

## LEADS Manual of Procedures Update:

V Feb.2025

Section	Change
Throughout	Update specimen labels
3.3	Update holiday closures to include Winter Break Update link to Holiday Closures page on NCRAD website

V April.2025

Section	Change
Throughout	Minor changes made to phrasing and wording. No alterations to procedures were made.
Document Footer	Updated to Version (4.2025)
7.1	Updated label format for Collection and Aliquot Tube Labels. Labels will now include a line that says either "COLLECT" or "ALIQUOT" to indicate if the label is meant for a collection tube or an aliquot tube.

V June.2025

Section	Change
Document Footer	Updated to Version (6.2025)
3.1	Updated the study coordinator contact information.
6.2	Added a second link for kit requests.

V January.2026

Section	Change
Document Footer	Updated to Version (1.2026)
12	Updated the blood and CSF collection forms to include early terminations



# **Longitudinal Early-Onset Alzheimer's Disease Study**

in collaboration with the

## **National Centralized Repository for Alzheimer's Disease and Related Dementias**



National Centralized Repository for  
Alzheimer's Disease and Related Dementias

### **Biospecimen Collection, Processing, and Shipment Manual of Procedures**

**Version 6.2025**

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## 1.0 Abbreviations

AD	Alzheimer's Disease
ATRI	Alzheimer's Therapeutic Research Institute
BL	Baseline visit
CI	Cognitively Impaired
CLIA	Clinical Laboratory Improvement Amendments
CN	Cognitively Normal
CSF	Cerebrospinal Fluid
DNA	Deoxyribonucleic Acid
EDC	Electronic Data Capture
EDTA	Ethylene Diamine Tetra-acetic Acid
IATA	International Air Transport Association
LP	Lumbar Puncture
LRS	Long Read Sequencing
NaHep	Sodium Heparin
NCRAD	National Centralized Repository for Alzheimer's Disease and Related Dementias
PBMC	Peripheral Blood Mononuclear Cell
RBC	Red Blood Cells
RCF	Relative Centrifugal Force
RNA	Ribonucleic Acid
RPM	Revolutions Per Minute

## 2.0 Purpose

The collection of biofluids is an important part of the Longitudinal Early-Onset Alzheimer's Disease Study (LEADS). The purpose of this manual is to provide study staff (PIs, study coordinators, phlebotomists) at the various study sites with instructions for collection and submission of biological samples for LEADS study visits. It includes instructions for biofluid submission to NCRAD located in Indianapolis at Indiana University.

*The following samples will be sent to NCRAD:*

- Serum
- Plasma
- Buffy Coat (DNA Extraction)
- Whole Blood
- RNA
- PBMC
- CSF

This manual includes instructions for collection of blood and CSF, fractionation of blood from collection tubes, aliquoting, labeling, storage prior to shipping, and shipping to NCRAD.

These procedures are relevant to all study personnel responsible for processing specimens being provided to NCRAD for the LEADS protocol.

## 3.0 NCRAD Information

### 3.1 NCRAD Contacts

**Tatiana Foroud, PhD, NCRAD Leader**

Phone: 317-274-2218

**Kelley Faber, MS, CCRC, Project Manager**

Phone: 317-274-7360

Email: [kelfaber@iu.edu](mailto:kelfaber@iu.edu)

**Colleen Mitchell, Laboratory Manager**

Phone: 317-278-9016

Email: [mitchecm@iu.edu](mailto:mitchecm@iu.edu)

**Isaac Harms, MS, CCRP, Study Coordinator**

Phone: 317-278-1980

Email: [ihamms@iu.edu](mailto:ihamms@iu.edu)

#### General NCRAD Contact Information

Phone: 1-800-526-2839 or 317-278-8413

Fax: 317-321-2003

Email: [alzstudy@iu.edu](mailto:alzstudy@iu.edu)

Website: [www.ncrad.org](http://www.ncrad.org)

LEADS Study Specific Webpage: [https://ncrad.org/resource\\_leads.html](https://ncrad.org/resource_leads.html)

#### Sample Shipment Mailing Address

LEADS at NCRAD

Indiana University School of Medicine

351 West 10th Street

TK-217

Indianapolis, IN 46202

### 3.2 NCRAD Hours of Operation

Indiana University business hours are from 8 AM to 5 PM Eastern Time, Monday through Friday.

Frozen samples must be shipped **Monday-Wednesday only**.

Check weather report to make sure impending weather events (blizzards, hurricanes, etc.) will not affect the shipping or delivery of the samples.

### 3.3 NCRAD Holiday Observations

- Please note that courier services may observe a different set of holidays. Please be sure to verify shipping dates with your courier prior to any holiday.

Date	Holiday
January 1	New Year's Day
3 <sup>rd</sup> Monday in January	Martin Luther King, Jr Day
4 <sup>th</sup> Monday in May	Memorial Day
June 19	Juneteenth (observed)
July 4	Independence Day (observed)
1 <sup>st</sup> Monday in September	Labor Day
4 <sup>th</sup> Thursday in November	Thanksgiving
4 <sup>th</sup> Friday in November	Friday after Thanksgiving
December 25 – December 31	Winter Break

Please note that between December 24<sup>th</sup> and January 2<sup>nd</sup>, Indiana University will be open Monday through Friday for essential operations **ONLY** and will re-open for normal operations on January 2<sup>nd</sup>. If at all possible, biological specimens for submission to Indiana University should **NOT** be collected and shipped to Indiana University after the second week of December. Should it be necessary to ship blood samples for DNA extraction to Indiana University during this period, please contact the Indiana University staff before December 20th by e-mailing [alzstudy@iu.edu](mailto:alzstudy@iu.edu), so that they can arrange to have staff available to process incoming samples.

Please note that courier services may observe a different set of holidays. Please be sure to verify shipping dates with your courier prior to any holiday.

**Please see: <https://ncrad.org/contact/holiday-closures> for additional information.**

## 4.0 Laboratory Collection

### 4.1 Site Required Equipment

The following materials and equipment are necessary for the processing of specimens at the collection site and are to be **supplied by the local site**:

- Personal Protective Equipment: lab coat, nitrile/latex gloves, safety glasses
- Tourniquet
- Alcohol Prep Pad
- Gauze Pad
- Bandage
- Butterfly needles and hub
- Microcentrifuge tube rack
- Sharps bin and lid
- Wet Ice Bucket
- Wet ice
- Dry ice pellets

In order to process samples consistently across all projects and ensure the highest quality samples possible, project sites must have access to the following equipment:

- Centrifuge capable of  $\geq 2000 \times g$  with refrigeration to 4°C
- -80°C Freezer

In order to ship specimens, you must provide:

Dry ice pellets (about approximately 30-45 lbs per shipment)

## 5.0 Biofluid Collection

### 5.1 LEADS Collection Schedule:

	CI Baseline	CN Baseline	CI Month 12	CN Month 12*	CI Month 24	CN Month 24	CI Month 36	CI Month 48 /Annual visit
Serum	X	X	X	X	X	X	X	X
Plasma	X	X	X	X	X	X	X	X
DNA	X	X	X	X	X	X	X	X
Whole blood for CLIA lab testing	X							
Whole blood for long read sequencing	X	X						
			<i>Collected only once over the entire course of a participant's participation in the LEADS Study.</i> <i>May be collected at longitudinal visits if not collected at Baseline</i>					
RNA	X	X	X	X	X	X	X	X
PBMC	X	X	X	X	X	X	X	X
CSF	X	X	X		X	X	X	

\*CN M12 CSF may be collected if CSF was not collected at Baseline.

