**NATIONAL INSTITUTE ON AGING**

**LATE ONSET ALZHEIMER DISEASE FAMILY BASED STUDY (NIA-AD FBS)**

**Mobile Phlebotomy Procedures Manual**

**December 2021**

This manual is to be used by the contracted Mobile Phlebotomy technician to provide detailed procedures for biospecimen collection, processing, and shipping for the NIA-AD FBS study. Review **Mobile Phlebotomy Procedures Manual** in its entirety prior to starting blood collection, with detailed procedures and schematics for your reference.

Questions should be directed to the NIA-AD FBS site coordinator prior to or during the blood draw visit.

|  |  |  |
| --- | --- | --- |
| **Coordinator name:** |  | **NIA-AD FBS Project Manager:**  Dolly Reyes- Dumeyer |
| Coordinator phone: |  | Phone: 212-305-5953 |
| Coordinator Email: |  | |
| Site Name: |  | |

**Biospecimen Collection Summary table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample Type** | **Number of tubes** | **Tube Type** | **Shipment** | **Kit example** |
| Whole blood for PBMC isolation | 2 | Sodium Heparin (Green Top) Blood Collection Tube (10 ml) | Room Temperature |  |
| Whole blood for isolation of plasma & buffy coat (for DNA  extraction) | 2 | EDTA (Lavender- Top) Blood Collection Tube (10 ml) | Dry Ice |  |

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**Instructions for Collection: Sodium Heparin (Green-Top) Blood Collection Tube (10mL) for collection of Peripheral Blood Mononuclear Cells (PBMC) x 2**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Type** | **Number of tubes** | **Tube Type** | **Shipment** |
| Whole blood for PBMC isolation | 2 | Sodium Heparin (Green-Top) Blood Collection Tube (10 ml) | Room Temperature  Must be shipped and received within 24 hours of collection |

**\*\*\*Important Visit Scheduling Note\*\*\***

**Once drawn, Sodium Heparin tubes MUST be shipped to NCRAD on the day of collection via UPS Priority Overnight.**

**These samples should only be collected Monday-Wednesday.**

**\*\*NOTE\*\* DO NOT collect these samples on Thursday or Friday.**

**Step 1.** Preparing for sample draw

**CRITICAL STEP: Store empty Sodium Heparin tubes at room temperature, 64°F - 77°F (18°C to 25°C) before use.**

Obtain blood collection kit from the participant. This kit was prepared to include all collection and shipping supplies needed for this collection. Confirm all collection tubes and aliquot tubes are labeled. Confirm Kit # and NIA-AD FBS ID # on collection tubes match the Biological Sample and Shipment notification form included in the envelope. Note any missing labels on the Biological Sample and Shipment form prior to the collection.

**Step 2.** Collecting Sample

2.1 Using a blood collection set, collect blood into the 10mL Sodium Heparin tubes using your institution’s recommended procedure for standard venipuncture technique.

2.2 The following techniques shall be used to prevent possible backflow:

2.2a Place participant’s arm in downward position.

2.2b Hold tube in vertical position, below the participant’s arm during blood collection.

2.2c Release tourniquet as soon as blood starts to flow into tube.

