# IN VITRO INVESTIGATION OF THE HEMOSTATIC POTENTIAL OF ETHANOLIC PEEL EXTRACTS FROM SELECTED BANANA (*Musa* spp.) VARIETIES ON HUMAN BLOOD

A RESEARCH PAPER

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In Partial Fulfillment of the Requirement of the Degree

Bachelor of Science in Medical Technology

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June 2026

# Misamis University

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## CERTIFICATE OF PANEL APPROVAL

The research paper attached hereto, entitled **"IN VITRO INVESTIGATION OF THE HEMOSTATIC POTENTIAL OF ETHANOLIC PEEL EXTRACTS FROM SELECTED BANANA (Musa spp.) VARIETIES ON HUMAN BLOOD"**, prepared Land submitted by **ASHLEY NICOLE B. ARABE, PRINCESS KYLLAH CHAN, KRISHAN KYLE D. MONDARES,** and **AIRA JEAN L. MONDEJAR** in partial fulfillment of the requirements for the degree **BACHELOR OF SCIENCE IN MEDICAL TECHNOLOGY,** is hereby recommended for approval.

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# ABSTRACT

Hemostatic agents are a highly important treatment for various hematological disorders. This study enabled the researchers to investigate plant extracts, like banana peels, as possible alternatives for hemostatic interventions. Moreover, the hemostatic properties of banana peel extracts have not been thoroughly researched and discussed. Hence, the main objective of the study was to assess the hemostatic properties of Musa spp. peel extracts at 25%, 50%, 75%, and 100% concentrations. These peel extracts were prepared by maceration in absolute ethanol and air-evaporated in a fume hood. The banana peel extracts were mixed with human blood samples to determine clotting time. The extract-treated blood samples were compared with those from a red-top tube in terms of procoagulant properties. The study employed physical, macroscopic, and microscopic examinations, as well as staining, to assess the effects of ethanolic banana peel extracts on red blood cell morphology. Data were analyzed using One-way ANOVA and the Kruskal-Wallis test. The findings revealed that only the 75% concentration of the Saba (Musa acuminata × balbisiana ABB Group) peel extract showed significant clotting delay ($F = 3.12$, $p = 0.036$). In contrast, the other peel extract preparations exhibited considerable hemostatic ability. Upon mixing with the banana peel extracts, the red blood cells exhibited lysis and rupture upon microscopic examination and hemolysis upon centrifugation. The destruction of red blood cells was observed across all banana peel extracts. Overall, the banana peel extracts showed significant hemostatic potential on human blood samples.

**Keywords:** *procoagulant properties, air evaporation, microscopic examination, varying concentrations*

# DEDICATION

*First and foremost, we dedicate this research to God Almighty, for His endless guidance, strength, wisdom, and blessings throughout this journey. Without His grace, this study would not have been possible.*

*To our beloved parents and families, thank you for your unwavering love, sacrifices, understanding, and encouragement. Your support has been our source of motivation in overcoming every challenge along the way.*

*To our loved ones and friends, we sincerely appreciate your patience, prayers, and constant support, which have inspired us to continue striving for success despite difficulties and pressures.*

*To our research adviser, we extend our deepest gratitude for your guidance, expertise, patience, and valuable insights that greatly contributed to the completion of this study.*

*To our panelists, thank you for your constructive criticisms, suggestions, and professional perspectives that helped improve and strengthen our research.*

*To our research instructor, we are truly grateful for the knowledge, guidance, and encouragement you have provided throughout the research process.*

*To future researchers, may this study serve as a useful reference and source of inspiration for further research and discoveries in related fields.*

*Lastly, we dedicate this work to all students who continuously persevere in pursuit of knowledge and academic excellence. May this research remind them that dedication, hard work, and faith can lead to meaningful achievements.*

**Ashley, Kyllah, Krishan, and Aira**

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**Ashley, Kyllah, Krishan, and Aira**

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# INTRODUCTION

## Background of the Study

Bleeding disorders persist to pose a serious health concern because they impair the normal hemostatic process responsible for preventing excessive blood loss. These conditions are exemplified by inherited platelet disorders, which cause abnormal platelet function and mucocutaneous bleeding, and by human immunodeficiency virus (HIV)-related thrombocytopenia, which results in impaired platelet production and coagulation abnormalities (Palma-Barqueros et al. 2021; Obeagu et al. 2023). The body's ability to stop bleeding following a vascular injury is critical to maintaining life. Hemostasis is the body's response that stops blood loss after an injury. It does this without affecting the flow of blood within the rest of the vascular system.

The hemostatic process requires the coordinated interaction among endothelial cells lining blood vessels, platelets, other blood cells, plasma proteins, calcium ions, and the coagulation cascade (McCall, 2021). According to Keohane et al. (2020), unbalanced hemostasis can be life-threatening, and the absence of a single plasma procoagulant protein may cause lifelong anatomic hemorrhage and transfusion dependence. Consequently, the investigation of alternative and naturally derived hemostatic agents has become

increasingly important in the pursuit of safe, effective, and accessible treatments for bleeding control.

The comprehensive review of Davenport and Sola-Visner (2021) explained that effective hemostasis depends on the interaction of platelets, coagulation factors, vascular components, and naturally occurring anticoagulants. The study highlighted the need to explore alternative approaches to improving hemostatic management, including investigating naturally derived substances with potential procoagulant properties. Their review further emphasized that identifying safe and effective procoagulant agents that enhance clot formation without disrupting the normal hemostatic balance remains a key focus of current research.

The increasing demand for safe and effective hemostatic materials has prompted researchers to investigate natural biomaterials that can control bleeding while promoting tissue repair. In Sung et al. (2021), the authors discussed recent advances in the development of hemostatic biomaterials for medical applications, emphasizing that natural polymers and plant-derived biomaterials have attracted considerable attention for their excellent biocompatibility, biodegradability, and cost-effectiveness. The authors highlighted that naturally derived hemostatic materials, including polysaccharides and other plant-based biomaterials, have shown promise as alternatives to conventional synthetic hemostatic agents. The study emphasized that future research should focus on identifying and optimizing novel biomaterials to improve coagulation efficiency while minimizing adverse reactions.

In recent years, there has been growing interest in medicinal plants as alternative sources of bioactive compounds with potential therapeutic applications. Plant-derived

products are often regarded as cost-effective, accessible, and environmentally sustainable alternatives to synthetic agents. For instance, reviews done by Ebrahimi et al. (2020) identified numerous medicinal plants with documented hemostatic activity, with the most frequently studied families including Asteraceae (Compositae), Lamiaceae, and Fabaceae. The review further reported that plant-derived phytochemicals such as tannins, saponins, phenolic compounds, and glycosides may contribute to hemostasis through various mechanisms, including promoting blood coagulation, increasing factor XII activity, enhancing platelet aggregation, inhibiting fibrinolysis, and inducing vasoconstriction. Similarly, *Aizoon hispanicum* (Spanish aizoon), *Centaurea hyalolepis*, *Heliotropium maris-mortui* (Dead Sea heliotrope), *Parietaria judaica* (spreading pellitory), *Polygonum arenarium* (sand knotweed), and *Verbascum sinuatum* (wavy-leaved mullein) plant extracts significantly affected blood coagulation parameters, supporting their traditional use in bleeding management (Abdallah et al., 2022). Moreover, Pandith et al. (2012) found that *Chromolaena odorata* leaf extract exhibited hemostatic activity in both in vitro and in vivo studies by shortening bleeding and clotting times.

Bananas (*Musa* spp.), classified under the family *Musaceae*, are widely available, and their peels have been recognized for a wide range of applications. Banana peels are used in a wide range of industries, including cosmetics, medicine, food processing, beverages, textiles, energy resources, paper manufacturing, bio-absorbents, biofuel production, and the agricultural sector (Bhavani et al., 2023). Banana peels contain bioactive substances like tannins, which may contribute to hemostatic activity (Achmad & Putri, 2021). Additionally, they contain secondary metabolites such as catechins and

anthocyanins, suggesting that banana peels are a rich source of phytochemicals with potential biological activities relevant to hemostasis (Bhavani et al., 2023; Vu et al., 2018).

Despite the extensive research on plant-based anticoagulants, there is a significant scarcity of scientific studies that specifically focus on the impact of various Musa spp. extracts on blood coagulation. This gap in the literature highlights an important area of inquiry, as the potential therapeutic properties of these plants could open new avenues for anticoagulant treatments. Therefore, it is necessary to thoroughly investigate the potential anticoagulant properties of extracts derived from different varieties of bananas, particularly the Latundan banana (Musa acuminata x balbisiana AAB Group), Lakatan banana (Musa acuminata), and Saba banana (Musa acuminata x balbisiana ABB Group).

A comprehensive evaluation of the effects of these extracts on coagulation parameters may provide valuable insights into therapeutic applications in preventing blood clots. Such information may reveal new treatment options and enhance understanding of how these extracts influence blood coagulation.

**Objectives of the Study**

This study aimed to investigate the procoagulant properties of Latundan banana (*Musa acuminata* × *balbisiana* AAB Group), Lakatan banana (*Musa acuminata*), and Saba banana (*Musa acuminata* × *balbisiana* ABB Group).

Specifically, this study aimed to:

1. Determine the procoagulant potential of 25%, 50%, 75%, and 100% concentrations of banana peel extracts from Latundan, Lakatan, and Saba varieties by assessing their clotting time in treated blood samples; and

2. Evaluate the effects of 25%, 50%, 75%, and 100% concentrations of treated blood samples from Latundan, Lakatan, and Saba varieties on the morphology of human red blood cells using EDTA-preserved blood samples as the control.

**Significance of the Study**

This study aimed to further knowledge in blood coagulation research, particularly in exploring plant-based procoagulants. Plant-derived compounds have shown great potential not only for therapeutic use but also as additives in blood collection and testing. Investigating the procoagulant potential of ethanolic banana (*Musa* spp.) peel extract on human blood samples may help establish a more sustainable and accessible source of procoagulant agents for laboratory application.

Beyond its pharmacological significance, this study supported environmental sustainability by promoting better waste management practices for discarded banana peels. Banana peels are often thrown away, contributing to large amounts of organic waste (Ansari et al., 2023). Since banana production generates 30–40% peel waste, amounting to around 3.5 million tons annually (Mishra et al., 2022), finding new uses for this plant material could help reduce waste accumulation.

Moreover, using this natural waste material for procoagulant research not only helps lower production costs but also supports eco-friendly scientific innovation. This can especially benefit laboratories with limited resources, as it provides an affordable option without compromising effectiveness. Lastly, using natural materials such as banana peels reduces reliance on synthetic chemicals and supports the growing movement toward environmentally friendly and responsible research.

## Scope and Delimitation

This study evaluated the procoagulant potential of banana (*Musa* spp.) peel extract in vitro. Specifically, the investigation focused on testing the procoagulant properties of banana peel extracts from selected Philippine banana cultivars, namely Latundan, Lakatan, and Saba. The investigation was designed solely to determine whether these plant-based extracts exhibit coagulation-promoting properties under controlled laboratory conditions, with the primary outcome measures being clotting time and effects on cellular morphology.

To clarify the experimental parameters, the banana peel extracts were prepared and tested at four concentrations: 25%, 50%, 75%, and 100%. These concentrations were included to evaluate whether procoagulant activity, if present, is dose-dependent and to determine the most effective concentration range for clot formation and its effects on cell morphology.

The study primarily assessed clotting time as the quantitative indicator of coagulation activity. A reduction in clotting time was interpreted as evidence of potential procoagulant activity. On the other hand, qualitative assessment of cellular morphology was conducted to observe any structural or morphological alterations in blood components following exposure to the banana peel extracts. These parameters were used to provide a comprehensive evaluation of the extracts' hemostatic effects.

# MATERIALS AND METHODS

## Research Design

This study used an experimental design to evaluate the procoagulant properties of peel extracts from three different banana species: Saba *(Musa acuminata × balbisiana* ABB Group), Lakatan *(Musa acuminata)*, and Latundan *(Musa acuminata × balbisiana* AAB Group).

The experiment examined the effects of varying concentrations of ethanolic extracts from different banana species on blood samples collected from consenting individuals. The researchers assessed each banana peel extract's procoagulant potential macroscopically and microscopically. Guided by this evidence, the study assessed and compared the effects of Latundan, Lakatan, and Saba peel extracts on blood coagulation in healthy human volunteers. The complete sequence of procedures, from collection to laboratory analysis, is presented in Figure 1, which shows the flowchart of the sample collection and experimental workflow.

## Research Setting

The experimental procedures were conducted at Misamis University's Department of Natural Sciences Laboratory and College of Medical Technology. The preparation of peel extracts, including grinding, alcoholic extraction, and storage, was carried out in the College of Natural Sciences laboratory. In contrast, blood sample collection and the modified coagulation assays were conducted at the College of Medical Technology

laboratory.

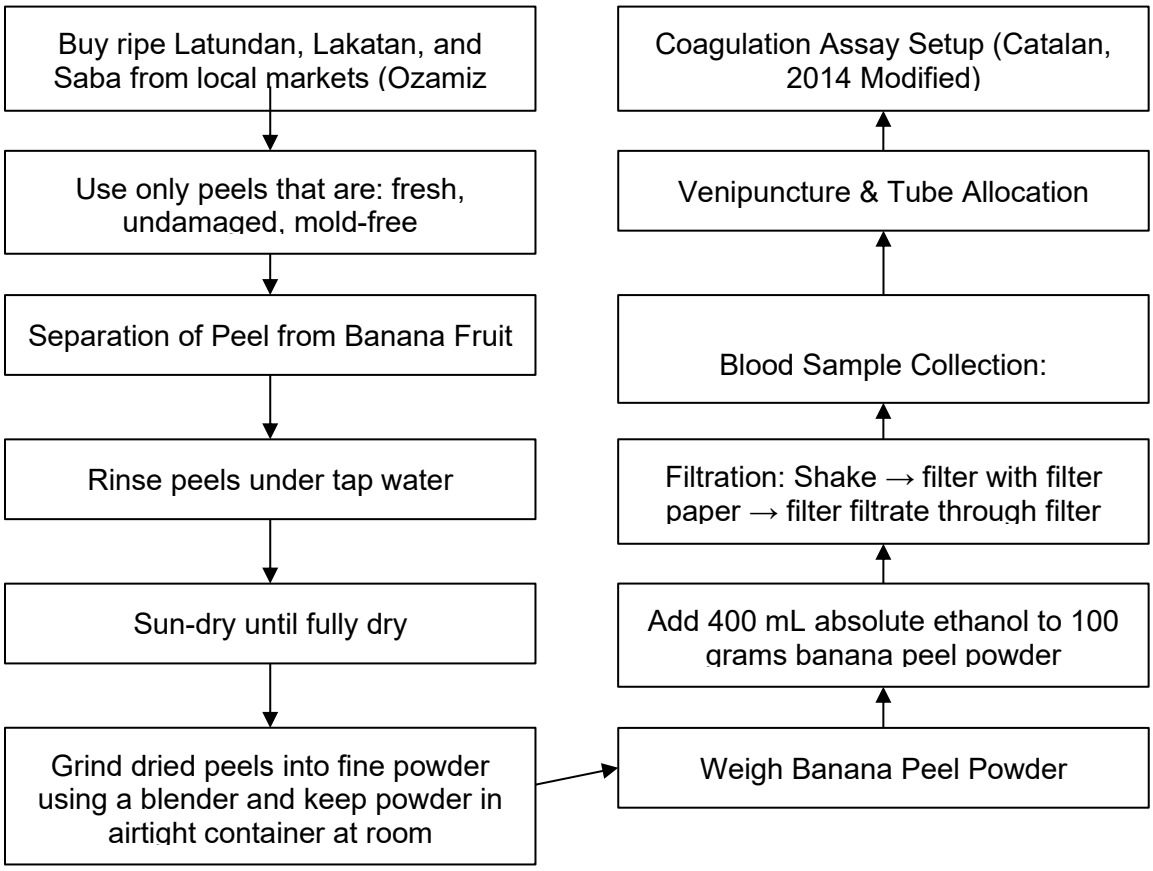


**Figure 1.** Flowchart of Sample Collection and Experimental Procedures

## Sample Collection

*Collection and Preparation of the Banana Peel*

The ripe fruits of Latundan (*Musa acuminata* × *balbisiana* AAB group), Lakatan (*Musa acuminata*), and Saba (*Musa acuminata* × *balbisiana* ABB group) were bought from a few local marketplaces in Ozamiz City. Only peels that appeared fresh, free from mold, and undamaged were used. Peels showing signs of chemical processing or spoilage were discarded.