Whole blood is collected in up to six different types of tubes (10 ml plain red-top serum tube, 3-10ml lavender-top EDTA tube, 6ml lavender-top EDTA tube, 3ml lavender-top EDTA tube, 2.5 ml PAXgene™ tube, and 2-10ml green-top Sodium Heparin (NaHep) tubes for shipment to NCRAD. The plain red-top serum, 10ml EDTA, and 3ml EDTA tubes are processed locally into serum, plasma, buffy coat, and whole blood fractions; they are then aliquoted, frozen at the study site, and shipped to NCRAD. The 6ml lavender top EDTA tube is frozen locally without further processing. The PAXgene™ tube is frozen locally without further processing. The

Sodium Heparin tubes are shipped to NCRAD on the day of the participant visit (Monday through Thursday only).

Consent forms must specify that any biological samples and de-identified clinical data may be shared with academic and/or industry collaborators through NCRAD. A copy of the consent form for each participant should be kept on file by the site investigator.

Frozen samples are to be submitted according to the shipping methods outlined in Section 9.1. Guidelines for the processing, storage location, and timing of sample collection are listed in the tables below.

## 5.2 Biofluid Collection Charts

### 5.2.1 Biofluid Collection for CI Participants: Baseline, 12-Months, 24-Months, 36-Months, and 48/Annual visits.

Sample Type	Tube Type	Number of Tubes Supplied in Kit	Aliquot Volume	Tubes to NCRAD	Ship
Whole blood for isolation of serum	Plain Red-Top Serum Blood Collection Tube (10 ml)	1	N/A	N/A	N/A
	SERUM: 2.0 ml cryovials with red cap (residual volume placed in 2.0 ml cryovial with blue cap)	4	1.5 ml serum aliquot per 2.0 ml cryovial (red cap)	Up to 4	Frozen
Whole blood for isolation of plasma & buffy coat (for DNA extraction)	EDTA (Lavender-Top) Blood Collection Tube (10 ml)	3	N/A	N/A	N/A
	PLASMA: 2.0 ml cryovials with lavender cap (residual volume placed in 2.0 ml cryovial with blue cap)	10	1.5 ml plasma aliquot per 2.0 ml cryovial (lavender cap)	Up to 10	Frozen

	BUFFY COAT: 2.0 ml cryovial	3	1 ml buffy coat aliquot per 2.0 ml cryovial (clear cap)	3	Frozen
Whole blood for testing at the CLIA laboratory (*collected at BASELINE ONLY)	EDTA (Lavender-Top) Blood Collection tube (6ml)	1	N/A	1	Frozen
Whole blood for long read sequencing (*collected only once)	EDTA (Lavender-Top) Blood Collection tube (3ml)	1	1 ml whole blood aliquot per 2.0 ml cryovial (green cap)	3	Frozen
Whole blood for RNA extraction	PAXgene™ Blood Collection Tube (2.5 ml)	1	N/A	1	Frozen
Whole blood for PBMC	Sodium Heparin (Green-Top) Blood Collection tube (10 ml)	2	N/A	2	Ambient
CSF Collection (*not collected at 48-Month/Annual visit)	Sterile Container	Conical tubes, 15 cryovial tubes (13 orange cap, 1 blue cap, 1 yellow cap)	1.5 ml CSF aliquots per 2.0 ml cryovial (orange cap); residual volume placed in 2.0 ml cryovial with blue cap; 1-2 ml for local lab placed in 2.0 ml cryovial with yellow cap.	Up to 14	Frozen

**5.2.2 Biofluid Collection for CN Participants: Baseline, 12-Months, 24-Months, 36-Months, and 48/Annual visits.**

Sample Type	Tube Type	Number of Tubes Supplied in Kit	Aliquot Volume	Tubes to NCRAD	Ship

<b>Whole blood for isolation of serum</b>	<b>Plain Red-Top Serum Blood Collection Tube (10 ml)</b>	1	N/A	N/A	N/A
	SERUM: 2.0 ml cryovials with red cap (residual volume placed in 2.0 ml cryovial with blue cap)	4	1.5 ml serum aliquot per 2.0 ml cryovial (red cap)	Up to 4	Frozen
<b>Whole blood for isolation of plasma &amp; buffy coat (for DNA extraction)</b>	<b>EDTA (Lavender-Top) Blood Collection Tube (10 ml)</b>	3	N/A	N/A	N/A
	PLASMA: 2.0 ml cryovials with lavender cap (residual volume placed in 2.0 ml cryovial with blue cap)	10	1.5 ml plasma aliquot per 2.0 ml cryovial (lavender cap)	Up to 10	Frozen
	BUFFY COAT: 2.0 ml cryovial	3	1 ml buffy coat aliquot per 2.0 ml cryovial (clear cap)	3	Frozen
<b>Whole blood for long read sequencing (*collected only once)</b>	<b>EDTA (Lavender-Top) Blood Collection tube (3ml)</b>	1	1 ml whole blood aliquot per 2.0 ml cryovial (green cap)	3	Frozen
<b>Whole blood for RNA extraction</b>	<b>PAXgene™ Blood Collection Tube (2.5 ml)</b>	1	N/A	1	Frozen
<b>Whole blood for PBMC</b>	<b>Sodium Heparin (Green-Top) Blood Collection tube (10 ml)</b>	2	N/A	2	Ambient
<b>CSF Collection (*collected at BL and M24, may be collected at M12 if CSF was not collected at BL)</b>	Sterile Containers (cryovial with yellow cap)	Conical tubes, 15 cryovial tubes (13 orange cap, 1 blue cap, 1 yellow cap)	1.5 ml CSF aliquots per 2.0 ml cryovial (orange cap); residual volume placed in 2.0 ml cryovial with blue cap; 1-2 ml for local lab placed in 2.0 ml	Up to 14	Frozen

			cryovial with yellow cap.		
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If a sample is not obtained at a particular visit, it should be recorded in the notes section of the **Biological Sample and Shipment Notification Form** (see [Appendix B-C](#)). Submit a copy to NCRAD with a reason provided for the omission and track it as a protocol deviation.