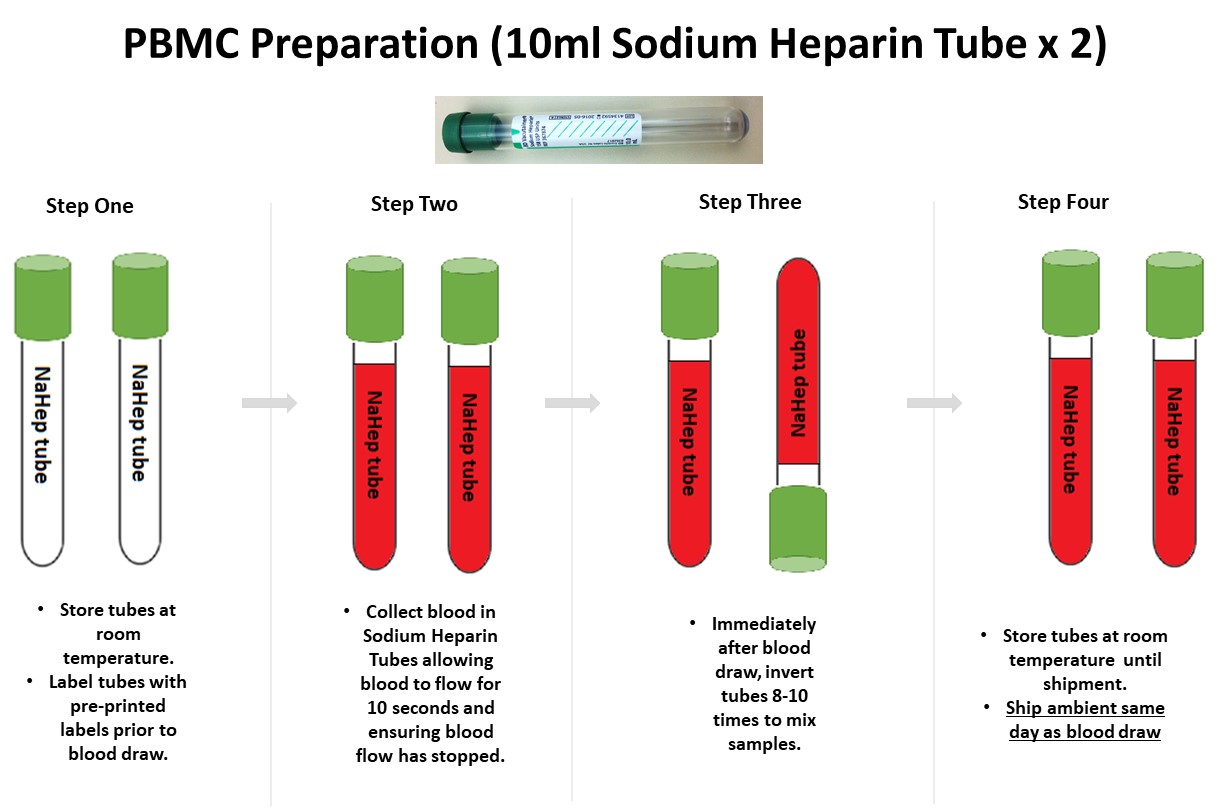
2.2d Make sure tube additives do not touch stopper or end of the needle during venipuncture.

2.3 Document collection on the Biological Sample and Shipment Notification Form - PBMC

**Step 3**. Immediately after blood collection, **gently** invert the tubes 8-10 times to mix sample.

**Step 4**. Seal the Sodium Heparin tubes in the ambient shipment kit. See Shipping instructions for complete packaging and shipping information. Ship the unprocessed tubes ambient to NCRAD.

**Samples must be shipped the same day as collection. Samples must be received the following day after collection.**

**\*\*Please be sure to compare the labels on each tube and cryovial to the Biological Sample Form included with each kit\***

**Instructions for Collection: Whole Blood Collection for isolation of Plasma and Buffy Coat: EDTA (Lavender-Top) Blood Collection Tube (10mL)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Type** | **Number of tubes** | **Tube Type** | **Shipment** |
| Whole blood for isolation of plasma & buffy coat (for DNA extraction) | 2 | EDTA (Lavender- Top) Blood Collection Tube (10 ml) | Dry Ice |

**Step 1.** Preparing for sample draw

Set centrifuge to 4 C to pre-chill before use.

Obtain blood collection kit from the participant. This kit was prepared to include all collection and shipping supplies needed for this collection. Confirm all collection tubes and aliquot tubes are labeled. Confirm Kit # and NIA-AD FBS ID # on collection tubes match the Biological Sample and Shipment notification form included in the envelope. Note any missing labels on the Biological Sample and Shipment form prior to the collection.

