tubes at room temperature
- Remix specimen collection tubes prior to centrifugation

NOTE: WHEN THE PATIENT'S HEMATOCRIT IS LESS THAN 30% OR GREATER THAN 55%, THE BLOOD TO ANTI-COAGULANT RATIO MUST BE ADJUSTED. BLUE TOP EVACUATED SPECIMEN COLLECTION TUBES MUST CONTAIN 3.2% (0.11 M) SODIUM CITRATE ANTICOAGULANT. WHICH IS THE RECOMMENDED CONCENTRATION FOR PLATELET FUNCTION STUDIES.

SAMPLE PREPARATION

Platelet Rich Plasma (PRP)

- Centrifuge the anti-coagulated blood at 150 x g for 10 minutes at room temperature
- Examine the plasma layer for red cells
- If red cells are present, re-centrifuge for an additional 5 minutes
- Use a Pipette to transfer the PRP to a plastic container labeled PRP
- Remove the PRP from a point just below the middle of the PRP volume for consistent platelet count *(THE TOP OF THE VOLUME HAS A LOWER PLATELET COUNT AND THE BOTTOM IS MORE CONCENTRATED)*
- Cap the container
- Allow the container to stand at room temperature

Platelet Poor Plasma (PPP)

- Centrifuge the remaining PRP blood specimen at 2500 x g for 20 minutes
- Use a Pipette to transfer the PPP to a plastic container labeled PPP
- Cap the container
- Allow the container to stand at room temperature

ASSAY PROCEDURE

Routine Aggregation Procedure

NOTE: THIS IS A GENERAL PROCEDURE. FOLLOW THE INSTRUCTIONS FOR USE PROVIDED BY THE MANUFACTURER OF THE AGGREGOMETER IN USE.

Prepare a Blank for Each Patient

NOTE: EACH PATIENT MUST HAVE THEIR OWN BLANK. ONE PATIENT'S BLANK CANNOT BE USED FOR ANY OTHER PATIENT. THE PATIENT'S BLANK MUST BE PREPARED FROM THE PATIENT'S PLATELET POOR PLASMA (PPP) SPECIMEN. IF THE SAME PATIENT IS BEING TESTED ON MULTIPLE TEST WELLS, THE SAME PATIENT'S BLANK MAY BE USED FOR THOSE TEST WELLS.

- Label a test tube with the letter "B", test well #, and patient ID to identify the Blank
- Pipette 250 µL of Platelet Poor Plasma (PPP) into the test tube *(DO NOT ADD A STIR BAR)*
- Place Blank aside for later use
- Repeat the steps above for each patient

Prepare Test Samples

- Label one to eight new test tubes with each patient ID and test well #
- Place the labeled test tubes into the correct well # 1 - 8 of the stirred sample incubation wells
- Add a stir bar to each test tube
- Pipette 225 µL of Platelet Rich Plasma (PRP) sample into each test tube in the stirred sample incubation wells *(MAKE SURE THERE ARE NO BUBBLES)*
- Select the on-screen timer for each stirred sample incubation well in use and the warming count down will start
- The samples will incubate at 37° C for the pre-set time
- Set the 100% baseline (Blank)
- Place the appropriate previously prepared patient's Blank test tube into test well # 1
- Select BLANK to activate the test well
- The BLANK button will change to START
- Repeat the steps above for each test well being used for testing

Begin Testing

- Once the countdown timer reaches 0:00, press the timer button to stop each stirred sample incubation well
- Transfer the test tube in the stirred sample incubation well # 1 to test well # 1
- Repeat the step above for each test well, making sure all test tubes remain with their corresponding well #'s during transfer
- Close the pipette guides
- Select START for test well # 1
- Pipette 25 µL of reagent directly into the Platelet Rich Plasma (PRP) test tube in test well # 1 *(DO NOT ALLOW REAGENT TO RUN DOWN THE WALL OF THE TEST TUBE OR PERMIT PIPETTE TIP TO BREAK THE SURFACE OF THE SAMPLE)*
- Select INJECT for test well # 1
- Repeat the steps above for each test well being used for testing
- The test will now run for the pre-set time *(OTHER MANUFACTURER'S TEST PROCEDURES MAY SPECIFY DIFFERENT TIMES OR VOLUMES)*

NOTE: USE A KNOWN DONOR AS A CONTROL SAMPLE. EACH LABORATORY SHOULD ESTABLISH AND VALIDATE ITS OWN TEST PROTOCOL AND VERIFY THE RESULTING PERFORMANCE OF ITS TEST SYSTEM (REAGENTS, INSTRUMENT, AND TEST PROTOCOL).