## 6.0 Specimen Collection Kits, Shipping Kits, and Supplies

NCRAD will provide: 1) Blood sample collection kits for research specimens to be stored at NCRAD, the Long Read Sequencing Blood Kit, the Blood Supplemental Supply Kit, the Frozen Shipment Kit and Ambient Shipping Kit; 2) CSF collection kits including Lumbar Puncture (LP) trays, the CSF Supplemental Supply Kit and the CSF Shipping Supply Kit; and 3) clinical lab supplies (with the exception of dry ice and equipment supplies listed in [Section 4.1](#)). The provided materials include blood tubes, pipettes, LP trays (when applicable), boxes for serum/plasma/buffy coat/whole blood/CSF aliquots, as well as partially completed shipping labels to send materials to NCRAD. Kit Number Labels, LDS ID Labels, Collection and Aliquot Tube Labels will all be provided by NCRAD. Details regarding the blood and CSF Kits are found in this Manual of Procedures. Collection and Aliquot Tube Labels will be pre-printed with study information specific to the type of sample being drawn. Ensure that all tubes are properly labeled during processing and at the time of shipment.

### 6.1 Specimen Collection Kit Contents

Collection kits contain the following (for each participant) and provide the necessary supplies to collect samples from a given participant. Do not replace or supplement any of the tubes or kit components provided with your own supplies unless you have received approval from the NCRAD Study team to do so. *Please store all kits at room temperature until use.*

#### LEADS CI Baseline Blood Kits

Quantity	CI Baseline Blood-Based Kit Components
1	Plain Red Top Serum (Red-Top) Blood Collection Tube (10 ml)

3	EDTA (Lavender-Top) Blood Collection Tube (10 ml)
1	EDTA (Lavender-Top) Blood Collection Tube (6ml)
1	PAXgene™ Blood Collection Tube (2.5 ml)
2	Sodium Heparin (Green-Top) Blood Collection Tube (10 ml)
3	Cryovial tube (2.0 ml) with red cap
9	Cryovial tube (2.0 ml) with lavender cap
2	Cryovial tube (2.0 ml) with blue cap
3	Cryovial tube (2.0 ml) with clear cap
4	Disposable graduated transfer pipette
1	50ml conical
6	Bubble wrap tube sleeve for frozen blood tubes
25	Pre-printed Collection and Aliquot Tube Label
5	Pre-printed Kit Number Label
10	Labels for handwritten LDS ID
1	81-cell cryobox
1	Resealable bag

#### LEADS CI M12, M24, M36, M48/Annual Blood Kits

Quantity	CI M12, M24, M36, M48/Annual Blood-Based Kit Components
1	Plain Red Top Serum (Red-Top) Blood Collection Tube (10 ml)
3	EDTA (Lavender-Top) Blood Collection Tube (10 ml)
1	PAXgene™ Blood Collection Tube (2.5 ml)
2	Sodium Heparin (Green-Top) Blood Collection Tube (10 ml)
3	Cryovial tube (2.0 ml) with red cap
9	Cryovial tube (2.0 ml) with lavender cap
2	Cryovial tube (2.0 ml) with blue cap
3	Cryovial tube (2.0 ml) with clear cap
4	Disposable graduated transfer pipette
1	50ml conical
5	Bubble wrap tube sleeve for frozen blood tubes
24	Pre-printed Collection and Aliquot Tube Label
5	Pre-printed Kit Number Label
9	Labels for handwritten LDS ID
1	81-cell cryobox
1	Resealable bag

**LEADS CN Baseline, M12, M24 Blood Kits**

Quantity	CN Baseline, M12, M24 Blood-Based Kit Components
1	Plain Red Top Serum (Red-Top) Blood Collection Tube (10 ml)
3	EDTA (Lavender-Top) Blood Collection Tube (10 ml)
1	PAXgene™ Blood Collection Tube (2.5 ml)
2	Sodium Heparin (Green-Top) Blood Collection Tube (10 ml)
3	Cryovial tube (2.0 ml) with red cap
9	Cryovial tube (2.0 ml) with lavender cap
2	Cryovial tube (2.0 ml) with blue cap
3	Cryovial tube (2.0 ml) with clear cap
4	Disposable graduated transfer pipette
1	50ml conical
5	Bubble wrap tube sleeve for frozen blood tubes
24	Pre-printed Collection and Aliquot Tube Label
5	Pre-printed Kit Number Label
9	Labels for handwritten LDS ID
1	81-cell cryobox
1	Resealable bag

**LEADS Long Read Sequencing Blood Kit**

Quantity	Long Read Sequencing Blood-Based Kit Components
1	EDTA (Lavender-Top) Blood Collection Tube (3 ml)
3	Cryovial tube (2.0 ml) with green cap
1	Cryovial tube (2.0 ml) with blue cap
1	Disposable graduated transfer pipette
4	Pre-printed Collection and Aliquot Tube Label
5	Pre-printed Kit Number Label
1	Labels for handwritten LDS ID

**LEADS Blood Supplemental Supply Kit**

<b>Quantity</b>	<b>Blood-Based Supplemental Supply Kit Components</b>
5	Plain Red Top Serum (Red-Top) Blood Collection Tube (10 ml)
10	EDTA (Lavender-Top) Blood Collection Tube (10 ml)
5	EDTA (Lavender-Top) Blood Collection Tube (6 ml)
5	EDTA (Lavender-Top) Blood Collection Tube (3 ml)
5	PAXgene™ Blood Collection Tube (2.5 ml)
10	Sodium Heparin (Green-Top) Blood Collection Tube (10 ml)
10	Cryovial tube (2.0 ml) with red cap
20	Cryovial tube (2.0 ml) with lavender cap
5	Cryovial tube (2.0 ml) with blue cap
5	Cryovial tube (2.0 ml) with clear cap
5	Cryovial tube (2.0 ml) with green cap
5	50ml conical
20	Disposable graduated transfer pipette
10	Bubble wrap tube sleeve for frozen blood tubes
10	Labels for handwritten LDS ID
5	81-cell cryobox

**LEADS Frozen Blood Shipping Supply Kit (fits up to 5 participants)**

<b>Quantity</b>	<b>Frozen Shipping Kit Components for Blood-Based Biomarkers</b>
5	Plastic Biohazard bag with absorbent sheet (Large)
1	Shipping box/Styrofoam container (Large)
1	UN3373 label Warning

**LEADS Ambient Blood Shipping Supply Kit**

Quantity	Ambient Shipping Kit Components for Blood-Based Biomarkers
1	Plastic biohazard bag with absorbent sheet
1	Small IATA shipping box with insulated cooler
1	Small refrigerant pack
1	Aqui-Pak 6 tube absorbent pouch
1	UN3373 Biological Substance Category B label
1	List of contents card
1	UPS return airbill pouch
1	UPS Clinic Pak