Keep labels in numerical order (by specimen number) throughout the aliquoting and shipping process.

**Step 2.** Collecting Whole Blood sample

* 1. Using a blood collection set, collect blood into the **EDTA (Lavender-top) Blood Collection Tube (10mL)** using your institution’s recommended procedure for standard venipuncture techniques.
  2. The following techniques shall be used to prevent possible backflow:

2.2a Place donor’s arm in downward position.

2.2b Hold tube in vertical position, below the donor’s arm during blood collection.

2.2c Release tourniquet as soon as blood starts to flow into tube.

2.2d Make sure tube additives do not touch stopper or end of the needle during venipuncture.

2.3 Allow at least 10 seconds for a complete blood draw to take place in each tube. Ensure that the blood has stopped flowing into the tube before removing the tube from the holder. The tube with its vacuum is designed to draw 10 mL of blood into the tube.

2.4 Document collection on the Biological Sample and Shipment Notification Form- Plasma/ Buffy Coat

\*\*If complications arise during the blood draw, please note the difficulties on the **Biological Sample and Shipment Notification Form**. Do not attempt to draw an additional EDTA tube at this time. Process blood obtained in existing EDTA tube.

**Step 3.** Processing sample following draw

**CRITICAL STEP: Immediately after blood collection, gently invert/mix (180 degree turns) the EDTA tube 8-10 times.**

**Step 4. CRITICAL STEP: Immediately after inverting the EDTA tube, place it on wet ice until centrifugation begins.**

Plasma samples need to be spun, aliquoted, and placed on dry ice **within 2 hours** from the time of collection.

**Step 5. CRITICAL: Tubes must be centrifuged at the appropriate speed and temperature to ensure plasma separation.**

**5.1** Centrifuge balanced tubes for 10 minutes at 2000 x g at 4 C. **It is critical that the tubes be centrifuged at the appropriate speed and temperature to ensure proper plasma separation (see worksheet in** [**Appendix**](#_Appendix_B:_Rate) **C to calculate RPM.)**

5.2 While centrifuging, record all times, temperatures and spin rates on the Biological Sample and Shipment Notification Form.

**Spin, aliquot and freeze all plasma and buffy coat aliquots within 2 hours of collection.**

**Step 6: Pooling Plasma**

|  |  |
| --- | --- |
| **Instruction** | **Illustration** |
| Remove the plasma, being careful not to agitate the packed red blood cells at the bottom of the collection tube. | Plasma  Buffy Coat  Red Blood Cells |
| Tilt the tube and place the disposable pipette tip along the lower side of the wall without touching the pellet (buffy coat) so that plasma is not contaminated |  |
| **NOTE: When pipetting plasma from the plasma tube into the conical, be very careful to pipette the plasma top layer only, leaving the buffy coat and the red blood cell layers untouched.** | |
| Transfer plasma from both EDTA tubes into the blue topped 15 mL conical tubes and gently invert 3 times.  NOTE: 15 mL blue top conical will not have a label. |  |
| **Step 7: Aliquot plasma** | |
| Aliquot plasma into the pre-labeled cryovials.  Aliquot 0.5 mL per cryovial (20 vials with 0.5 mL each).  Be sure to only place **plasma** in cryovials labeled with “PLASMA” labels.  \*If there is extra plasma left, use 1 extra cryovial with blue cap provided for another <0.5 mL aliquot of plasma.  \*\*If residual aliquot (<0.5 mL) is created, document the sample number and volume on the Biological Sample and Shipment Notification Form. |  |
| After plasma has been removed from the EDTA (Lavender-Top) Blood Collection Tube (10 ml), the top layer of cells is the buffy coat mixed with RBCs | RDA, pipetting buffy coat c disposable, cropped  Buffy Coat layer (mixed with RBCs) |