*Preparation of Banana Peel Extract Powder*

The extraction method for banana peels began with the separation of different banana species. First, wearing full PPE, then isolated the banana fruit from the peel. Then, according to Ergün (2021), the banana peels were washed with tap water and sun-dried in open air until fully dry (Figure 2). Once fully dried, the peels were ground into a powder using a blender (Figure 3). Once powdered, the dried banana peel powder was stored in an airtight container at room temperature away from direct sunlight.


**Figure 2.** Drying of Banana Peels (A, Lakatan; B, Saba; C, Latundan)


**Figure 3.** Preparation of Powdered Banana Peels (A. Fully dried Latundan banana peels; B. Grinding process of banana peels; C. Powdered Saba, Lakatan, and Latundan banana peels)

*Preparation of Concentrated Banana Peel Extract*

The extraction method used in this study was adapted from the conventional maceration technique described by Chaudhry et al. (2022), with several modifications to improve extraction yield and the study's suitability. One major modification involved the sample-to-solvent ratio, in which a 1:4 w/v ratio was used instead of the original 1:15 ratio, following the findings of Hartanti & Theeravit (2018), which suggested that this proportion could yield higher extraction yields. In addition, the present study utilized 100% absolute ethanol as the extraction solvent rather than using varying solvent concentrations and types.

For every 100 grams of banana peel powder, weighed in a triple-beam balance, 400 mL of absolute ethanol was added. The extraction period lasted 7 days with constant agitation to facilitate the more efficient release of phenolic compounds from the banana peel powder. After 7 days, the ethanolic banana peel extract was filtered twice using Whatman No. 1001-125 filter paper, after being well shaken (Figure 4). The filtrate was then air-evaporated in the light at room temperature under a fume hood for 24 hours, following the method of Bennour et al. (2020). The completed banana peel extracts were then stored at room temperature.

*Preparation of Varying Banana Peel Extracts*

For every 100 µL of 75% banana peel concentration, 75 µL of concentrated extract was added to 25 µL of absolute ethanol. The 50% concentration consisted of equal volumes of concentrated extract and absolute ethanol. The 25% concentration was prepared using 25 µL of concentrated extract and 75 µL of absolute ethanol per 100 µL solution (Table 1). Absolute ethanol was used as a diluent because it is widely regarded as an effective medium

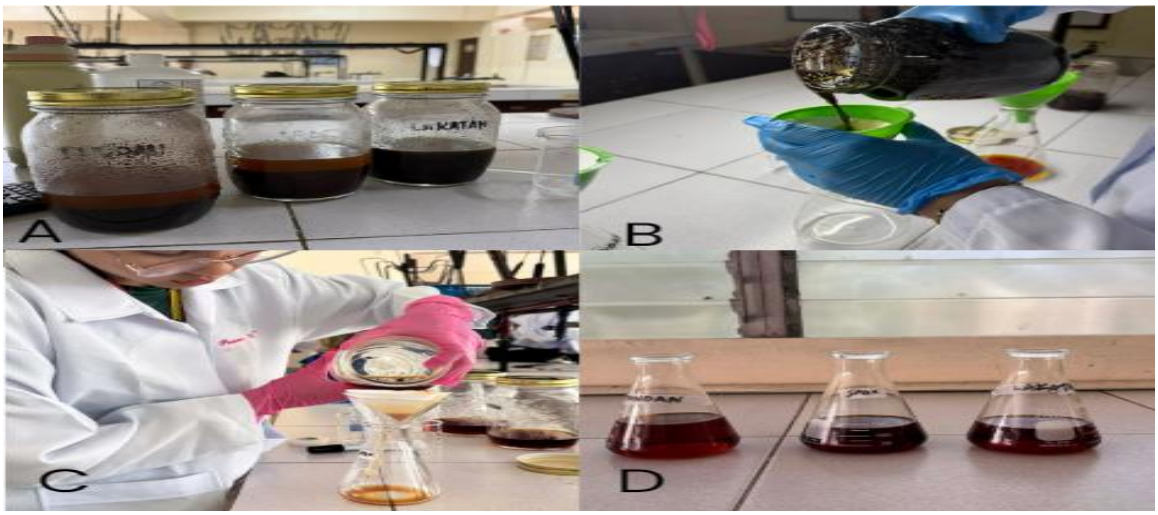


**Figure 4.** Preparation of Concentrated Banana Peel Extract (A. Soaking of powdered banana peels in ethanol; B. Initial filtration of the banana peel extract using filter paper; C. Secondary filtration of the filtrate using filter paper; D. Removal of ethanol via air evaporation)

for the extraction, purification, and stabilization of bioactive compounds (Sanap & Mahajan, 2023). Sanap & Mahajan (2023) showed that ethanol exhibits favorable separation and purification properties, making it suitable for maintaining extract consistency and for accurately preparing varying concentrations for experimental applications.

**Table 1. Dilution Scheme for Preparing Banana Peel Extract Concentrations**

| Percent Concentration (%) | Volume of Concentrated Extract (µL) | Final Volume (µL) |
|---|---|---|
| 75 | 75 | 100 |
| 50 | 50 | 100 |
| 25 | 25 | 100 |

The percentage of Banana Peel extract concentration was calculated as follows:

$$\text{Percent Concentration (\%)} = \frac{V_{\,concentrated\ extract}}{V_{Final\ solution}}\ x\ 100 \qquad (1)$$

Equation 1.

Where:

$V_{concentrated\ extract}$ is the volume of concentrated banana peel extract (µL).

$V_{Final\ solution}$ is the total final volume of the prepared solution (µL).

**Collection of Blood Samples**

With the completed ethics license (Approval Code: MUREC-UNDERGRAD 2026-004) from Misamis University Research Center, the researchers handed out consent forms, with a signature from the registered Medical Technologist who performed the blood extractions. These forms were handed to 15 third-year Bachelor of Science in Medical Technology volunteers at Misamis University. The 15 individuals were selected based on their normal health condition as confirmed through Complete Blood Count results. Donning complete PPE in accordance with Occupational Safety and Health Administration (2011) standards for clinical laboratory practice, the RMT extracted 10 mL of blood from consenting individuals. 5 mL of the collected blood was placed in an EDTA tube or a purple-top tube for Complete Blood Count. After collection, the blood samples were transported to the laboratory and processed within 1 hour. The complete blood count was performed using the Sysmex XN-550. The complete blood count results for the 15 volunteers were interpreted as normal after consultation with a licensed medical doctor. These EDTA tubes served as negative control. The other 5mL of blood samples were divided into 5 red-top tubes, each containing 1 mL of blood, and were then promptly added with varying concentrations of banana peel extract to begin the modified coagulation assay. The 5th red-top tube with no additive served as positive control.

**Modified Coagulation Assay**

To determine the procoagulant properties of banana peel at concentrations of 25%, 50%, 75%, and 100%, this study was based on the plant extraction procedure described by Catalan et al. (2014).

Standard laboratory procedures, including the use of complete PPE, were observed prior to beginning the modified coagulation assay. The procedure was modified by dividing the 15 healthy volunteers into 3 groups, each corresponding to the coagulation assay groups for the three different peel extract species. The collected 5 mL of blood from each volunteer was separated and treated with the 25%, 50%, 75%, and 100% concentrations of a specific species' peel extract. After collection of blood samples from consenting volunteers, the peripheral blood, amounting to 5 mL, was divided into 5 separate red-top tubes (blood tubes with no additive). The venous blood transferred to each red top tube amounted to 1 mL of peripheral blood. The 1 mL of venous blood in the tubes was subsequently mixed with 100 uL of the prepared peel extracts of the 25%, 50%, 75%, and 100% specific species through gentle inversion of the tubes. Then, the blood-and-peel extract mixture was observed macroscopically for any visible coagulation. The macroscopic evidence of coagulation is the complete loss of fluidity in the treated blood samples. The clotting times for the different concentrations across species were then recorded. Following observation, the peel extract-treated blood was centrifuged for 5 minutes at 3400 rpm. This centrifugation allowed for the separation of the blood component, enabling macroscopic observation of hemolysis. Red blood cell hemolysis is indicated by a red supernatant fluid in the blood tube following centrifugation.

**Evaluation of Peripheral Blood Smear**

Standard laboratory safety protocols were observed throughout the procedure, including the use of PPE. A drop of blood-and-peel extract mixture was placed on a slide for preparation of wet smears. The wet smears were then air-dried and stained with Hema-Quick. The Hema-Quick Stain was described in the study of Levitt et al. (2019) as a rapid Romanowsky-type staining technique used to enhance microscopic visualization of cellular morphology. It consists of a methanol-based fixative that preserves cellular structure, an eosin solution that stains the cytoplasm, and a methylene blue solution that highlights the nucleus. The combination produces a clear contrast between nuclear and cytoplasmic components, allowing quick evaluation of cell morphology. The smears were observed under the microscope at 1000x magnification to assess the presence of red blood cell clumping and crenation, and to preserve red blood cell size and morphology (Keohane et al., 2024).

**Data Analysis**

The collected data were organized and analyzed to evaluate the procoagulant effects of ethanolic peel extracts from Saba, Lakatan, and Latundan bananas at different concentrations, compared with the control group. Coagulation time (in seconds) served as the primary quantitative variable.

Mean coagulation times for five individuals at each extract concentration were computed to compare the effects of the different banana peel extracts. The control group served as the baseline for evaluating changes in coagulation time. Procoagulant activity

was further assessed through macroscopic observation of clot formation and microscopic examination of blood smear morphology to support the coagulation findings.

**Statistical Analysis**

The results underwent a normality test, such as the Shapiro-Wilk test, to assess whether the collected data, particularly the coagulation time in response to the different concentrations, follow a normal distribution. Since Saba and Lakatan exhibited a normal distribution, one-way analysis of variance was used to determine significant differences among treatment concentrations, followed by Tukey's Honestly Significant Difference (HSD) test for post hoc analysis. In contrast, Tundan data did not exhibit a normal distribution; therefore, the non-parametric method, specifically the Kruskal-Wallis test, was applied. All statistical analyses were conducted at a 0.05 level of significance ($\alpha = 0.05$).

**Ethical Consideration**

The study underwent ethical review and was approved by the Misamis University-Research Center Ethics Committee prior to its conduct (Approval Code: MUREC-UNDERGRAD 2026-004). Informed consent from student participants for blood sample collection was obtained after they were fully informed of the study's purpose, procedures, and potential benefits and risks, to ensure voluntary participation and uphold ethical standards. All personal and medical information of the participants was kept confidential and in accordance with institutional review board/ethics committee regulations. All efforts were made to minimize potential harm or discomfort during blood handling and sampling.

All biological materials such as blood samples were properly disposed of in a designated biohazard waste container. Chemical materials used during the study were collected in a labeled hazardous waste container and disposed of in accordance with institutional safety guidelines and environmental health regulations. Moreover, the results from this study remained anonymous, subject, of course, to access by volunteers, in order to ensure the privacy and autonomy of individuals who continue – or desist – over time, to control knowledge about their participation.

# RESULTS AND DISCUSSIONS

## Preliminary Trials and Optimization of Experimental Conditions

*Blood-to-Extract Ratio Optimization*

Prior to performing the modified clotting time assay of the varying concentrations (25%, 50%, 75%, and 100%) of the Latundan (*Musa acuminata* × *balbisiana* AAB group), Lakatan (*Musa acuminata*), and Saba (*Musa acuminata* × *balbisiana* ABB Group) peel extracts, a total of three trials were performed. The first trial involved experimenting with ratios, as shown in Table 2. It was found that a 1:1 blood-to-anticoagulant ratio produced faster clotting than a tube of extracted blood without an additive (positive control). In the following tube, a blood-to-anticoagulant ratio of 1:2 was used. The results remained the same as the previous 1:1 ratio. However, upon centrifugation of the clotted samples treated with the banana peel extract, a red supernatant liquid was observed, indicating hemolysis. Hemolysis of the blood samples was observed in both tubes at 1:1 and 1:2 blood-to-anticoagulant ratios. Based on these initial findings, the hemostatic potential of the banana peel extracts showed promise.

**Table 2. Optimization of Blood-to-Extract Ratio of Human Blood Treated with Varying Concentrations of Saba, Lakatan, and Latundan Banana Peel Extracts**

| Variety | 1:1 | 1:2 | 1:10 | Control |
|---|---|---|---|---|
| Saba | 2 | 1 | 3 | 3 |
| Tundan | 2 | 1 | 4 | 3 |
| Lakatan | 2 | 1 | 3 | 3 |

Grading: 1 = 1 to 5 minutes; 2 = 6 to 10 minutes; 3 = 11 to 15 minutes; 4 = 16 to 20 minutes

*Effects on Red Blood Cell Morphology*

The second trial was conducted using EDTA whole blood as a negative control, as shown in Figure 5. The extracted venous blood mixed with 100 uL of 100% Saba (*Musa acuminata* × *balbisiana* ABB Group) peel extract produced a clotted sample at the 20-minute mark. However, before complete clotting of the extract-treated blood, triplicate blood smears were prepared. After air-drying, the prepared blood smears were stained with Hema-Quick. Upon further examination via oil immersion microscopy, the blood morphology of the banana peel extract-treated blood exhibited a lysed and ruptured appearance upon inspection, as shown in Figure 6. Ruptured red blood cells were observed in extracts from all species.