**LEADS LP Kits**

**\*Sites must specify 22 or 24 gauge kit when ordering from NCRAD.**

Quantity	LP Kit Components
1	Sprotte needle, 22 or 24 gauge X 3.5" (90mm)
1	Introducer needle, 1 mm x 30 mm
1	Hypodermic needle, 22 gauge x 1.5"
1	Plastic syringe, (3 ml, luer lock) with 25G x 5/8" needle attached
4	Polypropylene syringe (5 ml, luer lock)
1	Needle stick pad
1	Adhesive bandage
1	Drape, fenestrated, 2 tabs, paper, 18" x 26"
2	Towel, 13.5" x 18"
6	Gauze pad, 2" x 2"
3	Sponge stick applicator
2	Lidocaine 1%, 5 ml
1	Povidone-Iodine Topical Solution, 0.75 oz

**LEADS CSF Kits**

Quantity	CSF Kit Components

13	Cryovial tube (2.0 ml) with orange cap
1	Cryovial tube (2.0 ml) with yellow cap
1	Cryovial tube (2.0 ml) with blue cap
3	15-ml conical polypropylene tube-individually wrapped
1	50-ml conical polypropylene tube-individually wrapped
15	Pre-printed CSF collection and Aliquot Tube Label
5	Pre-printed Kit Number label
3	Labels for handwritten LDS ID

#### CSF Supplemental Supply Kit

Quantity	CSF Supplemental Supply Kit Components
10	50-ml conical polypropylene tube-individually wrapped
20	15-ml conical polypropylene tube-individually wrapped
20	Cryovial tube (2.0 ml) with orange cap
5	Cryovial tube (2.0 ml) with blue cap
5	Cryovial tube (2.0 ml) with yellow cap
4	Styrofoam Shipping Containers (11"x9"x8" 1-½" wall)
3	Dry Ice Shipping Label, UN3373 Label, Fragile Label
10	Small biohazard bags with absorbent sheet
5	3 ½" × 22 Sprotte needle with Introducer (90mm)
10	Adhesive Spot Bandage
1 box	Alcohol swabs
3	Resealable bags
3	Shipping pouches

#### LEADS CSF Shipping Supply Kit

Quantity	CSF Shipping Supply Kit Components
1	Styrofoam Shipping Containers (11"x 9"x 8" 1-½" wall)
1	Small biohazard bag with absorbent sheet
1	Dry Ice Shipping Label, UN3373 Label, Fragile Label
1	Resealable Plastic Bag
1	Shipping pouch

#### Individual Supplies

Quantities	Items Available upon request within the NCRAD kit module.
By Request	81-cell cryobox
By Request	Cryovial tube (2.0 ml) with lavender cap
By Request	Cryovial tube (2.0 ml) with red cap
By Request	Cryovial tube (2.0 ml) with orange cap
By Request	Cryovial tube (2.0 ml) with clear cap
By Request	Cryovial tube (2.0 ml) with yellow cap
By Request	Cryovial tube (2.0 ml) with blue cap
By Request	Cryovial tube (2.0 ml) with green cap
By Request	50-ml conical polypropylene tube-individually wrapped
By Request	15-ml conical polypropylene tube-individually wrapped
By Request	UPS return airbill pouch
By Request	Small IATA shipping box with insulated cooler for ambient shipping
By Request	Aqui-Pak 6 tube absorbent pouch
By Request	Small refrigerant pack
By Request	Shipping container for dry ice shipment (shipping and Styrofoam box)
By Request	Styrofoam shipping containers (11"x9"x8" 1 1/2" wall)
By Request	Plastic biohazard bag with absorbent sheet (small)
By Request	Disposable graduated transfer pipette
By Request	50ml conical
By Request	PAXgene™ Blood Collection Tube (2.5 ml)
By Request	Plain Red Top Serum (Red-Top) Blood Collection Tube (10 ml)
By Request	Sodium Heparin (Green-Top) Blood Collection Tube (10 ml)
By Request	EDTA (Lavender-Top) Blood Collection Tube (10 ml)
By Request	EDTA (Lavender-Top) Blood Collection Tube (6 ml)
By Request	EDTA (Lavender-Top) Blood Collection Tube (3 ml)
By Request	Bubble wrap tube sleeve for frozen 6 ml EDTA tube
By Request	Warning label packet
By Request	UN3373 label
By Request	Dry ice shipping label
By Request	Fine point permanent markers
By Request	LDS ID Labels

## 6.2 Kit Supply to Study Sites

Each site will be responsible for ordering and maintaining a steady supply of kits from NCRAD. We advise sites to keep a supply of each kit type available. Be sure to check your supplies and order additional materials before you run out or supplies expire so you are prepared for study visits. Please follow the applicable link below to request additional kits and follow the prompts to request the desired supplies. Options include ordering a specific number of kits; we are also including the option of simply ordering the desired amount of extra supplies.

- LEADS Sites<sup>1</sup>: <http://kits.iu.edu/leads>

Please allow **THREE weeks** for kit orders to be processed and delivered.

Due to ongoing supply limitations, we ask that you please only order as many kits and extra supplies that you will be able to use in the next 30 days. Doing so allows us to fulfill as many kit requests as possible without depleting stock for other kit requests in our queue. If we are not able to fulfill any part of your request due to supplies being out of stock, we will reach out about those individually.

## 7.0 Blood Collection and Processing Procedures

**\*Important Note:** In order to ensure the highest quality samples are collected, processed, and stored, it is essential to follow the specific collection, processing, and shipment procedures detailed in the following pages. Collection of biomarkers and CSF should be collected after a minimum 6-hour fast, preferably in the morning. Please read the following instructions first before collecting any specimens. Have all your supplies and equipment out and prepared prior to drawing blood. **Please note that the centrifuge may take 30 minutes to cool, so please plan accordingly.** Draw blood in the following order:

1. Plain Red Top Serum Blood Collection Tube (10 ml) for Serum
2. EDTA (Lavender-Top) Blood Collection Tube (10 ml) for DNA and Plasma x 3
3. EDTA (Lavender-Top) Blood Collection Tube (6 ml) for CLIA lab testing
4. EDTA (Lavender-Top) Blood Collection Tube (3 ml) for long read sequencing.
5. PAXgene™ Blood Collection Tube (2.5 ml) for RNA
6. Sodium Heparin (Green-Top) Blood Collection Tube (10 ml)\* x 2

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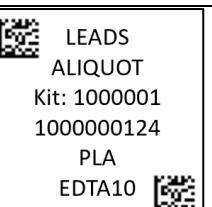
<sup>1</sup> You can also request kits using this alternative link: <https://redcap.link/leads>

SPECIFIC INSTRUCTIONS FOR COLLECTION AND PROCESSING OF EACH SAMPLE ARE  
DETAILED ON THE FOLLOWING PAGES.