QUALITY CONTROL

For platelet aggregation studies, a known donor should be tested in the same manner as the patient to ensure test system performance and consistency. A new control should be included with each test series, and preferably with each new reagent lot or after instrument maintenance. Each laboratory must define its acceptable ranges for its patient population and verify the expected performance of the test system.

RESULTS

The aggregation patterns for AGG/PAK™ 5 Combo Kit Reagents are depicted in Figures 1 through 10.

FIGURE 1: ADP NORMAL AGGREGATION

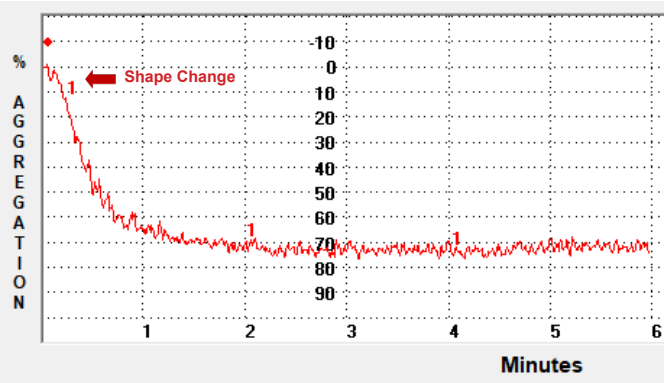


FIGURE 2: ADP ABNORMAL AGGREGATION

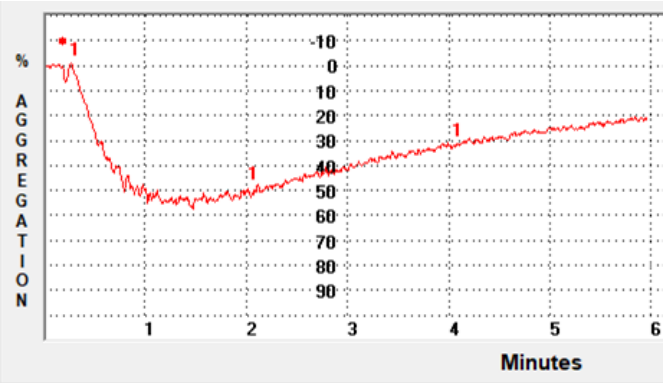


FIGURE 3: ARACHIDONIC ACID NORMAL AGGREGATION

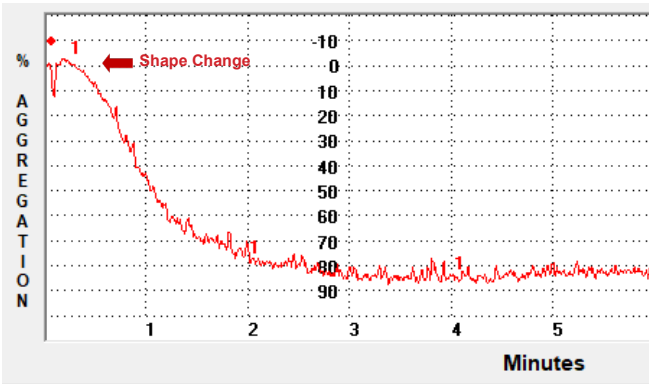


FIGURE 4: ARACHIDONIC ACID ABNORMAL RESPONSE (Aspirin Effect)