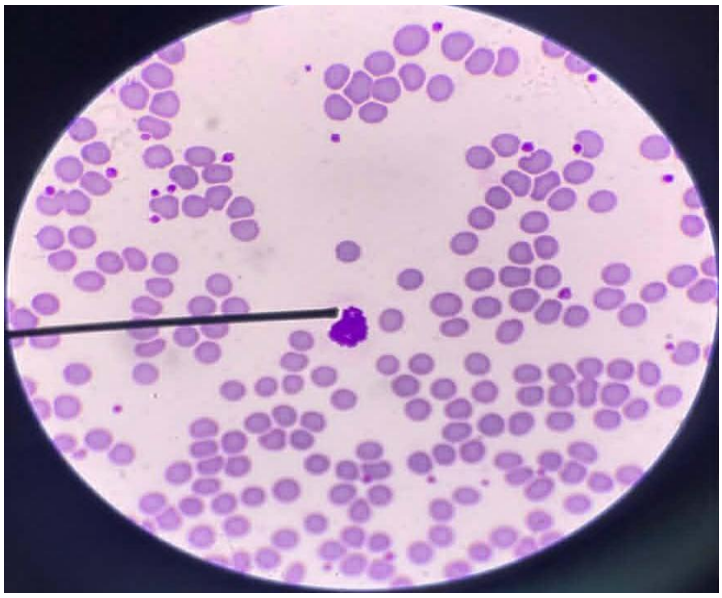

**Figure 5.** Oil immersion view of Peripheral Blood Smear of control (EDTA Whole Blood)

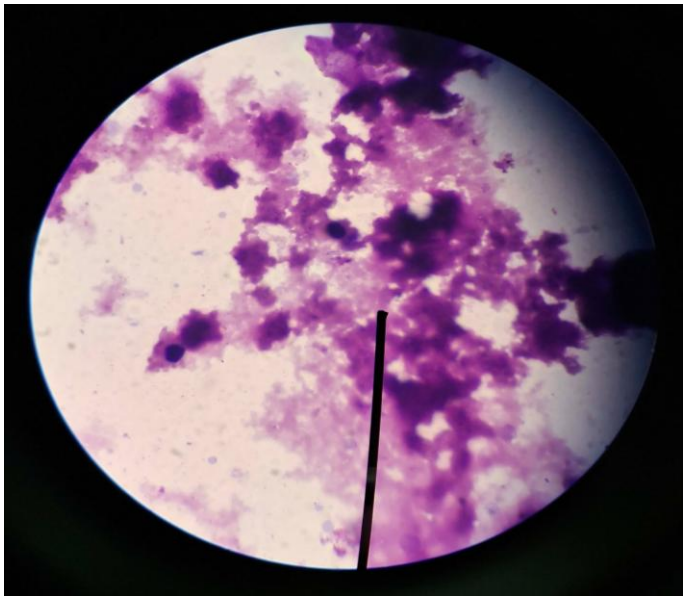

**Figure 6.** Oil immersion view of prepared Peripheral Blood Smear of venous blood mixed with 100 uL of 100% Saba *(Musa acuminata* × *balbisiana* ABB Group*)* peel extract

A total of 36 blood smears were evaluated, with each species' concentration investigated in triplicate. According to a study by Zheng et al. (2025), exposure to high concentrations of ethanol triggers a cascade of hemolysis. The concentration of absolute ethanol used in the extraction process could be a major contributor to RBC lysis. These findings of ruptured and lysed RBCs support the first trials' results of hemolysis upon centrifugation.

Interestingly, in the 75% concentration of banana peel extract-treated blood, clumped red blood cells were observed, as shown in Figure 7. These clumped red blood cells are the microscopic evidence of clotting in the blood samples. Moreover, in the 50% concentration of the peel extract-treated blood samples, red blood cell clumping was also observed; however, it was less pronounced than at 75% concentration. Consequently, the 25% concentration of the peel extract-treated blood samples showed a lower presence of

clumped red blood cells. The blood sample with a 25% concentration of Saba (*Musa acuminata* × *balbisiana* AAB group) peel extract most closely resembled the negative control (EDTA tube), exhibiting relatively normal red blood cell morphology before complete clotting. These results were observed across the triplicates of the specific concentrations, as well as the Latundan (*Musa acuminata* × *balbisiana* AAB group) and Lakatan (*Musa acuminata)* species.

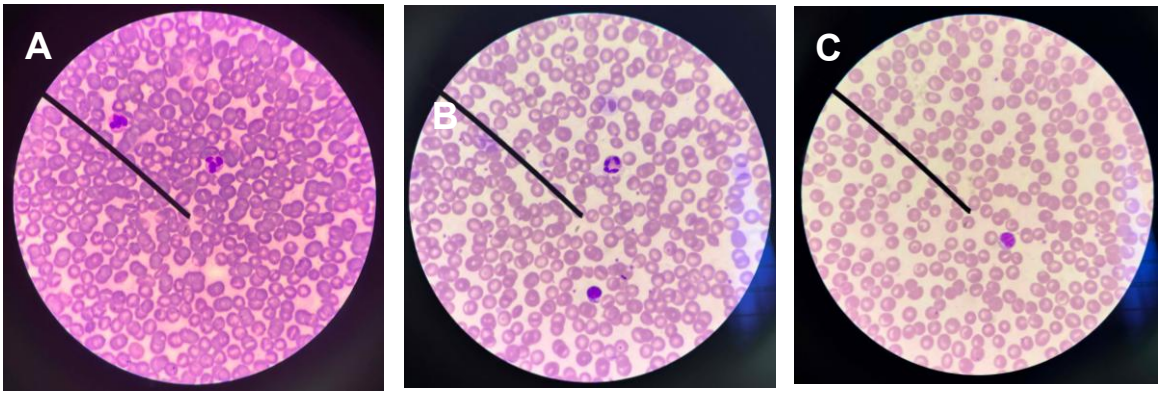


**Figure 7.** Oil immersion view of Peripheral Blood Smear of Treated Blood Samples **(A)** Venous blood mixed with 100 uL of 75% Saba (*Musa acuminata* × *balbisiana* AAB group) peel extract. **(B)** Venous blood mixed with 100 uL of 50% Saba (*Musa acuminata* × *balbisiana* AAB group) peel extract. **(C)** Venous blood mixed with 100 uL of 25% Saba (*Musa acuminata* × *balbisiana* AAB group) peel extract.

**Selection of Modified Assay Conditions**

Following the preliminary findings, the experimental conditions were modified to minimize hemolysis and allow more reliable assessment of clotting time. A reduced extract-to-blood ratio of 1:10 was employed by mixing 100 µL of extract with 1 mL of extracted venous blood. A total of 12 tubes were prepared. The final results across all tubes exhibited full clotting of the blood. Interestingly, coagulation delay in the blood tubes varied by species and concentration. These observed differences were repeated and recorded, leading to the final clotting time assay.

Table 3 showed the comparative clotting time of blood samples treated with varying concentrations of Latundan (*Musa acuminata* × *balbisiana* AAB group), Lakatan (*Musa acuminata*), and Saba (*Musa acuminata* × *balbisiana* ABB Group) peel extracts. The results showed variations in clotting responses across both concentrations and banana species. Saba generally showed higher values at higher concentrations, whereas Latundan showed fluctuating results, with the longest clotting time at 75%. Interestingly, Lakatan exhibited relatively stable but slightly increasing clotting times. The control group consistently showed shorter clotting times than most treated samples. Additionally, variable results were observed in the clotting time assay at the 75% and 100% concentrations. These inconsistencies were observed across the three species. Overall, the results suggest that banana peel extracts may influence blood clotting behavior in a species- and concentration-dependent manner**.**

**Table 3. Mean Clotting Time (seconds) of Human Blood Treated with Varying Concentrations of Saba, Lakatan, and Latundan Banana Peel Extracts**

| Variety | 25% | 50% | 75% | 100% | Control |
|---|---|---|---|---|---|
| **Saba** | 410.6 ± 55.5 | 360.0 ± 75.5 | 297.0 ± 45.3 | 367.6 ± 57.7 | 435.6 ± 59.5 |
| **Tundan** | 272.6 ± 75.1 | 432.6 ± 178.7 | 509.8 ± 211.9 | 321.4 ±71 .2 | 216.0 ± 68.4 |
| **Lakatan** | 286.2 ± 65.7 | 291.8 ± 75.5 | 312.0 ± 98.2 | 298.6 ± 85.2 | 228.8 ± 64.6 |

Table 4 presents the one-way analysis of variance for clotting time of Saba banana peel extract under different concentrations. The results showed a statistically significant difference among treatment groups ($F = 3.12$, $p = 0.036$). Since the p-value is less than 0.05, the null hypothesis was rejected, indicating that at least one treatment group differs significantly from the control group.

**Table 4. One-Way Analysis of Variance (ANOVA) of Mean Clotting Time Among Different Treatment Concentrations of Saba (*Musa acuminata* × *balbisiana* ABB Group) Peel Extract**

| Source of Variation | SS | df | MS | F | p-value | Decision |
|---|---|---|---|---|---|---|
| Between Groups | 52,584.24 | 4 | 13,146.06 | **3.12** | **0.036*** | Reject $H_0$ |
| Within Groups | 84,300.80 | 20 | 4,215.04 | | | |
| **Total** | 136,885.04 | 24 | | | | |

Legend: *significant @ $p < 0.05$

Table 5 revealed that only the comparison between the 75% concentration and the control was statistically significant, with a p-value of 0.018. Therefore, the null hypothesis for this comparison was rejected. This indicates that the 75% Saba extract significantly reduced clotting time compared to the control. Specifically, the 75% concentration exhibited a lower mean clotting time (297.0 ± 45.3 s) than the control (435.6 ± 59.5 s), suggesting faster clot formation rather than coagulation inhibition.

**Table 5. Pairwise Comparison of Mean Clotting Times (seconds) Among Different Treatment Concentrations of Saba (*Musa acuminata* × *balbisiana* ABB Group) Peel Extract Using Tukey's Honestly Significant Difference (HSD) Test**

| Comparison | Mean Difference | q-value | p-value | Decision |
|---|---|---|---|---|
| 25% vs 50% | 50.6 | 1.74 | 0.78 | Fail to Reject $H_0$ |
| 25% vs 75% | 113.6 | 3.91 | 0.07 | Fail to Reject $H_0$ |
| 25% vs 100% | 43.0 | 1.48 | 0.86 | Fail to Reject $H_0$ |
| 25% vs Control | 25.0 | 0.86 | 0.96 | Fail to Reject $H_0$ |
| 50% vs 75% | 63.0 | 2.17 | 0.56 | Fail to Reject $H_0$ |
| 50% vs 100% | 7.6 | 0.26 | 0.99 | Fail to Reject $H_0$ |
| 50% vs Control | 75.6 | 2.60 | 0.41 | Fail to Reject $H_0$ |
| 75% vs 100% | 70.6 | 2.43 | 0.47 | Fail to Reject $H_0$ |
| 75% vs Control | **138.6** | **4.78** | **0.018*** | **Reject $H_0$** |
| 100% vs Control | 68.0 | 2.34 | 0.50 | Fail to Reject $H_0$ |

*Legend: * significant @ $p < 0.05$*

Across the Lakatan and Latundan banana peel extracts, statistical analysis showed no significant differences in clotting time among the different treatment concentrations and the control group. For Lakatan, one-way ANOVA (Table 6) revealed no significant effect of treatment concentration on clotting time ($F = 1.27$, $p = 0.312$), indicating that clot formation was not significantly influenced by the different extract concentrations, including the control. Similarly, the Kruskal-Wallis test for Latundan (Table 7) also showed no significant differences among all treatment groups ($H = 7.86$, $p = 0.097$), including the control.

**Table 6. One-Way Analysis of Variance (ANOVA) of Mean Clotting Time Among Different Treatment Concentrations of Lakatan (*Musa acuminata*) Peel Extract**

| Source of Variation | SS | df | MS | F | p-value | Decision |
|---|---|---|---|---|---|---|
| Between Groups | 15,122.16 | 4 | 3,780.54 | **1.27** | **0. 312** | Fail to reject $H_0$ |
| Within Groups | 59,566.80 | 20 | 2,978.34 | | | |
| **Total** | 74,688.96 | 24 | | | | |

**Table 7. Kruskal–Wallis Test Results for Mean Clotting Time (seconds) Among Different Treatment Concentrations of Latundan (*Musa acuminata* × *balbisiana* AAB Group) Peel Extract**

| Source of Variation | Statistic | df | Test Statistic | p-value | Decision |
|---|---|---|---|---|---|
| Between Groups | Sum of Ranks | 4 | **H = 7.86** | **0.097** | Fail to Reject $H_0$ |
| Within Groups | Residual (Ranks) | 20 | — | — | — |
| **Total** | — | 24 | — | — | — |

These findings suggest hemostatic or coagulation-related activity in the peel extracts of Latundan (*Musa acuminata x balbisiana* AAB Group), Lakatan (*Musa acuminata*), and Saba (*Musa acuminata x balbisiana* ABB Group). These findings are consistent with the study by Bashmil et al. (2021), which stated that phenolic compound levels were highly dependent on plant species and maturation stage. These phenolic compounds were vital in various bioactive processes, including hemostasis. According to a study by Hikmawanti et al. (2021), ethanol at high concentrations exhibited poor extraction of phenolic compounds compared with lower concentrations. Similarly, the use of absolute ethanol on ripe banana peels reduced compound extraction efficiency, leading to differences in clotting time between the positive control and the peel extract-treated blood samples.

Interestingly, banana peel extracts have been investigated for potential hemostatic or coagulation-related properties. Achmad & Putri (2021) examined the potential of banana peel extract as a hemostatic agent in wound healing. It was reported that banana peel extract contained bioactive compounds like flavonoids, saponins, tannins, and alkaloids, which may contribute to hemostatic activity and wound healing. According to their systematic review, banana peel extract has promising potential as a natural alternative for promoting tissue repair and blood clotting. These findings may help explain the strong procoagulant activity observed in the present study, as some phytochemicals in banana peel extracts may be more associated with blood clotting or hemostatic activity than with antimicrobial or antioxidant effects.

Furthermore, banana extracts contain multiple phytochemicals that may have opposing effects on coagulation. These interactions may neutralize overall activity,

resulting in no observable change. Wani and Dhanya (2025) shared that the presence of flavonoids and tannins plays a significant role in promoting hemostasis through mechanisms such as vasoconstriction, stabilization of capillary permeability, and the enhancement of platelet aggregation. However, saponins at higher concentrations may exhibit hemolytic activity. Saponins are known to interact with cholesterol in erythrocyte membranes, increasing membrane permeability and potentially leading to red blood cell lysis. This may help explain the hemolysis and ruptured red blood cells observed in the present study.

# CONCLUSION AND RECOMMENDATION

This study found that ethanolic peel extracts of Latundan (Musa acuminata × balbisiana AAB group), Lakatan (Musa acuminata), and Saba (Musa acuminata × balbisiana ABB group) bananas exhibit potential hemostatic activity on human blood samples. Their effects may be attributed to bioactive compounds such as tannins, phenols, and flavonoids, although other phytochemicals with anticoagulant properties may have contributed to the variability in results. The banana's maturation stage and the extraction method may also have affected the concentration of these compounds. However, the ethanol extract caused red blood cell lysis and hemolysis, limiting its effectiveness in laboratory assays. Overall, the extracts demonstrated promising hemostatic potential.

In light of the study's results, alcoholic extractions at lower concentrations or aqueous-alcoholic extractions from unripe banana peels should be investigated, as this maturation stage exhibits high levels of phenolic compounds. Moreover, the phytochemicals in banana peels are an interesting aspect of the plant that warrants further research. These compounds show promising antioxidant and antimicrobial properties, which could be major contributors to natural alternatives to accepted medical interventions. Future studies should investigate the hemostatic potential of banana fruit pulp, as it is the edible and commonly consumed part of the banana. Evaluating the fruit may provide safer, more practical, and clinically relevant applications while avoiding the hemolytic effects associated with the ethanolic peel extracts.

# DECLARATION OF THE USE OF AI TOOLS

I acknowledge the use of ChatGPT [https://chat.openai.com] as a supplementary academic tool in the preparation of this research study entitled In vitro investigation of the hemostatic potential of ethanolic peel extracts from selected banana *(Musa spp.)* varieties on human blood.

The tool was utilized strictly to support the researchers in concept development, synthesis of related literature, and clarification of biochemical concepts related to coagulation.

I used the following prompt:

- "Explain the procoagulant activity of banana peel extract in an easy and understandable way."
- "Summarize related studies about banana (Musa spp.) peel and its bioactive compounds that may affect blood clotting."
- "Explain the results of a procoagulant experiment in a simple way, especially how decreasing clotting time shows stronger coagulation."
- "Describe banana peel extract and its phytochemical components such as tannins and flavonoids in a way that is easy to understand for research discussion."

I used the output as starting point of explaining in the related studies in an easier way and enhancing the scientific explanation of coagulation mechanisms influenced by banana *(Musa spp.)* peel extract.