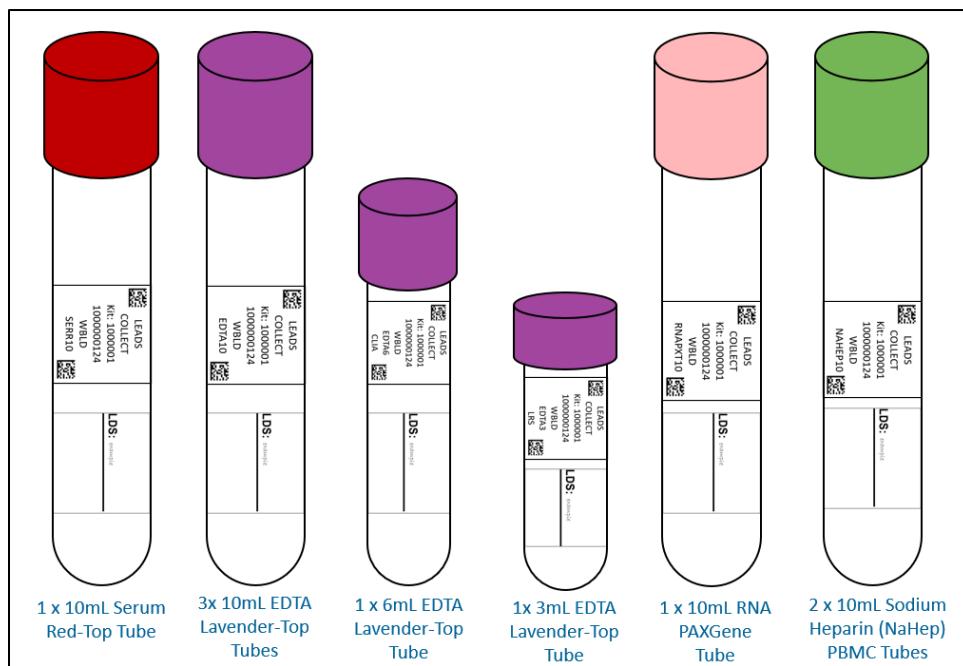
## 7.1 Kit Supply to Study Sites

### Label Type Summary:

1. Kit Number Label
2. Collection and Aliquot Tube Label
3. LEADS ID Label

	<p>The <b>Kit Number Labels</b> do not indicate a specimen type but are affixed on the Biological Sample and Shipment Notification Forms and on specific packing materials.</p>
	<p>The <b>Collection Tube Labels</b> for blood and CSF are placed on all collection tubes.</p>
	<p>The <b>Aliquot Tube Labels</b> for blood, blood derivatives, and CSF are placed on all aliquot tubes.</p>
	<p>The <b>LDS ID Labels</b> are placed on all collection tubes, both blood and CSF.</p>

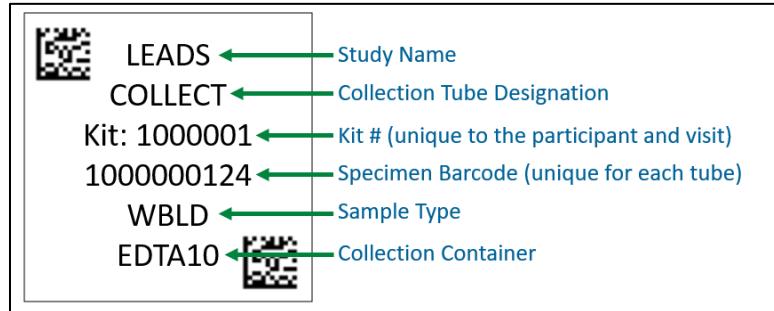
**\*Important Note:** Each collection tube will contain two labels: the Collection Tube Label and the LDS ID Label. Be sure to place labels in the same configuration consistently among tubes, with the barcoded label near the top of the tube and the handwritten LDS ID label.



In order to ensure the label adheres properly and remains on the tube, please follow these instructions:

- Place blood collection and aliquot labels on **ALL** collection and aliquot tubes **BEFORE** sample collection, sample processing, or freezing. This should help to ensure the label properly adheres to the tube before exposure to moisture or different temperatures.

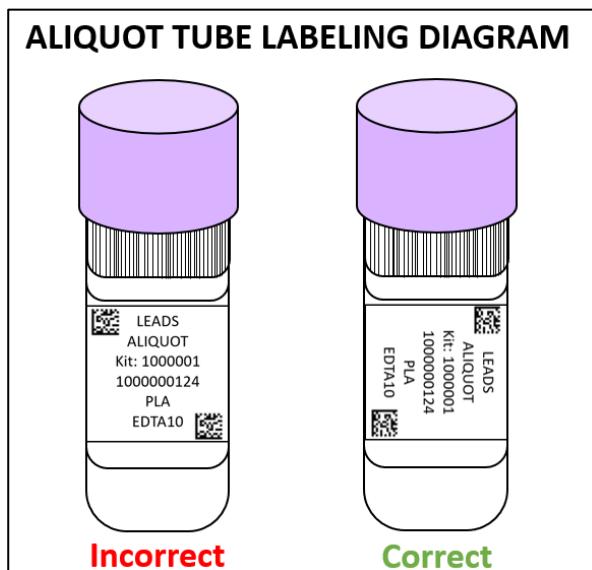
➤ Place cryovials in numerical order based on the specimen number, located at the top of the label. This ensures that no aliquot is misplaced or lost during the shipment process.



➤ Using a fine point permanent marker, fill-in and place the LDS ID Labels on the collection tubes only (RNA, Serum, NaHep, EDTA(s)) **BEFORE** sample collection, processing, or freezing. These labels are in addition to the Collection and Aliquot Tube Labels. **DO NOT** place LDS ID labels on any cryovials.

➤ Using a fine point permanent marker, fill-in and place the LDS ID Labels on the collection tubes only **BEFORE** sample collection, processing, or freezing. These labels are in addition to the Collection and Aliquot Tube Labels. **DO NOT** place LDS ID labels on any cryovials.

➤ The Collection and Aliquot Tube Labels contain two 2D barcodes on the upper left and lower right-hand sides of the label. Place the left-hand barcode toward the tube cap.



➤ Place label **horizontally** on the tube (wrapped around sideways if the tube is upright) and **just below the ridges** of the aliquot tubes (see labeling diagram below).

- Take a moment to ensure the label is **completely adhered** to each tube. It may be helpful to roll the tube between your fingers after applying the label.
- If there are any unused cryovials, please do not send the empty cryovials to NCRAD. These unused cryovials (ensure labels are removed) can be saved as part of a supplemental supply at your site or the cryovials can be disposed of per your site's requirements.

## 7.2 Kit Supply to Study Sites

- The following training videos are available to assist you with the specimen processing, aliquoting, and shipping processes. The videos are available at:  
[https://ncrad.org/resource\\_leads.html](https://ncrad.org/resource_leads.html)

- LEADS MOP Training
- Serum Processing and Aliquoting
- Plasma and Buffy Coat Processing and Aliquoting
- Frozen Shipping
- Ambient Shipping

## 7.3 Filling Aliquot Tubes (Serum, Plasma, Buffy Coat, Whole Blood, and CSF)

In order to ensure that NCRAD receives a sufficient amount of sample for processing and storage, and to avoid cracking of the tubes prior to shipment, each cryovial should be filled to the assigned volume with the respective biological material after processing is completed (refer to detailed processing instructions for average yield per sample).