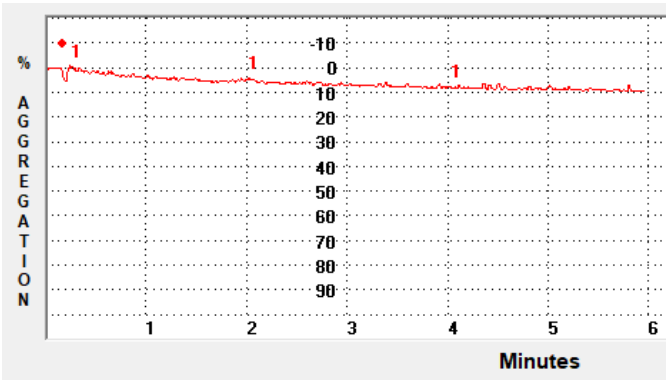


FIGURE 5: COLLAGEN NORMAL AGGREGATION

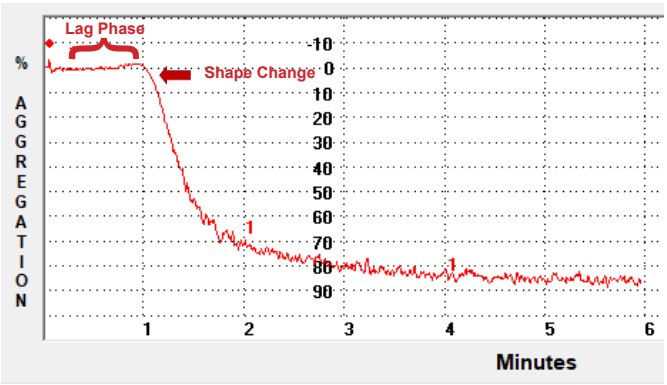
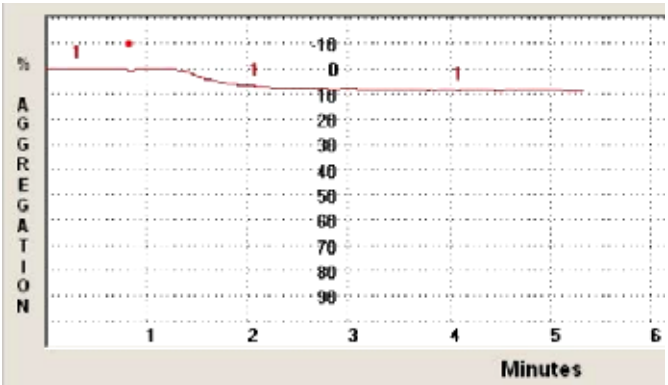


FIGURE 6: COLLAGEN ABNORMAL AGGREGATION



ADP REAGENT

Typical aggregation patterns induced by ADP Reagent are illustrated in Figures 1 through 2. When ADP Reagent is used at a final concentration of 20 µM, it induces a large single wave of aggregation in normal Platelet Rich Plasma (PRP). At lower concentrations, ranging from 2 µM to 10 µM, two distinct waves of aggregation may be observed. The primary wave is the immediate response to the exogenous ADP introduced by the reagent, while the secondary wave is due to the release of endogenous ADP from the storage pool of nucleotides within the platelets.

In some normal PRP samples, concentration-dependent disaggregation may be observed, indicating a variable response to different ADP concentrations. Spike marks in the figures indicate the points at which the reagent was added, providing clear reference points for the timing of reagent introduction and its effects on the aggregation process.

ARACHIDONIC ACID REAGENT

Typical aggregation patterns induced by Arachidonic Acid Reagent are illustrated in Figures 3 and 4. These patterns provide a comprehensive view of how the reagent interacts with Platelet Rich Plasma (PRP) under different conditions.
Ingestion of a single 600 mg dose of Aspirin has a significant impact on platelet aggregation, resulting in the absence of Arachidonic Acid-induced aggregation for up to 5 days, as demonstrated in Figure 5. This absence indicates that Aspirin effectively inhibits the aggregation response, which is crucial for understanding its anticoagulant properties.

Furthermore, a prolonged response time can be observed for up to 8 days following Aspirin ingestion, as depicted in Figure 6. This prolonged response time refers to the delay from the addition of Arachidonic Acid Reagent to the onset of aggregation, highlighting the extended effect of Aspirin on platelet function.