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# APPENDIX A

Sampling Computation

**Preliminary Optimization Trial Results for the Procoagulant Effect of Saba (Musa acuminata × balbisiana ABB Group) Peel Extract at Different Treatment Concentrations**

| Saba | | | | | |
|---|---|---|---|---|---|
| Sample | 25% | 50% | 75% | 100% | Control |
| 1 | 400 seconds | 290 seconds | 270 seconds | 310 seconds | 440 seconds |
| 2 | 370 seconds | 270 seconds | 265 seconds | 435 seconds | 500 seconds |
| 3 | 450 seconds | 370 seconds | 270 seconds | 380 seconds | 490 seconds |
| 4 | 349 seconds | 430 seconds | 310 seconds | 409 seconds | 400 seconds |
| 5 | 484 seconds | 440 seconds | 370 seconds | 304 seconds | 348 seconds |

**Preliminary Optimization Trial Results for the Procoagulant Effect of Latundan (Musa acuminata × balbisiana AAB Group) Peel Extract at Different Treatment Concentrations**

| Tundan | | | | | |
|---|---|---|---|---|---|
| Sample | 25% | 50% | 75% | 100% | Control |
| 1 | 269 seconds | 290 seconds | 473 seconds | 304 seconds | 186 seconds |
| 2 | 232 seconds | 267 seconds | 304 seconds | 297 seconds | 173 seconds |
| 3 | 312 seconds | 450 seconds | 621 seconds | 368 seconds | 253 seconds |
| 4 | 374 seconds | 429 seconds | 815 seconds | 410 seconds | 312 seconds |
| 5 | 176 seconds | 727 seconds | 336 seconds | 228 seconds | 156 seconds |

**Preliminary Optimization Trial Results for the Procoagulant Effect of Lakatan (Musa acuminata) Peel Extract at Different Treatment Concentrations**

| Lakatan | | | | | |
|---|---|---|---|---|---|
| Sample | 25% | 50% | 75% | 100% | Control |
| 1 | 322 seconds | 257 seconds | 270 seconds | 281 seconds | 207 seconds |
| 2 | 220 seconds | 240 seconds | 258 seconds | 251 seconds | 206 seconds |
| 3 | 388 seconds | 415 seconds | 490 seconds | 453 seconds | 350 seconds |
| 4 | 248 seconds | 234 seconds | 300 seconds | 255 seconds | 193 seconds |
| 5 | 253 seconds | 313 seconds | 242 seconds | 253 seconds | 188 seconds |

# APPENDIX B

Informed Consent Form (Institutional Format)

**MISAMIS UNIVERSITY**
**Ozamiz City**
**COLLEGE OF MEDICAL TECHNOLOGY**

**Donor Consent**

I, Christel Angelie G. de Leon, here by consent to participate as a sample donor in the research study titled "**THE IN VITRO INVESTIGATION OF THE HEMOSTATIC POTENTIAL OF ETHANOLIC PEEL EXTRACTS FROM SELECTED BANANA (*Musa* spp.) VARIETIES ON HUMAN BLOOD**" conducted by Ashely Nicole B. Arabe, Princess Kyllah Chan, Krishan Kyle D. Mondares, and Aira Jean L. Mondejar at Misamis University under the College of Medical Technology.

I understand the purpose, procedures, and possible risks involved in this study. I have been given the opportunity to ask questions and have received satisfactory explanations regarding my participation. I understand that my participation is entirely voluntary and that I may withdraw at any time without penalty.

This study has been reviewed and approved by the Misamis University-Research Center Ethics Committee (Approval Code: MUREC-UNDERGRAD 2026-004). I also understand that all personal and medical information gathered during the study will be kept strictly confidential.

By signing below, I confirm that I have read and understood this consent form and willingly agree to participate in this research study.

Sincerely,

CHRISTEL ANGELIE G. DE LEON
Blood Sample Donor

**NOTED BY:**

**KIMBERLY S. MALOLOT, RMT, MLS (ASCPi)**
Medical Technologist

# APPENDIX B Cont'd

**MISAMIS UNIVERSITY**
**Ozamiz City**
**COLLEGE OF MEDICAL TECHNOLOGY**

**Donor Consent**

I, RENZO GABRIEL A. MENDEZ, here by consent to participate as a sample donor in the research study titled "**THE IN VITRO INVESTIGATION OF THE HEMOSTATIC POTENTIAL OF ETHANOLIC PEEL EXTRACTS FROM SELECTED BANANA (*Musa* spp.) VARIETIES ON HUMAN BLOOD**" conducted by Ashely Nicole B. Arabe, Princess Kyllah Chan, Krishan Kyle D. Mondares, and Aira Jean L. Mondejar at Misamis University under the College of Medical Technology.

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By signing below, I confirm that I have read and understood this consent form and willingly agree to participate in this research study.

Sincerely,

RENZO GABRIEL A. MENDEZ
Blood Sample Donor

**NOTED BY:**

**KIMBERLY S. MALOLOT, RMT, MLS (ASCPi)**
Medical Technologist

# APPENDIX B Cont'd

**MISAMIS UNIVERSITY**
**Ozamiz City**
**COLLEGE OF MEDICAL TECHNOLOGY**

**Donor Consent**

I, JOEL ANDRE SUSADA, here by consent to participate as a sample donor in the research study titled "**THE IN VITRO INVESTIGATION OF THE HEMOSTATIC POTENTIAL OF ETHANOLIC PEEL EXTRACTS FROM SELECTED BANANA (*Musa* spp.) VARIETIES ON HUMAN BLOOD**" conducted by Ashely Nicole B. Arabe, Princess Kyllah Chan, Krishan Kyle D. Mondares, and Aira Jean L. Mondejar at Misamis University under the College of Medical Technology.

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This study has been reviewed and approved by the Misamis University-Research Center Ethics Committee (Approval Code: MUREC-UNDERGRAD 2026-004). I also understand that all personal and medical information gathered during the study will be kept strictly confidential.

By signing below, I confirm that I have read and understood this consent form and willingly agree to participate in this research study.

Sincerely,

JOEL ANDRE SUSADA
Blood Sample Donor

**NOTED BY:**

**KIMBERLY S. MALOLOT, RMT, MLS (ASCPi)**
Medical Technologist

# APPENDIX B Cont'd

**MISAMIS UNIVERSITY**
**Ozamiz City**
**COLLEGE OF MEDICAL TECHNOLOGY**

**Donor Consent**

I, AIRA JEAN L. MONDEJAR, here by consent to participate as a sample donor in the research study titled "**THE IN VITRO INVESTIGATION OF THE HEMOSTATIC POTENTIAL OF ETHANOLIC PEEL EXTRACTS FROM SELECTED BANANA (*Musa* spp.) VARIETIES ON HUMAN BLOOD**" conducted by Ashely Nicole B. Arabe, Princess Kyllah Chan, Krishan Kyle D. Mondares, and Aira Jean L. Mondejar at Misamis University under the College of Medical Technology.

I understand the purpose, procedures, and possible risks involved in this study. I have been given the opportunity to ask questions and have received satisfactory explanations regarding my participation. I understand that my participation is entirely voluntary and that I may withdraw at any time without penalty.

This study has been reviewed and approved by the Misamis University-Research Center Ethics Committee (Approval Code: MUREC-UNDERGRAD 2026-004). I also understand that all personal and medical information gathered during the study will be kept strictly confidential.

By signing below, I confirm that I have read and understood this consent form and willingly agree to participate in this research study.

Sincerely,

AIRA JEAN L. MONDEJAR
Blood Sample Donor

**NOTED BY:**

**KIMBERLY S. MALONOT, RMT, MLS (ASCPi)**
Medical Technologist

# APPENDIX B Cont'd

**MISAMIS UNIVERSITY**
**Ozamiz City**
**COLLEGE OF MEDICAL TECHNOLOGY**

**Donor Consent**

I, FRANZ IAN A. LEDESMA, here by consent to participate as a sample donor in the research study titled "**THE IN VITRO INVESTIGATION OF THE HEMOSTATIC POTENTIAL OF ETHANOLIC PEEL EXTRACTS FROM SELECTED BANANA (*Musa* spp.) VARIETIES ON HUMAN BLOOD**" conducted by Ashely Nicole B. Arabe, Princess Kyllah Chan, Krishan Kyle D. Mondares, and Aira Jean L. Mondejar at Misamis University under the College of Medical Technology.

I understand the purpose, procedures, and possible risks involved in this study. I have been given the opportunity to ask questions and have received satisfactory explanations regarding my participation. I understand that my participation is entirely voluntary and that I may withdraw at any time without penalty.

This study has been reviewed and approved by the Misamis University-Research Center Ethics Committee (Approval Code: MUREC-UNDERGRAD 2026-004). I also understand that all personal and medical information gathered during the study will be kept strictly confidential.

By signing below, I confirm that I have read and understood this consent form and willingly agree to participate in this research study.

Sincerely,

FRANZ IAN A. LEDESMA
Blood Sample Donor

**NOTED BY:**

**KIMBERLY S. MALOLOT, RMT, MLS (ASCPi)**
Medical Technologist

# APPENDIX B Cont'd

**MISAMIS UNIVERSITY**
**Ozamiz City**
**COLLEGE OF MEDICAL TECHNOLOGY**

**Donor Consent**

I, MARY MAE BAÑEZ, here by consent to participate as a sample donor in the research study titled **"THE IN VITRO INVESTIGATION OF THE HEMOSTATIC POTENTIAL OF ETHANOLIC PEEL EXTRACTS FROM SELECTED BANANA (*Musa* spp.) VARIETIES ON HUMAN BLOOD"** conducted by Ashely Nicole B. Arabe, Princess Kyllah Chan, Krishan Kyle D. Mondares, and Aira Jean L. Mondejar at Misamis University under the College of Medical Technology.

I understand the purpose, procedures, and possible risks involved in this study. I have been given the opportunity to ask questions and have received satisfactory explanations regarding my participation. I understand that my participation is entirely voluntary and that I may withdraw at any time without penalty.

This study has been reviewed and approved by the Misamis University-Research Center Ethics Committee (Approval Code: MUREC-UNDERGRAD 2026-004). I also understand that all personal and medical information gathered during the study will be kept strictly confidential.

By signing below, I confirm that I have read and understood this consent form and willingly agree to participate in this research study.

Sincerely,

MARY MAE BAÑEZ
Blood Sample Donor

**NOTED BY:**

**KIMBERLY S. MAHOLOT, RMT, MLS (ASCPi)**
Medical Technologist

# APPENDIX B Cont'd

**MISAMIS UNIVERSITY**
**Ozamiz City**
**COLLEGE OF MEDICAL TECHNOLOGY**

**Donor Consent**

I, JULIANA VANNICE LACUATA, here by consent to participate as a sample donor in the research study titled **"THE IN VITRO INVESTIGATION OF THE HEMOSTATIC POTENTIAL OF ETHANOLIC PEEL EXTRACTS FROM SELECTED BANANA (*Musa* spp.) VARIETIES ON HUMAN BLOOD"** conducted by Ashely Nicole B. Arabe, Princess Kyllah Chan, Krishan Kyle D. Mondares, and Aira Jean L. Mondejar at Misamis University under the College of Medical Technology.

I understand the purpose, procedures, and possible risks involved in this study. I have been given the opportunity to ask questions and have received satisfactory explanations regarding my participation. I understand that my participation is entirely voluntary and that I may withdraw at any time without penalty.

This study has been reviewed and approved by the Misamis University-Research Center Ethics Committee (Approval Code: MUREC-UNDERGRAD 2026-004). I also understand that all personal and medical information gathered during the study will be kept strictly confidential.

By signing below, I confirm that I have read and understood this consent form and willingly agree to participate in this research study.

Sincerely,

JULIANA VANNICE LACUATA
Blood Sample Donor

**NOTED BY:**

**KIMBERLY S. MALOLOT, RMT, MLS (ASCPi)**
Medical Technologist

# APPENDIX B Cont'd

**MISAMIS UNIVERSITY**
**Ozamiz City**
**COLLEGE OF MEDICAL TECHNOLOGY**

**Donor Consent**

I, ANGEL OBADB, here by consent to participate as a sample donor in the research study titled **"THE IN VITRO INVESTIGATION OF THE HEMOSTATIC POTENTIAL OF ETHANOLIC PEEL EXTRACTS FROM SELECTED BANANA (*Musa* spp.) VARIETIES ON HUMAN BLOOD"** conducted by Ashely Nicole B. Arabe, Princess Kyllah Chan, Krishan Kyle D. Mondares, and Aira Jean L. Mondejar at Misamis University under the College of Medical Technology.

I understand the purpose, procedures, and possible risks involved in this study. I have been given the opportunity to ask questions and have received satisfactory explanations regarding my participation. I understand that my participation is entirely voluntary and that I may withdraw at any time without penalty.

This study has been reviewed and approved by the Misamis University-Research Center Ethics Committee (Approval Code: MUREC-UNDERGRAD 2026-004). I also understand that all personal and medical information gathered during the study will be kept strictly confidential.

By signing below, I confirm that I have read and understood this consent form and willingly agree to participate in this research study.

Sincerely,

ANGEL OBADB
Blood Sample Donor

**NOTED BY:**

**KIMBERLY S. MALOLOT, RMT, MLS (ASCPi)**
Medical Technologist

# APPENDIX B Cont'd

**MISAMIS UNIVERSITY**
**Ozamiz City**
**COLLEGE OF MEDICAL TECHNOLOGY**

**Donor Consent**

I, LEOGIN AGUSTIN, here by consent to participate as a sample donor in the research study titled **"THE IN VITRO INVESTIGATION OF THE HEMOSTATIC POTENTIAL OF ETHANOLIC PEEL EXTRACTS FROM SELECTED BANANA (*Musa* spp.) VARIETIES ON HUMAN BLOOD"** conducted by Ashely Nicole B. Arabe, Princess Kyllah Chan, Krishan Kyle D. Mondares, and Aira Jean L. Mondejar at Misamis University under the College of Medical Technology.

I understand the purpose, procedures, and possible risks involved in this study. I have been given the opportunity to ask questions and have received satisfactory explanations regarding my participation. I understand that my participation is entirely voluntary and that I may withdraw at any time without penalty.

This study has been reviewed and approved by the Misamis University-Research Center Ethics Committee (Approval Code: MUREC-UNDERGRAD 2026-004). I also understand that all personal and medical information gathered during the study will be kept strictly confidential.

By signing below, I confirm that I have read and understood this consent form and willingly agree to participate in this research study.

Sincerely,

LEOGIN AGUSTIN
Blood Sample Donor

**NOTED BY:**

**KIMBERLY S. MALOLOT, RMT, MLS (ASCPi)**
Medical Technologist

# APPENDIX B Cont'd

**MISAMIS UNIVERSITY**
**Ozamiz City**
**COLLEGE OF MEDICAL TECHNOLOGY**

**Donor Consent**

I, Dannah Grace R. Vepe, here by consent to participate as a sample donor in the research study titled "**THE IN VITRO INVESTIGATION OF THE HEMOSTATIC POTENTIAL OF ETHANOLIC PEEL EXTRACTS FROM SELECTED BANANA (*Musa* spp.) VARIETIES ON HUMAN BLOOD**" conducted by Ashely Nicole B. Arabe, Princess Kyllah Chan, Krishan Kyle D. Mondares, and Aira Jean L. Mondejar at Misamis University under the College of Medical Technology.

I understand the purpose, procedures, and possible risks involved in this study. I have been given the opportunity to ask questions and have received satisfactory explanations regarding my participation. I understand that my participation is entirely voluntary and that I may withdraw at any time without penalty.

This study has been reviewed and approved by the Misamis University-Research Center Ethics Committee (Approval Code: MUREC-UNDERGRAD 2026-004). I also understand that all personal and medical information gathered during the study will be kept strictly confidential.

By signing below, I confirm that I have read and understood this consent form and willingly agree to participate in this research study.