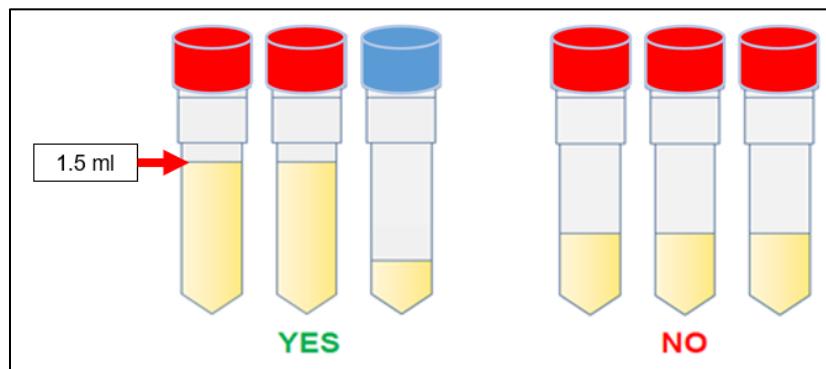
- Serum, plasma, and CSF samples should be processed into 1.5ml aliquots.
- Buffy coat and whole blood (for long read sequencing) should be processed into 1.0ml aliquots.

Over-filled tubes may burst once placed in the freezer, resulting in a loss of that sample.

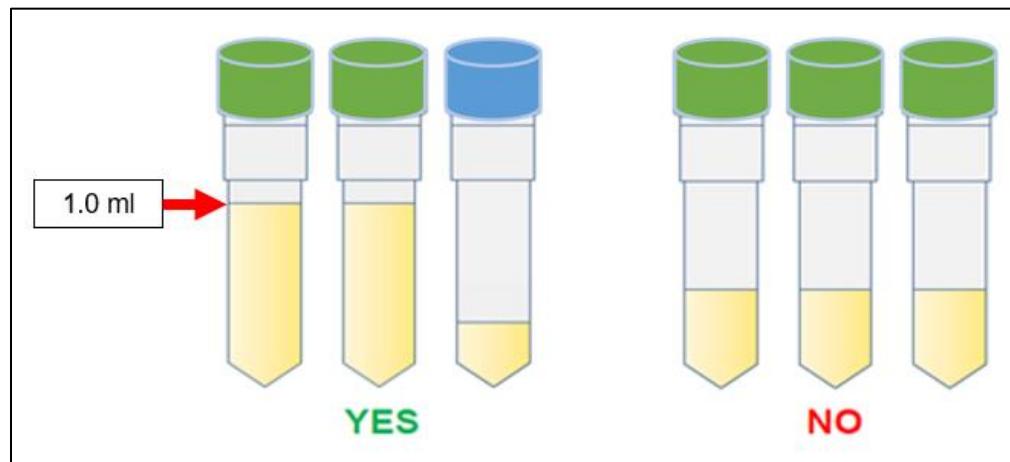
**Residuals:** If applicable, aliquot the remaining biologic material as the residual volume and ship to NCRAD. Essentially, all material should be shipped to NCRAD,

ensuring maximum amount in as many cryovials as will allow after processing the sample. Serum, plasma, whole blood (for long read sequencing), and CSF samples may require a residual. Residuals for serum, plasma, and CSF samples should be created if there is less than 1.5ml of sample remaining after filling all other aliquot tubes. A residual for whole blood (for long read sequencing) should be created if there is less than 1.0ml of sample remaining after filling all other aliquot tubes.

For example, if 3.6 ml of **serum** is obtained, you should fill 2 red capped cryovial tubes each with **1.5 ml**, and one additional blue capped cryovial tube with the remaining 0.6 ml.



Another example, if 2.7 ml of **whole blood (for long read sequencing)** is obtained, you should fill 2 green capped cryovial tubes each with **1.0ml**, and one additional blue capped cryovial tube with the remaining 0.7 ml.

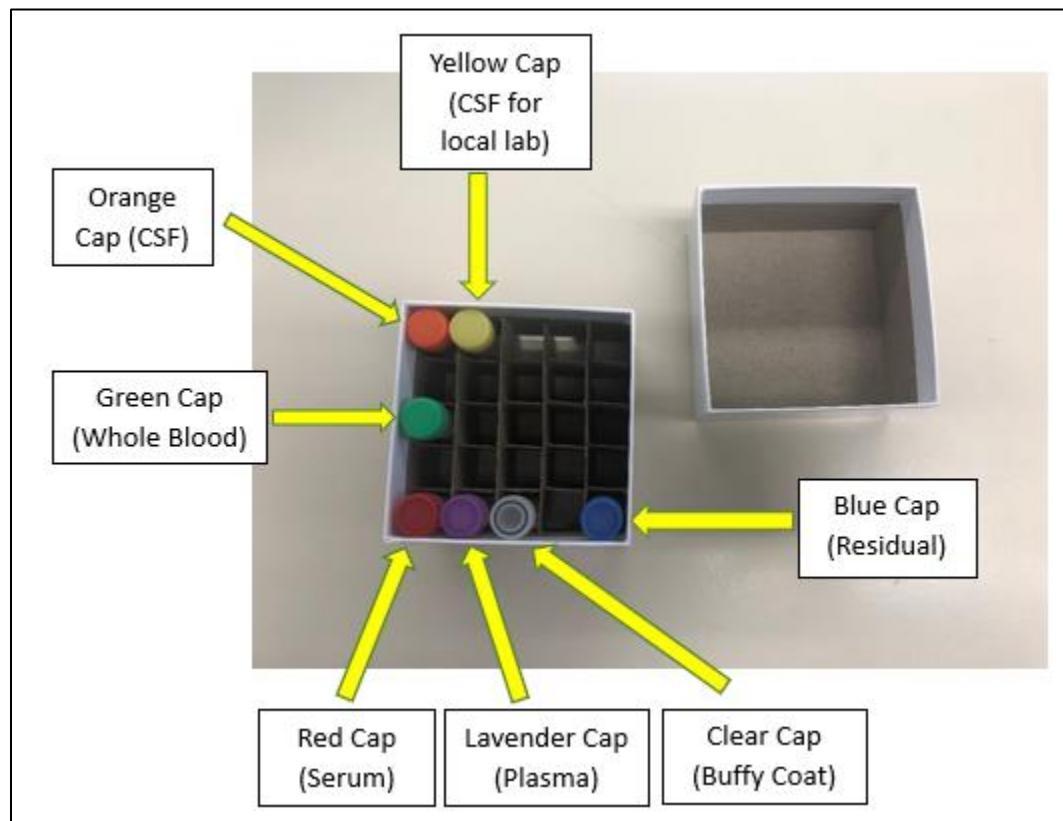


**Please Note:** It is critical for the integrity of the samples that study staff note if an aliquot tube contains a residual volume (anything under 1.5 ml for serum, plasma, or CSF samples and anything under 1 ml for whole blood aliquots). Please highlight that the aliquot contains a small

volume by utilizing the blue cryovial cap provided in each kit. Please record the specimen number and volume of the residual aliquot on the Biological Sample and Notification Form.