Spike marks in the figures indicate the points at which the reagent was added, providing clear reference points for the timing of reagent introduction and its effects on the aggregation process.

COLLAGEN REAGENT

Typical aggregation patterns induced by Collagen Reagent are illustrated in Figures 5 and 6, providing a detailed representation of the reagent's effects on Platelet Rich Plasma (PRP). Following the addition of Collagen Reagent to PRP, an initial lag phase occurs during which no aggregation is observed. After this lag phase, normal platelets will exhibit a noticeable shape change. Following the shape change, a large, single wave of aggregation is observed, demonstrating the robust response of the platelets to Collagen Reagent.

Spike marks in the figures indicate the exact points at which the reagent was added, providing clear reference points for the timing of reagent introduction and its effects on the aggregation process.

EPINEPHRINE REAGENT

Typical aggregation patterns induced by Epinephrine Reagent are depicted in Figures 7 and 8, offering a comprehensive view of its effects on Platelet Rich Plasma (PRP). When Epinephrine Reagent is added to normal PRP, it induces a biphasic response characterized by two distinct waves of aggregation. The first wave represents the initial platelet response to the reagent, while the second wave is due to the release of additional platelet agonists from the granules within the platelets, further amplifying the aggregation process.

This biphasic response is a hallmark of healthy PRP samples, indicating normal platelet function. Conversely, abnormal Epinephrine aggregation is identified when the final aggregation is less than 30%, as shown in Figure 10. Such a reduced response may