|  |  |
| --- | --- |
| **Step 8: Aliquot Buffy Coat** | |
| Aliquot buffy coat layer from each collection tube into separate cryovials with gray cap using a disposable graduated micropipette.  The buffy coat aliquot is expected to have a reddish color from the RBCs.  Place Buffy Coat cryovials into the same cryovial box with the plasma samples on Dry Ice | Buffy Coat Aliquot  use GRAY cap cryovial “BUFFY COAT” label |
| Place the labeled cryovials in the cryobox and place upright on dry ice and ship to NCRAD.  Record time aliquots placed on dry ice on Biological Sample and Shipment Notification Form. |  |
| Dispose of collection tubes with red blood cell pellet according to your site’s guidelines for disposing of biomedical waste. |  |

Diagram

Description automatically generated\*\*\*Please be sure to compare the labels on each tube and cryovial to the Biological Sample Form included with each kit\*\*\*

**Instructions for Ambient Shipping: Sodium Heparin (Green-Top) Blood Collection Tube (10mL) for collection of Peripheral Blood Mononuclear Cells (PBMC) x 2**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Type** | **Number of tubes** | **Tube Type** | **Shipment** |
| Whole blood for PBMC isolation | 2 | Sodium Heparin (Green-Top) Blood Collection Tube (10 ml) | Room Temperature  Must be shipped and received within 24 hours of collection |

|  |
| --- |
| **IMPORTANT!** |
| **AMBIENT SAMPLES MUST BE SHIPPED**  **MONDAY-WEDNESDAY ONLY!**  **Do NOT draw blood for ambient shipments on Thursday or Friday** |

**\*\*\* Packing and Labeling Guidelines \*\*\***

* The primary receptacle (collection tube) must be leak proof and must not contain more than 10 ml total.
* The secondary packaging (foam box) must be leak proof.
* Absorbent material must be placed between the primary receptacle (collectiontube) and the secondary packaging (foam box). The absorbent material should be of sufficient quantity in order to absorb the entire contents of the specimens being shipped. Examples of absorbent material are paper towels, absorbent pads, cotton balls, or cellulose wadding.
* A copy of the Biological Sample and Shipment Notification Form must be included between the secondary and outer packaging.
* The outer shipping container must display the following labels:
  + Sender’s name and address
  + Recipient’s name and address
  + Responsible Person
  + The words “Biological Substance, Category B”
  + UN3373

PMBC Blood Collection Tube (10 ml) shipments should be considered as Category B UN3373 and as such must be tripled packaged and compliant with the IATA Packing Instructions 650. *See the Latest Edition of the IATA Regulations for complete documentation.*

Triple packaging consists of a primary receptacle(s), a secondary packaging, and a rigid outer packaging. The primary receptacles must be packed in secondary packaging in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the secondary packaging. Secondary packaging must be secured in outer packaging with suitable cushioning material. Any leakage of the contents must not compromise the integrity of the cushioning material or of the outer packaging.