Sincerely,

DANNAH GRACE R. VEPE
Blood Sample Donor

**NOTED BY:**

**KIMBERLY S. MAÑOLOT, RMT, MLS (ASCPi)**
Medical Technologist

# APPENDIX B Cont'd

**MISAMIS UNIVERSITY**
**Ozamiz City**
**COLLEGE OF MEDICAL TECHNOLOGY**

**Donor Consent**

I, JOSHUA B. TIU, here by consent to participate as a sample donor in the research study titled "**THE IN VITRO INVESTIGATION OF THE HEMOSTATIC POTENTIAL OF ETHANOLIC PEEL EXTRACTS FROM SELECTED BANANA (*Musa* spp.) VARIETIES ON HUMAN BLOOD**" conducted by Ashely Nicole B. Arabe, Princess Kyllah Chan, Krishan Kyle D. Mondares, and Aira Jean L. Mondejar at Misamis University under the College of Medical Technology.

I understand the purpose, procedures, and possible risks involved in this study. I have been given the opportunity to ask questions and have received satisfactory explanations regarding my participation. I understand that my participation is entirely voluntary and that I may withdraw at any time without penalty.

This study has been reviewed and approved by the Misamis University-Research Center Ethics Committee (Approval Code: MUREC-UNDERGRAD 2026-004). I also understand that all personal and medical information gathered during the study will be kept strictly confidential.

By signing below, I confirm that I have read and understood this consent form and willingly agree to participate in this research study.

Sincerely,

JOSHUA B. TIU
Blood Sample Donor

**NOTED BY:**

**KIMBERLY S. MALOLOT, RMT, MLS (ASCPi)**
Medical Technologist

# APPENDIX B Cont'd

**MISAMIS UNIVERSITY**
**Ozamiz City**
**COLLEGE OF MEDICAL TECHNOLOGY**

**Donor Consent**

I, Channery Nicole R. Indoc, here by consent to participate as a sample donor in the research study titled "**THE IN VITRO INVESTIGATION OF THE HEMOSTATIC POTENTIAL OF ETHANOLIC PEEL EXTRACTS FROM SELECTED BANANA (*Musa* spp.) VARIETIES ON HUMAN BLOOD**" conducted by Ashely Nicole B. Arabe, Princess Kyllah Chan, Krishan Kyle D. Mondares, and Aira Jean L. Mondejar at Misamis University under the College of Medical Technology.

I understand the purpose, procedures, and possible risks involved in this study. I have been given the opportunity to ask questions and have received satisfactory explanations regarding my participation. I understand that my participation is entirely voluntary and that I may withdraw at any time without penalty.

This study has been reviewed and approved by the Misamis University-Research Center Ethics Committee (Approval Code: MUREC-UNDERGRAD 2026-004). I also understand that all personal and medical information gathered during the study will be kept strictly confidential.

By signing below, I confirm that I have read and understood this consent form and willingly agree to participate in this research study.

Sincerely,

CHANNERY NICOLE R. INDOC
Blood Sample Donor

**NOTED BY:**

**KIMBERLY S. MALOLOT, RMT, MLS (ASCPi)**
Medical Technologist

# APPENDIX B Cont'd

**MISAMIS UNIVERSITY**
**Ozamiz City**
**COLLEGE OF MEDICAL TECHNOLOGY**

**Donor Consent**

I, PRINCE ONE A. TALA, here by consent to participate as a sample donor in the research study titled "**THE IN VITRO INVESTIGATION OF THE HEMOSTATIC POTENTIAL OF ETHANOLIC PEEL EXTRACTS FROM SELECTED BANANA (*Musa* spp.) VARIETIES ON HUMAN BLOOD**" conducted by Ashely Nicole B. Arabe, Princess Kyllah Chan, Krishan Kyle D. Mondares, and Aira Jean L. Mondejar at Misamis University under the College of Medical Technology.

I understand the purpose, procedures, and possible risks involved in this study. I have been given the opportunity to ask questions and have received satisfactory explanations regarding my participation. I understand that my participation is entirely voluntary and that I may withdraw at any time without penalty.

This study has been reviewed and approved by the Misamis University-Research Center Ethics Committee (Approval Code: MUREC-UNDERGRAD 2026-004). I also understand that all personal and medical information gathered during the study will be kept strictly confidential.

By signing below, I confirm that I have read and understood this consent form and willingly agree to participate in this research study.

Sincerely,

PRINCE ONE A. TALA
Blood Sample Donor

**NOTED BY:**

**KIMBERLY S. MALOBOT, RMT, MLS (ASCPi)**
Medical Technologist

# APPENDIX B Cont'd

**MISAMIS UNIVERSITY**
**Ozamiz City**
**COLLEGE OF MEDICAL TECHNOLOGY**

**Donor Consent**

I, Daphne Jayce D. Laurete, here by consent to participate as a sample donor in the research study titled **"THE IN VITRO INVESTIGATION OF THE HEMOSTATIC POTENTIAL OF ETHANOLIC PEEL EXTRACTS FROM SELECTED BANANA (*Musa* spp.) VARIETIES ON HUMAN BLOOD"** conducted by Ashely Nicole B. Arabe, Princess Kyllah Chan, Krishan Kyle D. Mondares, and Aira Jean L. Mondejar at Misamis University under the College of Medical Technology.

I understand the purpose, procedures, and possible risks involved in this study. I have been given the opportunity to ask questions and have received satisfactory explanations regarding my participation. I understand that my participation is entirely voluntary and that I may withdraw at any time without penalty.

This study has been reviewed and approved by the Misamis University-Research Center Ethics Committee (Approval Code: MUREC-UNDERGRAD 2026-004). I also understand that all personal and medical information gathered during the study will be kept strictly confidential.

By signing below, I confirm that I have read and understood this consent form and willingly agree to participate in this research study.

Sincerely,

DAPHNE JAYCE D. LAURETE
Blood Sample Donor

**NOTED BY:**

**KIMBERLY S. MADDLOT, RMT, MLS (ASCPi)**
Medical Technologist

# APPENDIX B Cont'd

**MISAMIS UNIVERSITY**
**Ozamiz City**
**COLLEGE OF MEDICAL TECHNOLOGY**

**Donor Consent**

I, Judecael Kalil D. Zambra, here by consent to participate as a sample donor in the research study titled **"THE IN VITRO INVESTIGATION OF THE HEMOSTATIC POTENTIAL OF ETHANOLIC PEEL EXTRACTS FROM SELECTED BANANA (*Musa* spp.) VARIETIES ON HUMAN BLOOD"** conducted by Ashely Nicole B. Arabe, Princess Kyllah Chan, Krishan Kyle D. Mondares, and Aira Jean L. Mondejar at Misamis University under the College of Medical Technology.

I understand the purpose, procedures, and possible risks involved in this study. I have been given the opportunity to ask questions and have received satisfactory explanations regarding my participation. I understand that my participation is entirely voluntary and that I may withdraw at any time without penalty.

This study has been reviewed and approved by the Misamis University-Research Center Ethics Committee (Approval Code: MUREC-UNDERGRAD 2026-004). I also understand that all personal and medical information gathered during the study will be kept strictly confidential.

By signing below, I confirm that I have read and understood this consent form and willingly agree to participate in this research study.

Sincerely,

JUDECAEL ZAMBRA
Blood Sample Donor

**NOTED BY:**

**KIMBERLY S. MALOLOT, RMT, MLS (ASCPi)**
Medical Technologist

# APPENDIX B Cont'd

**MISAMIS UNVERSITY**
*Ozamiz City*
***Department of Student Affairs & Services***

MU-DSAS-006/02June2023

**PARENT'S CONSENT**

COLLEGE OF MEDICAL TECHNOLOGY
**Sponsoring Group/Organization**

I am allowing my son/daughter/ward, PRINCESS KYLLAH CHAN, to join the simple extraction for research *(activity)* to be held on February 2026 at MSU-IIT, Iligan City under the supervision of Dr. Meliza Barba *(Adviser/Faculty)*.

I understand that Misamis University exercises the necessary safety precautions in this activity.

In consideration of the benefits to be derived from the above activity, I expressly waive any and all claims against the administration or any member of the faculty and staff of the Misamis University on account of any unforeseen accident or injury that my son/daughter/ward might incur in connection with the aforementioned activity.

Dy Tan Kenneth
Signature over printed name of **Parent/Guardian**

01/16/26
Date

Princess Kyllah Chan
Signature over printed name of **Student**

01/16/26
Date

***Important*: This form shall be submitted to the DSAS Office at least two (2) days before the conduct of the activity.**

SUBSCRIBED AND SWORN to before me, this JAN 22 2026 day of _____ at Ozamiz City, Philippines, that the herein affiant personally came and appeared with his/her _____, as evidence of his/her personal identity.

Doc. No. 402
Page No. 82
Book No. IX
Series of 2026

**ATTY. REY B. BINAG, RMT**
Notarial Commission No. 2025-18
Notary Public for Ozamiz City and Clarin
City Hall Drive, Bernad Subdivision, Aguada, Ozamiz City
PTR No. 6007751; 01/05/2026; Ozamiz City
IBP O.R. No. 576165; 12/29/2025; Pasig City
Attorney's Roll No. 70648
MCLE Compliance No. VIII-0014127; Valid until 04/14/2028

Notary Public
Until _____
PTR No. _____
IBP No. _____
TIN No. _____
Roll No. _____

***(For DSAS Personnel only)***

*Attested by*:

**RODEL L. BALDADO, MHist, MAEd**
OIC, Department of Student Affairs & Services

Date: _____

# APPENDIX B Cont'd

**MISAMIS UNVERSITY**
*Ozamiz City*
***Department of Student Affairs & Services***

MU-DSAS-006/02June2023

**PARENT'S CONSENT**

COLLEGE OF MEDICAL TECHNOLOGY
**Sponsoring Group/Organization**

I am allowing my son/daughter/ward, ASHLEY NICOLE B. ARABE, to join the simple extraction for research *(activity)* to be held on February 2026 at MCU-IIT, Iligan City under the supervision of Dr. Meliza Parba *(Adviser/Faculty)*.

I understand that Misamis University exercises the necessary safety precautions in this activity.

In consideration of the benefits to be derived from the above activity, I expressly waive any and all claims against the administration or any member of the faculty and staff of the Misamis University on account of any unforeseen accident or injury that my son/daughter/ward might incur in connection with the aforementioned activity.

RHONA MARGARITA ARABE
Signature over printed name of **Parent/Guardian**

01/20/26
Date

ASHLEY NICOLE B. ARABE
Signature over printed name of **Student**

01/20/26
Date

***Important: This form shall be submitted to the DSAS Office at least two (2) days before the conduct of the activity.***

SUBSCRIBED AND SWORN to before me, this JAN 22 2026 day of _____ at Ozamiz City, Philippines, that the herein affiant personally came and appeared with his/her _____, as evidence of his/her personal identity.

Doc. No. 401
Page No. 82
Book No. IX
Series of 2026

**ATTY. REY B. BINAG, RMT**
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Notary Public for Ozamiz City and Clarin
City Hall Drive, Bernad Subdivision, Aguada, Ozamiz City
PTR No. 6007751; 01/05/2026; Ozamiz City
IBP O.R. No. 576165; 12/29/2025; Pasig City
Attorney's Roll No. 70648
MCLE Compliance No. VIII-0014127; Valid until 04/14/2028

Notary Public
Until _____
PTR No. _____
IBP No. _____
TIN No. _____
Roll No. _____

(*For DSAS Personnel only*)

*Attested by:*

**RODEL L. BALDADO, MHist, MAEd**
OIC, Department of Student Affairs & Services

Date: _____

# APPENDIX B Cont'd

**MISAMIS UNVERSITY**
*Ozamiz City*
***Department of Student Affairs & Services***

MU-DSAS-006/02June2023

**PARENT'S CONSENT**

COLLEGE OF MEDICAL TECHNOLOGY
**Sponsoring Group/Organization**

I am allowing my son/daughter/ward, KRISHAN KYLE D. MONDAREZ, to join the sample extraction for research *(activity)* to be held on February 2026 at WU-IIT, Iligan City under the supervision of Dr. Meliza Parba *(Adviser/Faculty)*.

I understand that Misamis University exercises the necessary safety precautions in this activity.

In consideration of the benefits to be derived from the above activity, I expressly waive any and all claims against the administration or any member of the faculty and staff of the Misamis University on account of any unforeseen accident or injury that my son/daughter/ward might incur in connection with the aforementioned activity.

ALMA S. MONDAREZ
Signature over printed name of **Parent/Guardian**

01/16/26
Date

KRISHAN KYLE D. MONDAREZ
Signature over printed name of **Student**

01/16/26
Date

***Important: This form shall be submitted to the DSAS Office at least two (2) days before the conduct of the activity.***

SUBSCRIBED AND SWORN to before me, this JAN 22 2026 day of _____ at Ozamiz City, Philippines, that the herein affiant personally came and appeared with his/her _____, as evidence of his/her personal identity.

Doc. No. 403
Page No. 82
Book No. IX
Series of 2026

**ATTY. REX B. BINAG, RMT**
Notarial Commission No. 2025-18
Notary Public for Ozamiz City and Clarin
City Hall Drive, Bernad Subdivision, Aguada, Ozamiz City
PTR No. 6007751; 01/05/2026; Ozamiz City
IBP O.R. No. 576165; 12/29/2025; Pasig City
Attorney's Roll No. 70648
MCLE Compliance No. VIII-CJ14127; Valid until 04/14/2028

Notary Public
Until _____
PTR No. _____
IBP No. _____
TIN No. _____
Roll No. _____

(*For DSAS Personnel only*)

*Attested by:*

**RODEL L. BALDADO, MHist, MAEd**
OIC, Department of Student Affairs & Services

Date: _____

# APPENDIX C

Permits (Gratuitous Permit)

**MISAMIS UNIVERSITY**

*Ozamiz City*

**College of Medical Technology**

CERTIFIED: ISO 9001:2015 Quality Management System – DNV-GL Pty Limited Australia
ACCREDITED: Philippine Association of Colleges and Universities Commission on Accreditation (PACUCOA)
GRANTED: AUTONOMOUS STATUS by the Commission on Higher Education (CHED)

January 19, 2026

**HAYDEE D. VILLANUEVA, PhD**
Dean, College of Arts and Sciences

Dear Dr. Villanueva:

Good day.

We are writing to respectfully request permission to use a laboratory room and to borrow the necessary laboratory equipment in connection with our approved research study entitled **"The Anticoagulant Potential of Ethanolic Banana (*Musa* spp.) Peel Extract on Human Blood Samples"**. The laboratory will be utilized on February -March from 1:00 to 4:00 PM for the conduct of experimental procedures and data collection required for the completion of our research. We assure you that the laboratory room and all borrowed laboratory equipment will be handled with utmost care and responsibility. All institutional policies, laboratory rules, and safety protocols will be strictly observed, and all facilities and equipment will be returned in proper condition immediately after use.

The use of the laboratory facilities is essential to the successful completion of our research, which is a required academic undertaking of our program. In this regard, we respectfully seek your kind approval of this request. Thank you very much for your time and consideration.