FIGURE 7: EPINEPHRINE NORMAL AGGREGATION

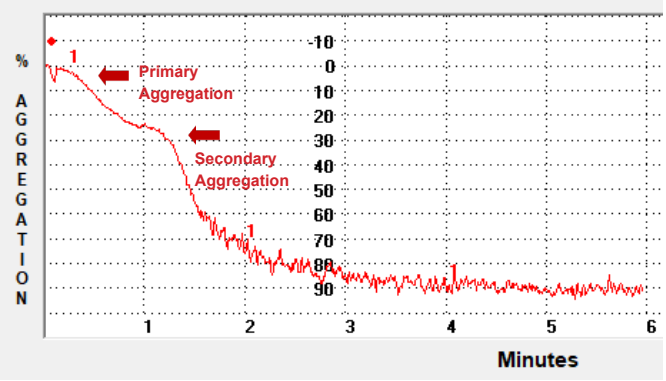


FIGURE 8: EPINEPHRINE ABNORMAL AGGREGATION

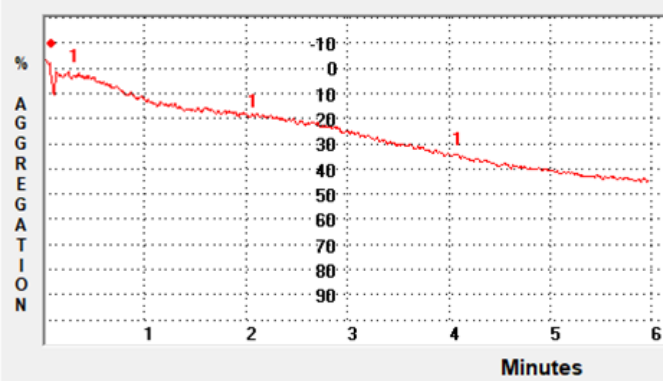


FIGURE 9: RISTOCETIN-INDUCED PLATELET AGGREGATION (RIPA) NORMAL AGGREGATION

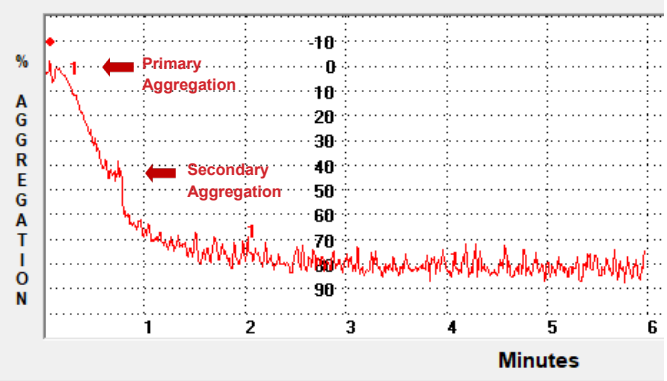
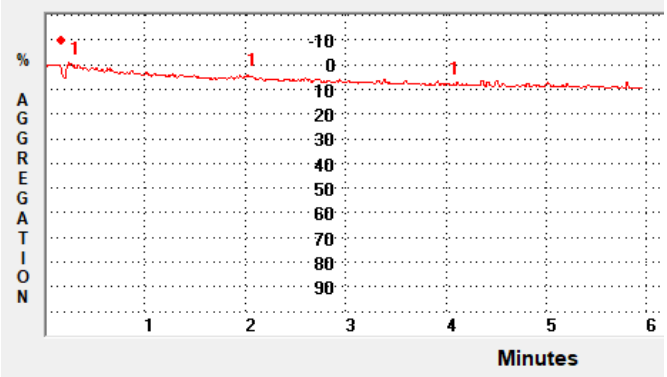


FIGURE 10: RISTOCETIN-INDUCED PLATELET AGGREGATION (RIPA) ABNORMAL AGGREGATION



indicate platelet dysfunction or other hematological abnormalities, providing valuable diagnostic information.

Spike indicators in the figures mark the exact points at which the reagent is added, offering clear reference points for the timing of reagent introduction. These markers are essential for correlating the addition of Epinephrine Reagent with the observed aggregation patterns, allowing for precise analysis of its immediate effects on the aggregation process.

RISTOCETIN REAGENT

Typical aggregation patterns induced by Ristocetin Reagent are depicted in Figures 9 and 10, providing a detailed view of the reagent's effects on Platelet Rich Plasma (PRP). Ristocetin-induced aggregation can manifest as either a biphasic response or a single large wave of aggregation. The primary wave of aggregation results from the agglutination of platelets mediated by the von Willebrand Factor in the presence of Ristocetin. Following this, a secondary wave may occur due to the release of endogenous ADP from the platelets, which further contributes to the aggregation process. In patients without a bleeding disorder, the administration of a high dose of Ristocetin typically results in a strong, single wave of aggregation. This robust response is indicative of normal platelet function and von Willebrand Factor activity. Conversely, a low dose of Ristocetin generally elicits no response in these patients, as the lower concentration is insufficient to induce significant platelet aggregation.

However, a strong response to a low dose of Ristocetin suggests the presence of certain types of von Willebrand Disease. In contrast, normal individuals with no bleeding disorders typically exhibit little or no response to low doses of Ristocetin.

It is essential to interpret these aggregation results within the broader context of the patient's clinical condition. A definitive diagnosis should only be made after further testing and comprehensive evaluation. The figures include spike marks that indicate the precise points of reagent addition, providing clear reference points for understanding the timing of reagent introduction and its immediate effects on the aggregation process.

EXPECTED VALUES

Each laboratory must establish its own expected ranges and performance characteristics for this reagent at the concentrations used to induce platelet aggregation. These ranges should be determined using the laboratory's specific instrumentation, procedures, reference intervals, and patient population.

Published literature reports that ADP Reagent typically produces a Final Aggregation response in the range of 69–91% and a Lag Phase of ≥15 seconds, Arachidonic Acid Reagent typically produces a Final Aggregation response in the range of 61–93% and a Lag Phase of ≥25 seconds, Collagen Reagent typically produces a Final Aggregation response in the range of 66–92% and a Lag Phase of ≥61 seconds, Epinephrine Reagent typically produces a Final Aggregation response in the range of 54–92%, and RIPA Final Aggregation response in the range of 67–95%, under standard test conditions. This literature-based range is provided as general information only; laboratories must verify and establish their own expected ranges before clinical use.