**Steps for completing shipping process for Ambient Shipment**

|  |  |
| --- | --- |
| Retrieve refrigerant pack from participant. It was placed in freezer at least 24 hours prior to shipment. |  |
| Contact UPS 1-800-742-5877 to locate the closest UPS store location to drop off the package for same day shipping**.**  **Do NOT** ship from UPS drop box location. |  |
| Scan or take a picture with a cell phone of completed Biological Sample and Shipment notification form- PBMC |  |
| Notify NCRAD of shipment by emailing [alzstudy@iu.edu](mailto:alzstudy@iu.edu).  If email is unavailable, please call NCRAD **1-800-526-2839**  Donot ship until you have notified NCRAD coordinators of the shipment in advance. | **Content of email:**   1. **Completed Biological Sample and Shpment notification form- PBMC (scanned)** 2. **UPS Shipment tracking number**   Email to [alzstudy@iu.edu](mailto:alzstudy@iu.edu) |
| Place filled and labeled sodium heparin (green-top) tubes within the slots in the absorbent pad provided, and place into the plastic biohazard bag with absorbent sheet.  Remove as much air as possible from the plastic biohazard bag and seal the bag according to the directions printed on the bag. | **Blood Samples**  **Absorbent Pad/Sleeve**  **Biohazard Bag** |
| Place the refrigerant pack into the cooler on top of the filled biohazard bag.  Place the Styrofoam lid onto the cooler inside the shipping box. |  |
| Place the Biological Sample and Shipment Notification Form within the shipping box and list of contents form in the shipping box before closing and securing box top.  Secure box with packing tape strip.  Confirm UN3373 (Biological Substance Category B) label is on outside of the cardboard box |  |
| Place shipping box inside UPS Next Day mailing envelope with the pre-printed return address label |  |
| Specimens should be sent via UPS Next Day Air. Samples must be sent next day and on **Monday through Wednesday** to avoid any potential shipping delays. | **NCRAD**  **IU School of Medicine**  **351 W. 10th Street, TK 217**  **Indianapolis, IN 46202**  **Phone: 1-800-526-2839** |

**Remember to complete the Biological Sample and Shipment Notification (**[**A**](#AppendixB)**), include a copy in your shipment AND include a scanned copy in the email notification to** [**alzstudy@iu.edu**](mailto:alzstudy@iu.edu) **IN ADVANCE to confirm the shipment.**

In addition to tracking and reconciliation of samples, the condition and number of samples received are tracked by NCRAD for each sample type. Investigators and clinical coordinators for each project are responsible to ensure the requested amounts of each fluid are collected to the best of their ability.

**\*\*****Instructions for Frozen Shipping: Whole Blood Collection for isolation of Plasma and Buffy Coat: EDTA (Lavender-Top) Blood Collection Tube (10mL)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Type** | **Number of tubes** | **Tube Type** | **Shipment** |
| Whole blood for isolation of plasma & buffy coat (for DNA extraction) | 2 | EDTA (Lavender- Top) Blood Collection Tube (10 ml) | Dry Ice |

|  |
| --- |
| **IMPORTANT!** |
| **FROZEN SAMPLES MUST BE SHIPPED**  **MONDAY-WEDNESDAY ONLY!**  **Do NOT draw blood on Thursday or Friday** |

**\*\*\* Packing and Labeling Guidelines \*\*\***

* The primary receptacle (frozen cryovials) must be leak proof and must not contain more than 1L total.
* The secondary packaging (biohazard bag) must be leak proof and if multiple blood tubes are placed in a single secondary packaging, they must be either individually wrapped or separated to prevent direct contact with adjacent blood tubes.
* Absorbent material must be placed between the primary receptacle (within the cryovial box containing the frozen cryovials) and the secondary packaging. The absorbent material should be of sufficient quantity in order to absorb the entire contents of the specimens being shipped. Examples of absorbent material are paper towels, absorbent pads, cotton balls, or cellulose wadding.
* A copy of the Biological Sample and Shipment Notification Form must be included between the secondary and outer packaging.
* The outer shipping container must display the
* following labels:
  + Sender’s name and address
  + Recipient’s name and address
  + Responsible Person
  + The words “Biological Substance, Category B”
  + UN3373
  + Class 9 label including UN 1845, and net weight of dry ice contained