Respectfully yours,

**ASHLEY NICOLE B. ARABE**
Researcher

**PRINCESS KYLLAH CHAN**
Researcher

# APPENDIX C Cont'd

**MISAMIS UNIVERSITY**

*Ozamiz City*

**College of Medical Technology**

CERTIFIED: ISO 9001:2015 Quality Management System – DNV-GL Pty Limited Australia
ACCREDITED: Philippine Association of Colleges and Universities Commission on Accreditation (PACUCOA)
GRANTED: AUTONOMOUS STATUS by the Commission on Higher Education (CHED)

**KRISHAN KYLE D. MONDARES**
Researcher

NOTED BY:

**MELIZA P. ARBA, PhD**
Research Adviser

**ARJADE O. ALCABAZA, LPT, RChT**
Laboratory-in-charge

RECOMMENDING APPROVAL:

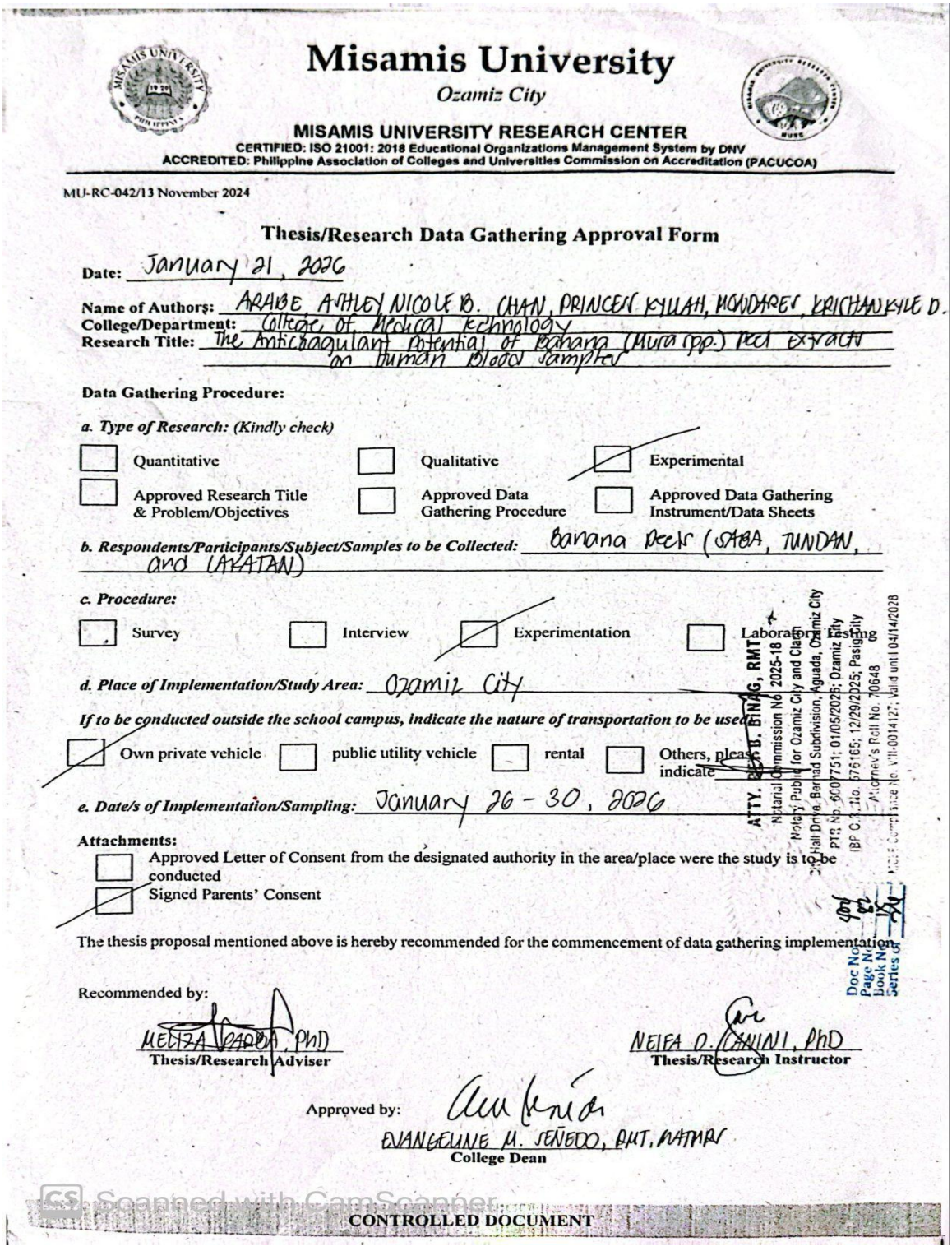
**Nelfa D. Canini, PhD**
Chairperson, Department of Natural Sciences

APPROVED BY:

**HAYDEE D. VILLANUEVA, PhD**
Dean, College of Arts and Sciences

# APPENDIX D

Approved Letter of Consent



**Misamis University**
*Ozamiz City*

**MISAMIS UNIVERSITY RESEARCH CENTER**
CERTIFIED: ISO 21001: 2018 Educational Organizations Management System by DNV
ACCREDITED: Philippine Association of Colleges and Universities Commission on Accreditation (PACUCOA)

MU-RC-042/13 November 2024

**Thesis/Research Data Gathering Approval Form**

**Date:** January 21, 2026

**Name of Authors:** ARABE, ASHLEY NICOLE B., CHAN, PRINCESS KYLIAH, MONDAREZ, KRISHAN KYLE D.
**College/Department:** College of Medical Technology
**Research Title:** The Anticoagulant Potential of Banana (Musa spp.) Peel Extracts on Human Blood Samples

**Data Gathering Procedure:**

*a. Type of Research: (Kindly check)*

☐ Quantitative ☐ Qualitative ☒ Experimental

☐ Approved Research Title & Problem/Objectives ☐ Approved Data Gathering Procedure ☐ Approved Data Gathering Instrument/Data Sheets

*b. Respondents/Participants/Subject/Samples to be Collected:* Banana Peels (SABA, TUNDAN, and LAKATAN)

*c. Procedure:*

☐ Survey ☐ Interview ☒ Experimentation ☐ Laboratory Testing

*d. Place of Implementation/Study Area:* Ozamiz City

*If to be conducted outside the school campus, indicate the nature of transportation to be used:*

☒ Own private vehicle ☐ public utility vehicle ☐ rental ☐ Others, please indicate _____

*e. Date/s of Implementation/Sampling:* January 26 - 30, 2026

**Attachments:**

☐ Approved Letter of Consent from the designated authority in the area/place were the study is to be conducted
☒ Signed Parents' Consent

The thesis proposal mentioned above is hereby recommended for the commencement of data gathering implementation.

Recommended by:

MELIZA [illegible], PhD
**Thesis/Research Adviser**

NEIFA D. [illegible], PhD
**Thesis/Research Instructor**

Approved by:

EVANGELINE M. SEÑEDO, RMT, MATMan
**College Dean**

ATTY. [illegible] G. BINAG, RMT
Notarial Commission No. 2025-18
Notary Public for Ozamiz City and Clarin
2nd Hall Drive, Bernad Subdivision, Aguada, Ozamiz City
PTR No. 5607751; 01/05/2025; Ozamiz City
IBP O.R. No. 576165; 12/29/2025; Pasig City
Attorney's Roll No. 70648
MCLE Compliance No. VII-0014127; Valid until 04/14/2028
Doc No.
Page No.
Book No.
Series of

# APPENDIX E

Statistical Computations

Normality Test Result

The data were subjected to the Shapiro–Wilk test to assess distributional assumptions. Most treatment groups exhibited normal distribution ($p > 0.05$). However, Tundan at 50% ($W = 0.735$, $p = 0.028$) and 75% ($W = 0.701$, $p = 0.017$) significantly deviated from normality. Consequently, parametric analysis is appropriate for Saba and Lakatan, while non-parametric methods are recommended for Tundan.

**Combined Normality Test Results (Shapiro–Wilk Test)**

| Variety | Treatment | W Statistic | p-value | Interpretation |
|---|---|---|---|---|
| **Saba** | 25% | 0.958 | 0.792 | Normal |
| | 50% | 0.941 | 0.676 | Normal |
| | 75% | 0.914 | 0.483 | Normal |
| | 100% | 0.933 | 0.621 | Normal |
| | Control | 0.952 | 0.744 | Normal |
| **Tundan** | 25% | 0.926 | 0.566 | Normal |
| | 50% | 0.735 | 0.028 | **Not Normal** |
| | 75% | 0.701 | 0.017 | **Not Normal** |
| | 100% | 0.918 | 0.512 | Normal |
| | Control | 0.943 | 0.689 | Normal |
| **Lakatan** | 25% | 0.948 | 0.718 | Normal |
| | 50% | 0.956 | 0.781 | Normal |
| | 75% | 0.931 | 0.604 | Normal |
| | 100% | 0.940 | 0.671 | Normal |
| | Control | 0.947 | 0.709 | Normal |

# APPENDIX E Cont'd

**Kruskal–Wallis test for Clotting Time (seconds) of Tundan Across Treatment Concentrations**

**A. Rank Summary Table**

| Treatment | n | Sum of Ranks ($R_i$) | Mean Rank |
|---|---|---|---|
| 25% | 5 | 51 | 10.2 |
| 50% | 5 | 81 | 16.2 |
| 75% | 5 | 95 | 19.0 |
| 100% | 5 | 65 | 13.0 |
| Control | 5 | 29 | 5.8 |

**B. Test Statistics Table**

| Statistic | Value |
|---|---|
| Total Sample Size (N) | 25 |
| Degrees of Freedom (df) | 4 |
| H Statistic | 7.86 |
| p-value | 0.097 |
| Decision ($\alpha = 0.05$) | **Fail to Reject $H_0$** |

# APPENDIX E Cont'd

**Table 1.** *Comparative Clotting Time (seconds) of Three Banana Varieties Across Different Treatment Concentrations*

| Variety | 25% | 50% | 75% | 100% | Control |
|---|---|---|---|---|---|
| **Saba** | 410.6 ± 55.5 | 360.0 ± 75.5 | 297.0 ± 45.3 | 367.6 ± 57.7 | 435.6 ± 59.5 |
| **Tundan** | 272.6 ± 75.1 | 432.6 ± 178.7 | 509.8 ± 211.9 | 321.4 ± 71.2 | 216.0 ± 68.4 |
| **Lakatan** | 286.2 ± 65.7 | 291.8 ± 75.5 | 312.0 ± 98.2 | 298.6 ± 85.2 | 228.8 ± 64.6 |

A one-way Analysis of Variance revealed a significant effect of treatment concentration on clotting time in Saba ($F(4,20) = 3.12$, $p = 0.036$). Post hoc analysis using Tukey's Honestly Significant Difference revealed that only the 75% treatment significantly differed from the control ($p = 0.018$), leading to rejection of the null hypothesis for this comparison. All other pairwise comparisons failed to reject the null hypothesis ($p > 0.05$), indicating no statistically significant differences among those treatment levels.

In contrast, no significant differences were observed in Lakatan ($F(4,20) = 1.27$, $p = 0.312$), indicating that treatment concentration had no significant effect.

**Table 2.** *One-Way Analysis of Variance for Clotting Time of Saba Under Different Treatment Concentrations*

| Source of Variation | SS | df | MS | F | p-value | Decision |
|---|---|---|---|---|---|---|
| Between Groups | 52,584.24 | 4 | 13,146.06 | **3.12** | **0.036*** | Fail to reject $H_0$ |
| Within Groups | 84,300.80 | 20 | 4,215.04 | | | |
| **Total** | 136,885.04 | 24 | | | | |

Legend: * significant @ $p < 0.05$

# APPENDIX E Cont'd

**Table 3.** *Pairwise Comparison of Clotting Time (seconds) for Saba Using Tukey's Honestly Significant Difference Following Analysis of Variance*

| Comparison | Mean Difference | q value | p-value | Decision |
|---|---|---|---|---|
| 25% vs 50% | 50.6 | 1.74 | 0.78 | Fail to Reject $H_0$ |
| 25% vs 75% | 113.6 | 3.91 | 0.07 | Fail to Reject $H_0$ |
| 25% vs 100% | 43.0 | 1.48 | 0.86 | Fail to Reject $H_0$ |
| 25% vs Control | 25.0 | 0.86 | 0.96 | Fail to Reject $H_0$ |
| 50% vs 75% | 63.0 | 2.17 | 0.56 | Fail to Reject $H_0$ |
| 50% vs 100% | 7.6 | 0.26 | 0.99 | Fail to Reject $H_0$ |
| 50% vs Control | 75.6 | 2.60 | 0.41 | Fail to Reject $H_0$ |
| 75% vs 100% | 70.6 | 2.43 | 0.47 | Fail to Reject $H_0$ |
| 75% vs Control | **138.6** | **4.78** | **0.018*** | **Reject $H_0$** |
| 100% vs Control | 68.0 | 2.34 | 0.50 | Fail to Reject $H_0$ |

Legend: * significant @ $p < 0.05$

**Table 4.** *One-Way Analysis of Variance for Clotting Time of Lakatan Under Different Treatment Concentrations*

| Source of Variation | SS | df | MS | F | p-value | Decision |
|---|---|---|---|---|---|---|
| Between Groups | 15,122.16 | 4 | 3,780.54 | **1.27** | **0.312** | Fail to reject $H_0$ |
| Within Groups | 59,566.80 | 20 | 2,978.34 | | | |
| **Total** | 74,688.96 | 24 | | | | |

A nonparametric analysis using the Kruskal–Wallis test showed no statistically significant differences in clotting time among treatment concentrations for Tundan ($H(4) = 7.86$, $p = 0.097$). Therefore, the null hypothesis was not rejected.

# APPENDIX E Cont'd

**Table 5.** *Kruskal–Wallis Test Results for Clotting Time (seconds) of Tundan Across Treatment Concentrations*

| Source of Variation | Statistic | df | Test Statistic | p-value | Decision |
|---|---|---|---|---|---|
| Between Groups | Sum of Ranks | 4 | **H = 7.86** | **0.097** | Fail to Reject $H_0$ |
| Within Groups | Residual (Ranks) | 20 | — | — | — |
| **Total** | — | 24 | — | — | — |

# APPENDIX F

Complete Blood Count Results

**TOBIAS FELICIANO FAITH GENERAL HOSPITAL INC.**

(formerly FAITH HOSPITAL)
Feliciano St., Aguada, Ozamis City
Tel. No. (088)521-0018

**SECTION OF HEMATOLOGY**

| | | | |
|---|---|---|---|
| PID | : 0025601 | Lab No. | : 2607050 |
| Patient Name | : | OR No. | : 91732 |
| Age | : | Room No. | : OPD |
| Sex | : | Exam Date | : Apr. 30, 2026 04:28PM |
| Requesting Physician | : | | |
| Remarks | : | | |

| TEST | | RESULT | UNIT | REFERENCE RANGE |
|---|---|---|---|---|
| **Complete Blood Count** | | | | |
| Hematocrit | | 42.2 | % | 35.0 - 50.0 |
| Hemoglobin | | 14.6 | g/dL | 12.0 - 16.5 |
| RBC | | 5.22 | X10^12/L | 3.8 - 5.8 |
| WBC | | 8.3 | X10^9/L | 4.0 - 10.0 |
| Platelet Count | | 365 | X10^3/uL | 140 - 440 |
| **Red Cell Indices** | | | | |
| MCV | | 80.8 | fL | 80.0 - 99.0 |
| MCH | | 28.0 | pg | 26.5 - 33.5 |
| MCHC | | 34.6 | % | 32.0 - 36.0 |
| RDW-CV | | 12.2 | % | 10.0 - 15.0 |
| RDW-SD | | 35.4 | fL | 35.0 - 56.0 |
| **Differential Count** | | | | |
| Neutrophil | L | 54.8 | % | 55.0 - 65.0 |
| Lymphocytes | H | 35.9 | % | 25.0 - 35.0 |
| Monocytes | | 8.1 | % | 4.0 - 9.0 |
| Eosinophil | | 0.7 | % | 0.0 - 7.0 |
| Basophil | | 0.5 | % | 0.0 - 2.0 |