LIMITATIONS

In Light Transmission Aggregometry, the presence of red blood cells in the PRP will cause the observed aggregation to be reduced. The presence of platelets in the PPP will cause final aggregation to be increased. Spurious results may occur if the PRP platelet count is less than 75,000 platelets / cumm. PRP platelet counts can only be performed using the hemocytometer method. Compromised samples must be rejected. If the results are abnormal, the test should be repeated on another occasion. Each laboratory must establish reference ranges tailored to the population it serves, and the specific reagent concentrations used.

TABLE 2: ADP, ARACHIDONIC ACID, COLLAGEN, EPINEPHRINE, AND RISTOCETIN RESULTS OBSERVED IN PLATELET FUNCTION DEFECTS

DEFECT	ADP REAGENT	ARACHIDONIC ACID	COLLAGEN REAGENT
ASPIRIN-LIKE	↓ or N	↓ or N	↓
THROMBASTHENIA	↓ ↓	↓ ↓	↓
STORAGE POOL DISEASE	↓	↓	↓
VON WILLEBRAND DISEASE	N	N	N
BERNARD-SOULIER SYNDROME	N	N	N

DEFECT	EPINEPHRINE REAGENT	RISTOCETIN REAGENT
ASPIRIN-LIKE	↓ or N	↓ or N
THROMBASTHENIA	↓ ↓	N
STORAGE POOL DISEASE	↓	↓ or N
VON WILLEBRAND DISEASE	N	↓ ↓
BERNARD-SOULIER SYNDROME	N	↓ ↓

↓ = *Reduced Aggregation Resulting From a Decrease or Absence of Secondary Wave*

↓ ↓ = *Reduced Aggregation Resulting From a Decrease or Absence of Primary and Secondary Wave*

N = *Normal Response*

ANALYTICAL PERFORMANCE

Platelet aggregation, induced by commonly used reagents like ADP, Arachidonic Acid, Collagen, Epinephrine, and Ristocetin, is a non-linear test system. Responses are based on the difference between the patient's Platelet Rich Plasma (PRP) and Platelet Poor Plasma (PPP) light transmission and therefore, results are unique to that patient. Certain parameters are more prone to non-linearity than others. These include lag phase, primary slope, secondary slope, biphasic response and disaggregation. The non-linearity is caused by many factors such as the reaction chemistry and instrumentation. Platelet aggregation displays the response rate or activity and does not quantify the reactants or their concentrations.

In platelet aggregation, accuracy is a relative parameter and is dependent on the test system. The limitations of platelet aggregation make it difficult to provide typical precision or reproducibility ranges.

The variability in linearity, precision and reproducibility of results in ADP, Arachidonic Acid, Collagen, Epinephrine, and Ristocetin Reagent-based test systems is acknowledged by multiple standards organizations. The commonly accepted CV is ± 15%.

Test to Test Reproducibility:	less than ± 7.5%
Instrument to Instrument Reproducibility:	less than ± 15.0%
Reagent Lot to Lot Variability:	less than ± 10.5%
Laboratory to Laboratory (System to System)	less than ± 12.5%

SYMBOLS

Bio-Hazardous

Catalog Number

Caution

CE Marked & Registered Product

Consult Instructions For Use

European Union Representative

In Vitro Diagnostic Device

Manufacturer

Must Read

Non-Sterile

Single Use Only

Temperature Limitations

United Kingdom Marked & Registered Product

United Kingdom Representative

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REVISION HISTORY

Document No: 107649 Revision: AA, January 2025

- New Product Combo Kit

Document No: 107649 Revision: AB, March 2026

- Editorial corrections (typographical); no changes to content or regulatory information.
- Updated Storage and Stability information to include 24-hour post-reconstitution stability for Arachidonic Acid Reagent and 2-hour room temperature stability for ADP dilutions.
- Revised Ristocetin Reagent reconstitution instructions to improve clarity; removed the separate Ristocetin dilution approach and added a Ristocetin Reconstitution using purified water.
- Updated Expected Results section: removed results chart, added literature-based ADP, Arachidonic Acid, Collagen, Epinephrine, and Ristocetin Reagents range statement, and clarified that laboratories must establish their own expected ranges.

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