**Steps for completing Shipping process for FROZEN Shipping**

|  |  |
| --- | --- |
| Contact UPS 1-800-742-5877 to locate the closest UPS store location to drop off the package for same day shipping.  **Do NOT** ship from UPS drop box location. |  |
| Scan or take a picture with a cell phone of completed Biological Sample and Shipment notification form- Plasma/ Buffy Coat |  |
| Email NCRAD notification of shipment [alzstudy@iu.edu](mailto:alzstudy@iu.edu).  If email is unavailable, please call NCRAD **1-800-526-2839**  **Do** not ship until you have notified NCRAD coordinators of the shipment in advance. | **Content of email:**   1. **Completed Biological Sample and Shipment Notification Form- Plasma/ Buffy Coat (scanned)** 2. **UPS Shipment tracking number**   Email to [alzstudy@iu.edu](mailto:alzstudy@iu.edu) |
| Place all labeled and frozen plasma and buffy coat aliquots in a cryovial box. |  |
| Place cryovial box in a clear biohazard bag. Do **not** remove absorbent material found in the bag and seal according to the instructions on the bag. |  |
| Place approximately 2-3 inches of dry ice in the bottom of the Styrofoam shipping container.  Place the biohazard bag with cryovial box into the Styrofoam-lined shipping container on top of the dry ice.  Ensure cryovial box is placed so the cryovials are upright in the shipping container. |  |
| The dry ice should entirely fill the inner box and be placed on top of the biohazard bags to ensure the frozen state of the specimens. The inner Styrofoam shipping container must contain approximately 10 lbs. (or 4.5kg) of dry ice. | **C:\Users\drcmitch\AppData\Local\Temp\image6.jpeg** |
| Replace the lid of the Styrofoam container.  Place the completed Biological Sample and Shipment Notification Form in the package on top of the Styrofoam lid.  Close and seal the outer cardboard shipping carton with package tapes (2).  **DO NOT** completely seal the outer cardboard box with tape, as the dry ice needs to vent. |  |

|  |  |
| --- | --- |
| Apply the provided, pre-printed UPS shipping label to the outside of the box.  **Important:** Remove any previous shipping labels prior to shipping |  |
| Specimens should be sent via UPS Next Day Air. Frozen specimens should be sent **Monday through Wednesday** to avoid any potential shipping delays. | **NCRAD**  **IU School of Medicine**  **351 W. 10th Street, TK 217**  **Indianapolis, IN 46202**  **Phone: 1-800-526-2839** |

**DRAW and Ship all frozen samples Monday - Wednesday ONLY!**

**BE AWARE OF INCIPIENT INCLEMENT WEATHER THAT MAY DELAY SHIPMENT/DELIVERY OF SAMPLES!**

**Remember to complete the Biological Sample and Shipment Notification (**[**A**](#AppendixB)**), include a copy in your shipment AND include a scanned copy in the email notification to** [**alzstudy@iu.edu**](mailto:alzstudy@iu.edu) **IN ADVANCE to confirm the shipment.**

In addition to tracking and reconciliation of samples, the condition and number of samples received are tracked by NCRAD for each sample type. Investigators and clinical coordinators for each project are responsible to ensure the requested amounts of each fluid are collected to the best of their ability and that samples are packed with sufficient amounts of dry ice to avoid thawing in the shipment process.

**Appendix A:** **Biological Sample and Shipment Notification Form – PBMC**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Type** | **Number of tubes** | **Tube Type** | **Shipment** |
| Whole blood for PBMC isolation | 2 | Sodium Heparin (Green-Top) Blood Collection Tube (10 ml) | Room Temperature  Must be shipped and received within 24 hours of collection |

**Biological Sample and Shipment Notification Form** *Please email this form prior to the date of shipment*

\*\* Completed by contracted remote phlebotomist at time of blood collection.

*\*\* Blood collection completed by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (name)*

*Company: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*Contact phone: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

|  |
| --- |
| To: Kelley Faber Email: [alzstudy@iu.edu](mailto:alzstudy@iu.edu) Phone: 1-800-526-2839 |
| *General Information:* **UPS tracking #:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  Site Coordinator: Date:  Phone: Email: |
| KIT BARCODE  **Study: NIA-AD FBS Kit #:**  **Site ID:** \_\_\_\_\_\_\_ Family ID:\_\_\_\_\_\_\_ Individual ID:\_\_\_\_\_\_\_\_  **Sex:** M F **Year of Birth: \_\_\_\_\_\_\_\_\_\_** |
| *Blood Collection: \*\**  1. Date Blood Tubes Drawn:\_\_\_\_\_\_\_\_\_ (MM/DD/YYYY) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(time) am/pm  2. Original Volume Drawn (2 x NaHep Green Top):\_\_\_\_\_\_\_\_\_ (mL) |
|  |