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# APPENDIX F Cont'd

## TOBIAS FELICIANO FAITH GENERAL HOSPITAL INC.

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## SECTION OF HEMATOLOGY

| | | | |
|---|---|---|---|
| PID | [redacted] | Lab No. | : 2607050 |
| Patient Name | [redacted] | OR No. | : 91732 |
| Age | 5 | Room No. | : OPD |
| Sex | : FEMALE | Exam Date | : Apr. 30, 2026 04:28PM |
| Requesting Physician | : | | |
| Remarks | : | | |

| TEST | | RESULT | UNIT | REFERENCE RANGE |
|---|---|---|---|---|
| **Complete Blood Count** | | | | |
| Hematocrit | | 42.2 | % | 35.0 - 50.0 |
| Hemoglobin | | 14.6 | g/dL | 12.0 - 16.5 |
| RBC | | 5.22 | X10^12/L | 3.8 - 5.8 |
| WBC | | 8.3 | X10^9/L | 4.0 - 10.0 |
| Platelet Count | | 365 | X10^3/uL | 140 - 440 |
| **Red Cell Indices** | | | | |
| MCV | | 80.8 | fL | 80.0 - 99.0 |
| MCH | | 28.0 | pg | 26.5 - 33.5 |
| MCHC | | 34.6 | % | 32.0 - 36.0 |
| RDW-CV | | 12.2 | % | 10.0 - 15.0 |
| RDW-SD | | 35.4 | fL | 35.0 - 56.0 |
| **Differential Count** | | | | |
| Neutrophil | L | 54.8 | % | 55.0 - 65.0 |
| Lymphocytes | H | 35.9 | % | 25.0 - 35.0 |
| Monocytes | | 8.1 | % | 4.0 - 9.0 |
| Eosinophil | | 0.7 | % | 0.0 - 7.0 |
| Basophil | | 0.5 | % | 0.0 - 2.0 |

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# APPENDIX F Cont'd

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## SECTION OF HEMATOLOGY

PID : 0025607
Patient Name : [redacted]
Age : 2005
Sex : MALE
Requesting Physician :
Remarks :

Lab No. : 2607056
OR No. : 71938
Room No. : OPD
Exam Date : Apr. 30, 2026 04:32PM

| TEST | | RESULT | UNIT | REFERENCE RANGE |
|---|---|---|---|---|
| **Complete Blood Count** | | | | |
| Hematocrit | | 40.6 | % | 35.0 - 50.0 |
| Hemoglobin | | 14.0 | g/dL | 12.0 - 16.5 |
| RBC | | 4.53 | X10^12/L | 3.8 - 5.8 |
| WBC | | 5.6 | X10^9/L | 4.0 - 10.0 |
| Platelet Count | | 335 | X10^3/uL | 140 - 440 |
| **Red Cell Indices** | | | | |
| MCV | | 89.6 | fL | 80.0 - 99.0 |
| MCH | | 30.9 | pg | 26.5 - 33.5 |
| MCHC | | 34.5 | % | 32.0 - 36.0 |
| RDW-CV | | 13.2 | % | 10.0 - 15.0 |
| RDW-SD | | 43.3 | fL | 35.0 - 56.0 |
| **Differential Count** | | | | |
| Neutrophil | L | 39.4 | % | 55.0 - 65.0 |
| Lymphocytes | H | 49.8 | % | 25.0 - 35.0 |
| Monocytes | | 7.1 | % | 4.0 - 9.0 |
| Eosinophil | | 3.2 | % | 0.0 - 7.0 |
| Basophil | | 0.5 | % | 0.0 - 2.0 |

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# APPENDIX F Cont'd

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## SECTION OF HEMATOLOGY

| | | | |
|---|---|---|---|
| PID | : 0025597 | Lab No. | : 2607046 |
| Patient Name | : | OR No. | : 71928 |
| Age | : 2004 | Room No. | : OPD |
| Sex | : MALE | Exam Date | : Apr. 30, 2026 04:27PM |
| Requesting Physician | : | | |
| Remarks | : | | |

| TEST | | RESULT | UNIT | REFERENCE RANGE |
|---|---|---|---|---|
| **Complete Blood Count** | | | | |
| Hematocrit | | 42.7 | % | 35.0 - 50.0 |
| Hemoglobin | | 14.7 | g/dL | 12.0 - 16.5 |
| RBC | | 4.69 | X10^12/L | 3.8 - 5.8 |
| WBC | | 6.2 | X10^9/L | 4.0 - 10.0 |
| Platelet Count | | 212 | X10^3/uL | 140 - 440 |
| **Red Cell Indices** | | | | |
| MCV | | 91.0 | fL | 80.0 - 99.0 |
| MCH | | 31.3 | pg | 26.5 - 33.5 |
| MCHC | | 34.4 | % | 32.0 - 36.0 |
| RDW-CV | | 11.3 | % | 10.0 - 15.0 |
| RDW-SD | | 37.7 | fL | 35.0 - 56.0 |
| **Differential Count** | | | | |
| Neutrophil | L | 49.3 | % | 55.0 - 65.0 |
| Lymphocytes | | 34.5 | % | 25.0 - 35.0 |
| Monocytes | H | 10.7 | % | 4.0 - 9.0 |
| Eosinophil | | 4.5 | % | 0.0 - 7.0 |
| Basophil | | 1.0 | % | 0.0 - 2.0 |

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# APPENDIX F Cont'd

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## SECTION OF HEMATOLOGY

PID
Patient Name
Age : 21Y DOB : Dec-26-2004
Sex : FEMALE
Requesting Physician :
Remarks :

Lab No. : 2607044
OR No. : 71926
Room No. : OPD
Exam Date : Apr. 30, 2026 04:26PM

| TEST | RESULT | UNIT | REFERENCE RANGE |
|---|---|---|---|
| **Complete Blood Count** | | | |
| Hematocrit | 35.2 | % | 35.0 - 50.0 |
| Hemoglobin | 12.2 | g/dL | 12.0 - 16.5 |
| RBC | 4.35 | X10^12/L | 3.8 - 5.8 |
| WBC | 6.5 | X10^9/L | 4.0 - 10.0 |
| Platelet Count | 272 | X10^3/uL | 140 - 440 |
| **Red Cell Indices** | | | |
| MCV | 80.9 | fL | 80.0 - 99.0 |
| MCH | 28.0 | pg | 26.5 - 33.5 |
| MCHC | 34.7 | % | 32.0 - 36.0 |
| RDW-CV | 13.1 | % | 10.0 - 15.0 |
| RDW-SD | 38.7 | fL | 35.0 - 56.0 |
| **Differential Count** | | | |
| Neutrophil | 58.1 | % | 55.0 - 65.0 |
| Lymphocytes | 30.9 | % | 25.0 - 35.0 |
| Monocytes | 7.4 | % | 4.0 - 9.0 |
| Eosinophil | 2.8 | % | 0.0 - 7.0 |
| Basophil | 0.8 | % | 0.0 - 2.0 |

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## SECTION OF HEMATOLOGY

PID
Patient Name
Age : 20Y DOB : Jul-23-2005
Sex : MALE
Requesting Physician :
Remarks :

Lab No. : 2607053
OR No. : 71935
Room No. : OPD
Exam Date : Apr. 30, 2026 04:30PM

| TEST | | RESULT | UNIT | REFERENCE RANGE |
|---|---|---|---|---|
| **Complete Blood Count** | | | | |
| Hematocrit | | 40.6 | % | 35.0 - 50.0 |
| Hemoglobin | | 13.8 | g/dL | 12.0 - 16.5 |
| RBC | | 4.61 | X10^12/L | 3.8 - 5.8 |
| WBC | | 9.6 | X10^9/L | 4.0 - 10.0 |
| Platelet Count | | 289 | X10^3/uL | 140 - 440 |
| **Red Cell Indices** | | | | |
| MCV | | 88.1 | fL | 80.0 - 99.0 |
| MCH | | 29.9 | pg | 26.5 - 33.5 |
| MCHC | | 34.0 | % | 32.0 - 36.0 |
| RDW-CV | | 12.2 | % | 10.0 - 15.0 |
| RDW-SD | | 39.5 | fL | 35.0 - 56.0 |
| **Differential Count** | | | | |
| Neutrophil | H | 65.2 | % | 55.0 - 65.0 |
| Lymphocytes | L | 21.2 | % | 25.0 - 35.0 |
| Monocytes | H | 10.8 | % | 4.0 - 9.0 |
| Eosinophil | | 2.0 | % | 0.0 - 7.0 |
| Basophil | | 0.8 | % | 0.0 - 2.0 |

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# APPENDIX F Cont'd

## TOBIAS FELICIANO FAITH GENERAL HOSPITAL INC.

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## SECTION OF HEMATOLOGY

PID
Patient Nan
Age : 21Y DOB : Mar-31-2005
Sex : FEMALE
Requesting Physician :
Remarks :

Lab No. : 2607575
OR No. : 73375
Room No. : OPD
Exam Date : May. 09, 2026 03:43PM

| TEST | | RESULT | UNIT | REFERENCE RANGE |
|---|---|---|---|---|
| **Complete Blood Count** | | | | |
| Hematocrit | | 39.0 | % | 35.0 - 50.0 |
| Hemoglobin | | 13.1 | g/dL | 12.0 - 16.5 |
| RBC | | 4.90 | X10^12/L | 3.8 - 5.8 |
| WBC | H | 10.1 | X10^9/L | 4.0 - 10.0 |
| Platelet Count | | 384 | X10^3/uL | 140 - 440 |
| **Red Cell Indices** | | | | |
| MCV | L | 79.6 | fL | 80.0 - 99.0 |
| MCH | | 26.7 | pg | 26.5 - 33.5 |
| MCHC | | 33.6 | % | 32.0 - 36.0 |
| RDW-CV | | 13.1 | % | 10.0 - 15.0 |
| RDW-SD | | 37.3 | fL | 35.0 - 56.0 |
| **Differential Count** | | | | |
| Neutrophil | | 55.1 | % | 55.0 - 65.0 |
| Lymphocytes | | 32.0 | % | 25.0 - 35.0 |
| Monocytes | H | 9.1 | % | 4.0 - 9.0 |
| Eosinophil | | 3.5 | % | 0.0 - 7.0 |
| Basophil | | 0.3 | % | 0.0 - 2.0 |

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## APPENDIX F Cont'd

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## SECTION OF HEMATOLOGY

PID : 0025608
Patient N
Age
Sex : FEMALE
Requesting Physician :
Remarks :

Lab No. : 2607057
OR No. : 71939
Room No. : OPD
Exam Date : Apr. 30, 2026 04:33PM

| TEST | | RESULT | UNIT | REFERENCE RANGE |
|---|---|---|---|---|
| **Complete Blood Count** | | | | |
| Hematocrit | L | 34.1 | % | 35.0 - 50.0 |
| Hemoglobin | | 12.1 | g/dL | 12.0 - 16.5 |
| RBC | | 3.90 | X10^12/L | 3.8 - 5.8 |
| WBC | | 6.7 | X10^9/L | 4.0 - 10.0 |
| Platelet Count | | 286 | X10^3/uL | 140 - 440 |
| **Red Cell Indices** | | | | |
| MCV | | 87.4 | fL | 80.0 - 99.0 |
| MCH | | 31.0 | pg | 26.5 - 33.5 |
| MCHC | | 35.5 | % | 32.0 - 36.0 |
| RDW-CV | | 12.3 | % | 10.0 - 15.0 |
| RDW-SD | | 39.7 | fL | 35.0 - 56.0 |
| **Differential Count** | | | | |
| Neutrophil | H | 67.7 | % | 55.0 - 65.0 |
| Lymphocytes | L | 24.0 | % | 25.0 - 35.0 |
| Monocytes | | 6.4 | % | 4.0 - 9.0 |
| Eosinophil | | 1.5 | % | 0.0 - 7.0 |
| Basophil | | 0.4 | % | 0.0 - 2.0 |

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## APPENDIX F Cont'd

# TOBIAS FELICIANO FAITH GENERAL HOSPITAL INC.

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## SECTION OF HEMATOLOGY

PID
Patient Name
Age : 20Y DOB : May-27-2005
Sex : FEMALE
Requesting Physician :
Remarks :

Lab No. : 2607051
OR No. : 71933
Room No. : OPD
Exam Date : Apr. 30, 2026 04:29PM

| TEST | | RESULT | UNIT | REFERENCE RANGE |
|---|---|---|---|---|
| **Complete Blood Count** | | | | |
| Hematocrit | | 40.8 | % | 35.0 - 50.0 |
| Hemoglobin | | 13.7 | g/dL | 12.0 - 16.5 |
| RBC | | 4.84 | X10^12/L | 3.8 - 5.8 |
| WBC | | 7.9 | X10^9/L | 4.0 - 10.0 |
| Platelet Count | | 344 | X10^3/uL | 140 - 440 |
| **Red Cell Indices** | | | | |
| MCV | | 84.3 | fL | 80.0 - 99.0 |
| MCH | | 28.3 | pg | 26.5 - 33.5 |
| MCHC | | 33.6 | % | 32.0 - 36.0 |
| RDW-CV | | 11.9 | % | 10.0 - 15.0 |
| RDW-SD | | 36.1 | fL | 35.0 - 56.0 |
| **Differential Count** | | | | |
| Neutrophil | H | 71.4 | % | 55.0 - 65.0 |
| Lymphocytes | L | 19.7 | % | 25.0 - 35.0 |
| Monocytes | | 7.0 | % | 4.0 - 9.0 |
| Eosinophil | | 0.9 | % | 0.0 - 7.0 |
| Basophil | | 1.0 | % | 0.0 - 2.0 |

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# APPENDIX F Cont'd

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## SECTION OF HEMATOLOGY

PID
Patient Name
Age : 21Y DOB : Nov-14-2004
Sex : FEMALE
Requesting Physician :
Remarks :

Lab No. : 2607045
OR No. : 71927
Room No. : OPD
Exam Date : Apr. 30, 2026 04:27PM

| TEST | | RESULT | UNIT | REFERENCE RANGE |
|---|---|---|---|---|
| **Complete Blood Count** | | | | |
| Hematocrit | | 37.6 | % | 35.0 - 50.0 |
| Hemoglobin | | 12.6 | g/dL | 12.0 - 16.5 |
| RBC | | 4.38 | X10^12/L | 3.8 - 5.8 |
| WBC | | 7.1 | X10^9/L | 4.0 - 10.0 |
| Platelet Count | | 234 | X10^3/uL | 140 - 440 |
| **Red Cell Indices** | | | | |
| MCV | | 85.8 | fL | 80.0 - 99.0 |
| MCH | | 28.8 | pg | 26.5 - 33.5 |
| MCHC | | 33.5 | % | 32.0 - 36.0 |
| RDW-CV | | 12.1 | % | 10.0 - 15.0 |
| RDW-SD | | 38.4 | fL | 35.0 - 56.0 |
| **Differential Count** | | | | |
| Neutrophil | L | 54.1 | % | 55.0 - 65.0 |
| Lymphocytes | | 30.6 | % | 25.0 - 35.0 |
| Monocytes | | 7.5 | % | 4.0 - 9.0 |
| Eosinophil | H | 7.1 | % | 0.0 - 7.0 |
| Basophil | | 0.7 | % | 0.0 - 2.0 |

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# APPENDIX F Cont'd

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Feliciano St., Aguada, Ozamis City
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## SECTION OF HEMATOLOGY

PID
Patien
Age
Sex : MALE
Requesting Physician :
Remarks :