To assist in the preparation and aliquoting of samples, colored caps are used for the cryovial tubes. The chart below summarizes the association between cap color and type of cryovial.

Cap Color	Sample Type
Red Cap	Serum
Lavender Cap	Plasma
Clear Cap	Buffy Coat
Green Cap	Whole blood
Blue Cap	Residual (plasma, serum, whole blood or CSF)
Orange Cap	CSF
Yellow Cap	CSF for local lab



## 7.4 Plain Red-Top Serum Blood Collection Tube (10 ml) for Serum

**Whole Blood Collection for Isolation of Serum: Plain Red-Top Serum Blood Collection Tube (10 ml) (for processing of serum aliquots)**

**Important Note:** Ensure all tubes are not expired prior to collection and processing of samples.

1. Set centrifuge 4°C to pre-chill before use.
2. Place completed LDS ID Label and Collection and Aliquot “**WBLD SERR10**” Tube Label on the Plain Red-Top Serum Blood Collection Tube. Place pre-printed Collection and Aliquot “**SER SERR10**” Tube Labels on the (3) 2.0 ml cryovial tubes with red caps and (1) 2.0 ml cryovial with blue cap (if necessary, for residual).
3. Using a blood collection set and a holder, collect blood into **Plain Red-Top Serum Blood Collection Tubes (10 ml)** using your institution's recommended procedure for standard venipuncture technique.

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

- a) Place participant's arm in a downward position.
- b) Hold tube in a vertical position, below the participant's arm during blood collection.
- c) Release tourniquet as soon as blood starts to flow into last collection tube.
- d) Make sure tube additives do not touch the stopper or the end of the needle during venipuncture.

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

- a. 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 Serum tube at this time. Process blood obtained in existing Serum tube.

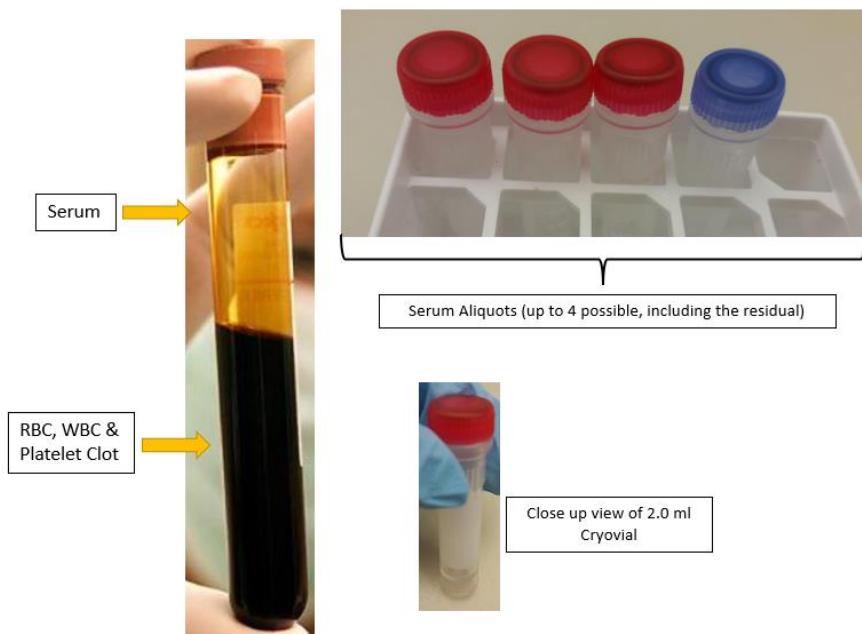
5. **CRITICAL STEP: Immediately after blood collection, gently invert/mix (180 degree turns) each tube 5 times.**

6. **CRITICAL STEP: Allow blood to clot at room temperature by placing it upright in a vertical position in a tube rack for 30 minutes. If sample is not clotted allow it to set up to 60 minutes to clot. Serum samples need to be spun, aliquoted, and placed in the freezer within 2 hours from the time of collection.**

7. After 30 minutes of clotting, centrifuge the collection tube for 10 minutes at 2000 x g at 4°C. **It is critical that the tube be centrifuged at the appropriate speed to ensure proper serum separation (see worksheet in [Appendix A](#) to calculate RPM)**