**Appendix B: Biological Sample and Shipment Notification – Plasma and Buffy Coat**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Type** | **Number of tubes** | **Tube Type** | **Shipment** |
| Whole blood for isolation of plasma & buffy coat (for DNA extraction) | 2 | EDTA (Lavender- Top) Blood Collection Tube (10 ml) | Dry Ice |

*Please email this form prior to the date of shipment*

|  |
| --- |
| To: Kelley Faber Email: [alzstudy@iu.edu](mailto:alzstudy@iu.edu) Phone: 1-800-526-2839 |
| *General Information:* **UPS tracking #:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  Site Coordinator: Date:  Phone: Email: |
| KIT BARCODE  **Study: NIA-AD FBS Kit #:**  **Site ID:** \_\_\_\_\_\_\_ Family ID:\_\_\_\_\_\_\_ Individual ID:\_\_\_\_\_\_\_\_  **Sex:** M F **Year of Birth: \_\_\_\_\_\_\_\_\_\_** |
| *Blood Collection: \*\**   |  |  | | --- | --- | | 1. Date Drawn: [MM/DD/YY] | 1. Time of Draw: [HH:MM] | | 1. Date subject last ate: [MM/DD/YY] | 1. Time subject last ate: [HH:MM] | |
| *Blood Processing: \*\**   |  |  | | --- | --- | | **Plasma & Buffy Coat (Lavender-top) Tube (2x10 mL)** | | | Time spin started: | \_\_\_\_\_\_ [HH:MM] | | Duration of centrifuge: | \_\_\_\_\_\_\_ Minutes | | Temp of centrifuge: \_\_\_\_ °C Rate of centrifuge: \_\_\_\_\_\_\_ x g | | | Time aliquoted: | \_\_\_\_\_\_\_ [HH:MM] | | Number of 0.5 mL plasma aliquots created (lavender cap, up to 20): |  | | If applicable, volume of residual plasma aliquot (less than 0.5 mL in blue cap): | \_\_\_\_\_\_\_\_\_\_\_\_ mL | | If applicable, specimen number of residual plasma aliquot (last four digits): |  | | Buffy coat #1 last four digits of specimen number: | | | Buffy coat #1 volume: \_\_\_\_\_\_\_\_\_\_\_\_ mL Original blood volume drawn: \_\_\_\_\_\_\_\_\_\_\_\_ mL | | | Buffy coat #2 last four digits of specimen number: | | | Buffy coat #2 volume: \_\_\_\_\_\_\_\_\_\_\_\_ mL Original blood volume drawn: \_\_\_\_\_\_\_\_\_\_\_\_ mL | |   \*\* Completed by contracted remote phlebotomist at time of blood collection.  *\*\* Blood collection completed by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (name)*  *Company: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*  *Contact phone: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* |
| Notes: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**Appendix C: Rate of Centrifuge Worksheet**

**Centrifuge Information**

Please answer the following questions about your centrifuge.

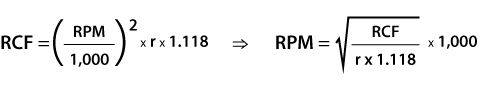
**Centrifuge Type**

Fixed Angle Rotor: ☐ Swing Bucket Rotor: ☐

**Radius of Rotation (mm):**

Determine the centrifuge’s radius of rotation (in mm) by measuring distance from the center of the centrifuge spindle to the bottom of the device when inserted into the rotor (if measuring a swing bucket rotor, measure to the middle of the bucket).

**Calculating RPM from G-Force:**



RCF = Relative Centrifugal Force (G-Force)

RPM = Rotational Speed (revolutions per minute)

R= Centrifugal radius in mm = distance from the center of the turning axis to the bottom of centrifuge