Lab No. : 2607052
OR No. : 71934
Room No. : OPD
Exam Date : Apr. 30, 2026 04:30PM

| TEST | | RESULT | UNIT | REFERENCE RANGE |
|---|---|---|---|---|
| **Complete Blood Count** | | | | |
| Hematocrit | | 43.0 | % | 35.0 - 50.0 |
| Hemoglobin | | 15.6 | g/dL | 12.0 - 16.5 |
| RBC | | 5.27 | X10^12/L | 3.8 - 5.8 |
| WBC | | 6.2 | X10^9/L | 4.0 - 10.0 |
| Platelet Count | | 299 | X10^3/uL | 140 - 440 |
| **Red Cell Indices** | | | | |
| MCV | | 81.6 | fL | 80.0 - 99.0 |
| MCH | | 29.6 | pg | 26.5 - 33.5 |
| MCHC | H | 36.3 | % | 32.0 - 36.0 |
| RDW-CV | | 12.9 | % | 10.0 - 15.0 |
| RDW-SD | | 38.1 | fL | 35.0 - 56.0 |
| **Differential Count** | | | | |
| Neutrophil | | 64.7 | % | 55.0 - 65.0 |
| Lymphocytes | | 25.0 | % | 25.0 - 35.0 |
| Monocytes | | 7.5 | % | 4.0 - 9.0 |
| Eosinophil | | 2.2 | % | 0.0 - 7.0 |
| Basophil | | 0.6 | % | 0.0 - 2.0 |

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# APPENDIX F Cont'd

## TOBIAS FELICIANO FAITH GENERAL HOSPITAL INC.

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Tel. No. (088)521-0018

## SECTION OF HEMATOLOGY

PID : 0025605
Patient : [redacted]
Age
Sex
Requesting Physician :
Remarks :

Lab No. : 2607054
OR No. : 71936
Room No. : OPD
Exam Date : Apr. 30, 2026 04:31PM

| TEST | RESULT | UNIT | REFERENCE RANGE |
|---|---|---|---|
| **Complete Blood Count** | | | |
| Hematocrit | 44.2 | % | 35.0 - 50.0 |
| Hemoglobin | 15.8 | g/dL | 12.0 - 16.5 |
| RBC | 5.28 | X10^12/L | 3.8 - 5.8 |
| WBC | 6.9 | X10^9/L | 4.0 - 10.0 |
| Platelet Count | 282 | X10^3/uL | 140 - 440 |
| **Red Cell Indices** | | | |
| MCV | 83.7 | fL | 80.0 - 99.0 |
| MCH | 29.9 | pg | 26.5 - 33.5 |
| MCHC | 35.7 | % | 32.0 - 36.0 |
| RDW-CV | 12.3 | % | 10.0 - 15.0 |
| RDW-SD | 37.0 | fL | 35.0 - 56.0 |
| **Differential Count** | | | |
| Neutrophil | 62.3 | % | 55.0 - 65.0 |
| Lymphocytes | 25.7 | % | 25.0 - 35.0 |
| Monocytes | 8.7 | % | 4.0 - 9.0 |
| Eosinophil | 2.0 | % | 0.0 - 7.0 |
| Basophil | 1.3 | % | 0.0 - 2.0 |

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# APPENDIX F Cont'd

## TOBIAS FELICIANO FAITH GENERAL HOSPITAL INC.

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## SECTION OF HEMATOLOGY

PID
Pat
Ag
Sex : FEMALE
Requesting Physician :
Remarks :

Lab No. : 2607047
OR No. : 71929
Room No. : OPD
Exam Date : Apr. 30, 2026 04:27PM

| TEST | RESULT | UNIT | REFERENCE RANGE |
|---|---|---|---|
| **Complete Blood Count** | | | |
| Hematocrit | 39.6 | % | 35.0 - 50.0 |
| Hemoglobin | 13.6 | g/dL | 12.0 - 16.5 |
| RBC | 4.70 | X10^12/L | 3.8 - 5.8 |
| WBC | 7.5 | X10^9/L | 4.0 - 10.0 |
| Platelet Count | 385 | X10^3/uL | 140 - 440 |
| **Red Cell Indices** | | | |
| MCV | 84.3 | fL | 80.0 - 99.0 |
| MCH | 28.9 | pg | 26.5 - 33.5 |
| MCHC | 34.3 | % | 32.0 - 36.0 |
| RDW-CV | 12.0 | % | 10.0 - 15.0 |
| RDW-SD | 36.7 | fL | 35.0 - 56.0 |
| **Differential Count** | | | |
| Neutrophil | 57.6 | % | 55.0 - 65.0 |
| Lymphocytes | 28.9 | % | 25.0 - 35.0 |
| Monocytes | 8.3 | % | 4.0 - 9.0 |
| Eosinophil | 4.5 | % | 0.0 - 7.0 |
| Basophil | 0.7 | % | 0.0 - 2.0 |

**SELWAYNE ANDRION P. VELASCO, RMT**
**License No. 121309**
Medical Technologist

**HAROLD L. TEE, MD., FPSO., FPSP**
**License No. 0077234**
Pathologist

# APPENDIX F Cont'd

## TOBIAS FELICIANO FAITH GENERAL HOSPITAL INC.

(formerly FAITH HOSPITAL)
Feliciano St., Aguada, Ozamis City
Tel. No. (088)521-0018

## SECTION OF HEMATOLOGY

PID : 0025609
Patien
Age
Sex
Requesting Physician :
Remarks :

Lab No. : 2607058
OR No. : 71940
Room No. : OPD
Exam Date : Apr. 30, 2026 04:34PM

| TEST | RESULT | UNIT | REFERENCE RANGE |
|---|---|---|---|
| **Complete Blood Count** | | | |
| Hematocrit | 42.5 | % | 35.0 - 50.0 |
| Hemoglobin | 14.9 | g/dL | 12.0 - 16.5 |
| RBC | 5.05 | X10^12/L | 3.8 - 5.8 |
| WBC | 7.0 | X10^9/L | 4.0 - 10.0 |
| Platelet Count | 370 | X10^3/uL | 140 - 440 |
| **Red Cell Indices** | | | |
| MCV | 84.2 | fL | 80.0 - 99.0 |
| MCH | 29.5 | pg | 26.5 - 33.5 |
| MCHC | 35.1 | % | 32.0 - 36.0 |
| RDW-CV | 12.1 | % | 10.0 - 15.0 |
| RDW-SD | 36.5 | fL | 35.0 - 56.0 |
| **Differential Count** | | | |
| Neutrophil | 55.3 | % | 55.0 - 65.0 |
| Lymphocytes | 32.0 | % | 25.0 - 35.0 |
| Monocytes | 8.0 | % | 4.0 - 9.0 |
| Eosinophil | 4.3 | % | 0.0 - 7.0 |
| Basophil | 0.4 | % | 0.0 - 2.0 |

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**HAROLD L. TEE, MD., FPSO., FPSP**
**License No. 0077234**
Pathologist

# APPENDIX G

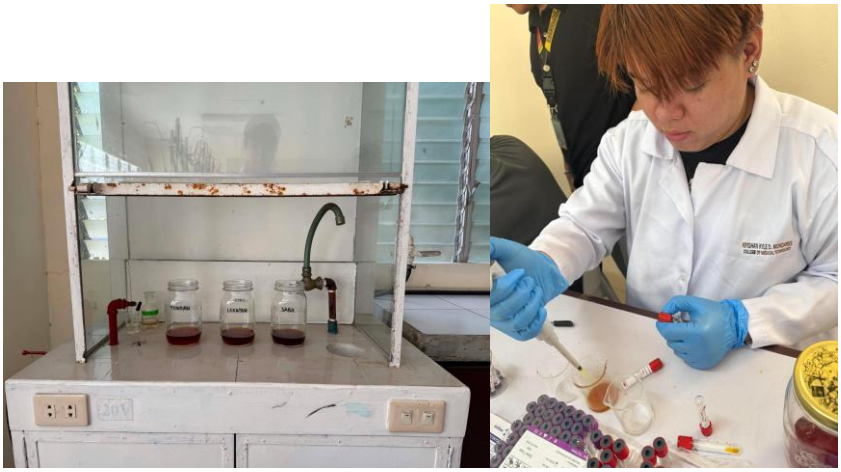
Documentation

*Collection and Preparation of Banana Peels*

*Preparation of Powdered Banana Peels*

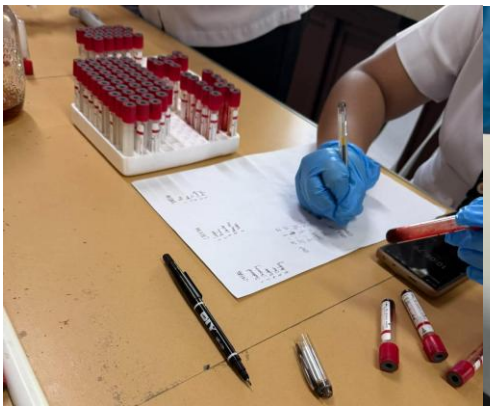
# APPENDIX G Cont'd

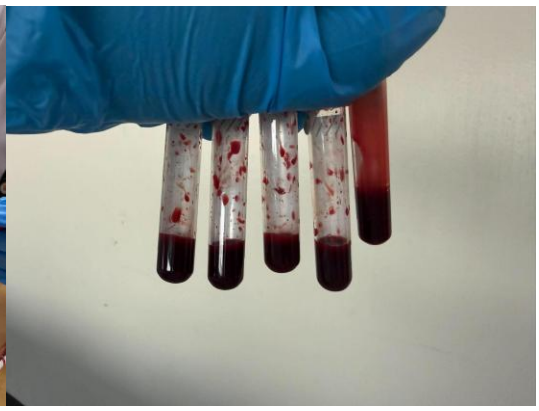
*Preparation for Banana Peel Extract and Concentrations*

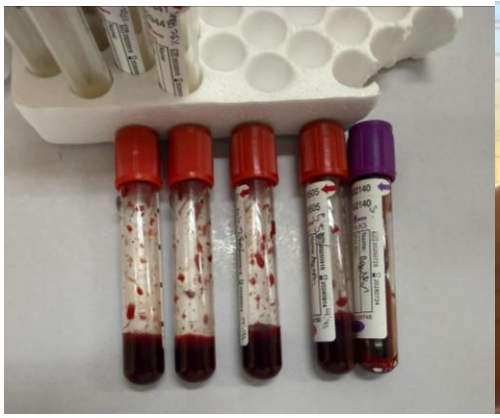



# APPENDIX G Cont'd

*Blood Collection and Coagulation Assay*







# APPENDIX H

Grammarly report and Turnitin results

Report: FINAL PAPER_PROCOAGULANT

## FINAL PAPER_PROCOAGULANT

by Misamis University

### General metrics

| 42,694 | 6,170 | 537 | 24 min 40 sec | 47 min 27 sec |
|---|---|---|---|---|
| characters | words | sentences | reading time | speaking time |

### Score

99

This text scores better than 99% of all texts checked by Grammarly

### Writing Issues

| 4 | 1 | 3 |
|---|---|---|
| Issues left | Critical | Advanced |

### Plagiarism

This text hasn't been checked for plagiarism

# APPENDIX H Cont'd



## 19% Overall Similarity

The combined total of all matches, including overlapping sources, for each database.

### Filtered from the Report

- Bibliography

### Match Groups

- **97 Not Cited or Quoted 16%**
  Matches with neither in-text citation nor quotation marks
- **15 Missing Quotations 2%**
  Matches that are still very similar to source material
- **5 Missing Citation 0%**
  Matches that have quotation marks, but no in-text citation
- **0 Cited and Quoted 0%**
  Matches with in-text citation present, but no quotation marks

### Top Sources

9% Internet sources
7% Publications
16% Submitted works (Student Papers)

### Integrity Flags

**1 Integrity Flag for Review**

- **Hidden Text**
  **7 suspect characters on 2 pages**
  Text is altered to blend into the white background of the document.

Our system's algorithms look deeply at a document for any inconsistencies that would set it apart from a normal submission. If we notice something strange, we flag it for you to review.

A Flag is not necessarily an indicator of a problem. However, we'd recommend you focus your attention there for further review.

# CURRICULUM VITAE

## I. PERSONAL DATA

| | | |
|---|---|---|
| **NAME** | **:** | Ashley Nicole B. Arabe |
| **BIRTHDATE** | **:** | January 10, 2005 |
| **BIRTHPLACE** | **:** | Ozamiz City, Misamis Occidental |
| **ADDRESS** | **:** | Purok 3, Poblacion 1, Clarin |
| **CONTACT DETAILS** | **:** | 09955139129 |
| | | ashleynicolebalansag@gmail.com |

## II. EDUCATIONAL BACKGROUND

| | | |
|---|---|---|
| **PRIMARY EDUCATION** | **:** | Holy Child High School of Clarin, Inc. |
| | | Poblacion 2, Clarin, Misamis Occidental |
| **SECONDARY EDUCATION** | **:** | Holy Child High School of Clarin, Inc. |
| | | Poblacion 2, Clarin, Misamis Occidental |
| **TERTIARY EDUCATION** | **:** | Misamis University |
| | | Aguada, Ozamiz City, Misamis Occidental |

# CURRICULUM VITAE

## III. PERSONAL DATA

| | | |
|---|---|---|
| **NAME** | **:** | Princess Kyllah Chan |
| **BIRTHDATE** | **:** | November 2, 2003 |
| **BIRTHPLACE** | **:** | Cebu City, Cebu |
| **ADDRESS** | **:** | Purok 2C Kinuman Sur, Ozamiz City |
| **CONTACT DETAILS** | **:** | 09620502641 |
| | | pkyllahchan@gmail.com |

## IV. EDUCATIONAL BACKGROUND

| | | |
|---|---|---|
| **PRIMARY EDUCATION** | **:** | Ozamiz City Central School |
| | | Tinago, Ozamiz City, Misamis Occidental |
| **SECONDARY EDUCATION** | **:** | Ozamiz City National High School |
| | | Lam-an, Ozamiz City, Misamis Occidental |
| **TERTIARY EDUCATION** | **:** | Misamis University |
| | | Aguada, Ozamiz City, Misamis Occidental |

# CURRICULUM VITAE

## V. PERSONAL DATA

| | | |
|---|---|---|
| **NAME** | **:** | Krishan Kyle D. Mondares |
| **BIRTHDATE** | **:** | December 9, 2004 |
| **BIRTHPLACE** | **:** | Ozamiz, Misamis Occidental |
| **ADDRESS** | **:** | Catadman Acasia P-7, Ozamiz City |
| **CONTACT DETAILS** | **:** | 09629972203 |
| | | mondareskrishankyle@gmail.com |

## VI. EDUCATIONAL BACKGROUND

| | | |
|---|---|---|
| **PRIMARY EDUCATION** | **:** | Firm Foundation Christian Academy |
| | | Circumferencial Rd., Aguada, Ozamiz City |
| **SECONDARY EDUCATION** | **:** | Firm Foundation Christian Academy |
| | | Circumferencial Rd., Aguada, Ozamiz City |
| **TERTIARY EDUCATION** | **:** | Misamis University |
| | | Aguada, Ozamiz City, Misamis Occidental |

# CURRICULUM VITAE

## VII. PERSONAL DATA

| | | |
|---|---|---|
| **NAME** | **:** | Aira Jean L. Mondejar |
| **BIRTHDATE** | **:** | November 14, 2004 |
| **BIRTHPLACE** | **:** | Clarin, Misamis Occidental |
| **ADDRESS** | **:** | Purok 7, Poblacion 1, Clarin |
| **CONTACT DETAILS** | **:** | 09814777337 |
| | | airajeanmondejar@gmail.com |

## VIII. EDUCATIONAL BACKGROUND

| | | |
|---|---|---|
| **PRIMARY EDUCATION** | **:** | San Roque Elementary School |
| | | Poblacion 4, Clarin, Misamis Occidental |
| **SECONDARY EDUCATION** | **:** | Clarin National High School |
| | | Poblacion 3, Clarin, Misamis Occidental |
| **TERTIARY EDUCATION** | **:** | Misamis University |
| | | Aguada, Ozamiz City, Misamis Occidental |