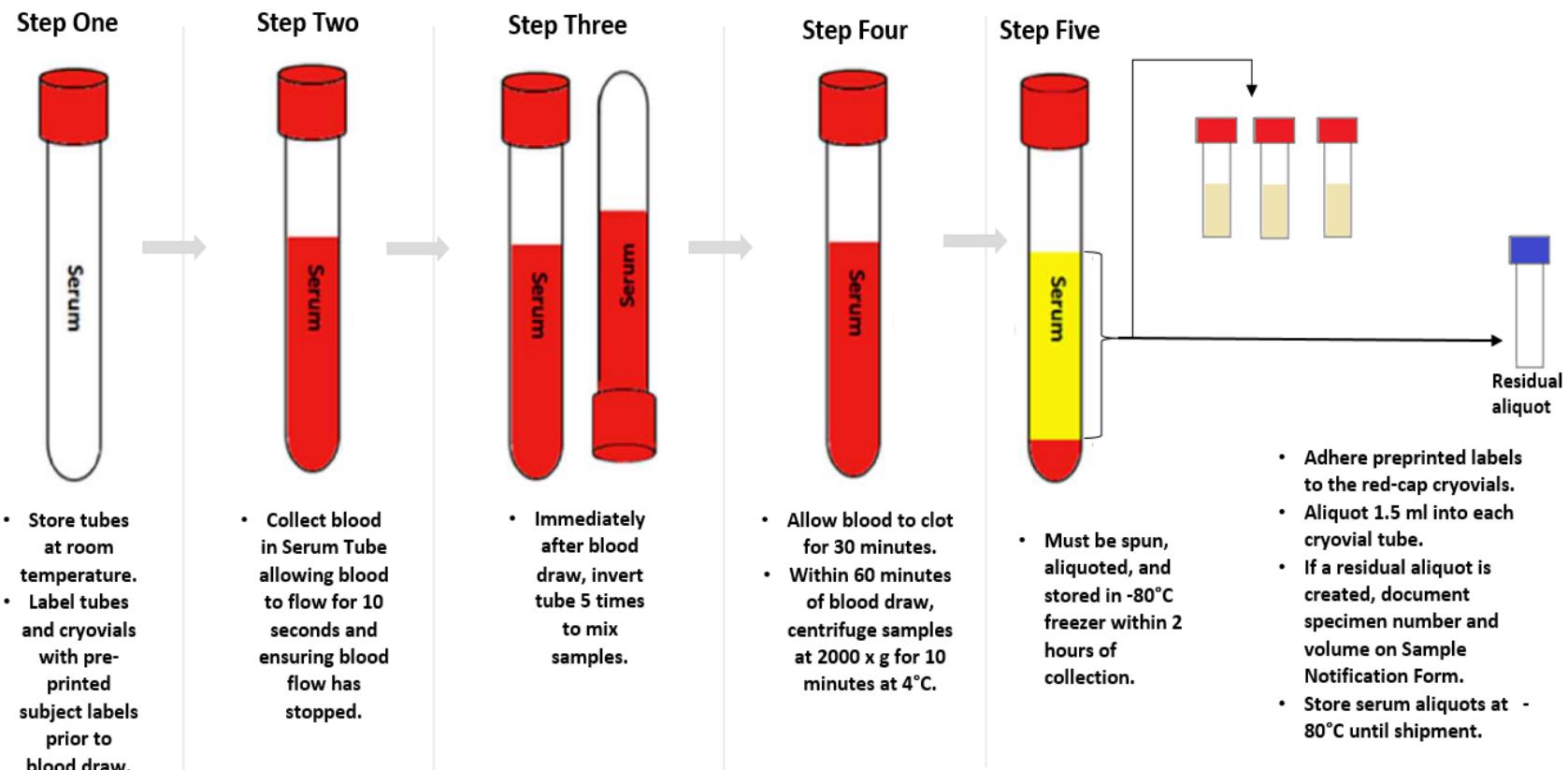
- a. Equivalent rpm for spin at 2000 x g
- b. While centrifuging, remember to record all times, temperatures and spin rates on the Biological Sample and Shipment Notification Form [Appendix B](#).
- c. Serum samples need to be spun, aliquoted, and placed in the freezer within 2 hours from the time of collection.
- d. Record time aliquoted on the Biological Sample Shipment and Notification Form.

8. Remove the serum by tilting the tube and placing the pipette tip along the lower side of the wall. Using a disposable pipette, transfer serum into the pre-labeled cryovials with the red caps. Aliquot 1.5 ml per cryovial (total vials= up to 3 with 1.5 ml each and 1 residual with <1.5 ml). The Serum tube should yield, on average, 4- 5 ml of serum for a total of (3) 2.0 ml aliquot cryovial tubes per participant with 1.5 ml per cryovial tube. Be sure to only place **serum** in cryovials labeled with the "SERUM" label and red caps. If there is extra serum left, use 1 extra cryovial provided for another <1.5 ml aliquot of serum and label as appropriate. **If a residual aliquot (<1.5 ml) is created, document the sample number and volume on the Biological Sample and Shipment Notification Form.**



9. Place the labeled cryovials in the 81 cell cryobox and place on dry ice pellets. Transfer to **-80°C Freezer when possible**. Store all samples at **-80°C until shipped** to NCRAD on dry ice pellets. Record time aliquots placed in freezer and storage temperature of freezer on Biological Sample and Shipment Notification Form.

## Serum Preparation (10ml Red Top Tube)



**Important Note:** Ensure all tubes are not expired prior to collection and processing of samples.

## 7.5 EDTA (Lavender-Top) Blood Collection Tube (10 ml) for Plasma and Buffy Coat

**Whole Blood Collection for Isolation of Plasma and Buffy Coat: EDTA (Lavender-Top) Blood Collection Tube (10 ml) (for processing of plasma aliquots and buffy coat aliquot)**

**Important Note:** Ensure all tubes are not expired prior to collection and processing of samples.

1. Set centrifuge to 4°C to pre-chill before use.
2. Place completed LDS ID Label and pre-printed “**WBLD EDTA10**” Collection and Aliquot Tube Labels on the 3 x 10mL lavender top EDTA tubes. Place pre-printed “**PLA EDTA10**” Collection and Aliquot Tube Labels on the (9) 2.0 ml cryovial tubes with lavender caps and (1) 2.0 ml cryovial tube with blue cap (if necessary, for residual). Place pre-printed “**BUF EDTA10**” Collection and Aliquot Tube Labels on the (3) 2.0 ml cryovial tubes with clear lids.
3. Please ensure that aliquots are kept in numerical order (by specimen number) throughout the aliquoting and shipping process, from left to right.
4. Using a blood collection set and a holder, collect blood into the **EDTA (Lavender-Top) Blood Collection Tube (10 ml)** using your institution's recommended procedure for standard venipuncture technique.

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

- a) Place participant's arm in a downward position.
- b) Hold tube in a vertical position, below the participant's arm during blood collection.
- c) Release tourniquet as soon as blood starts to flow into last collection tube.
- d) Make sure tube additives do not touch stopper or end of the needle during venipuncture.

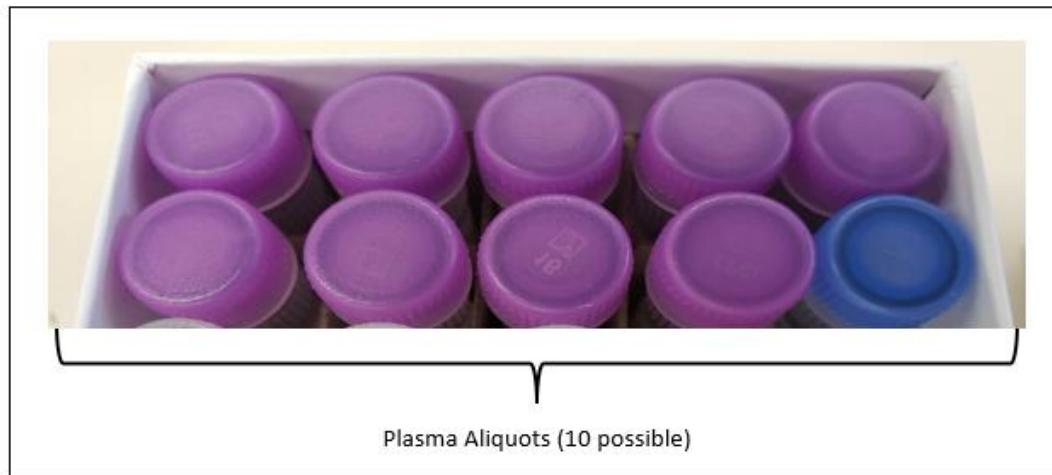
5. Allow at least 10 seconds for a complete blood draw to take place in each tube. **Ensure that the blood has stopped flowing into the tube before removing the tube from the holder.** The tube with its vacuum is designed to draw 10 ml of blood into the tube.
  - a. If complications arise during the 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.

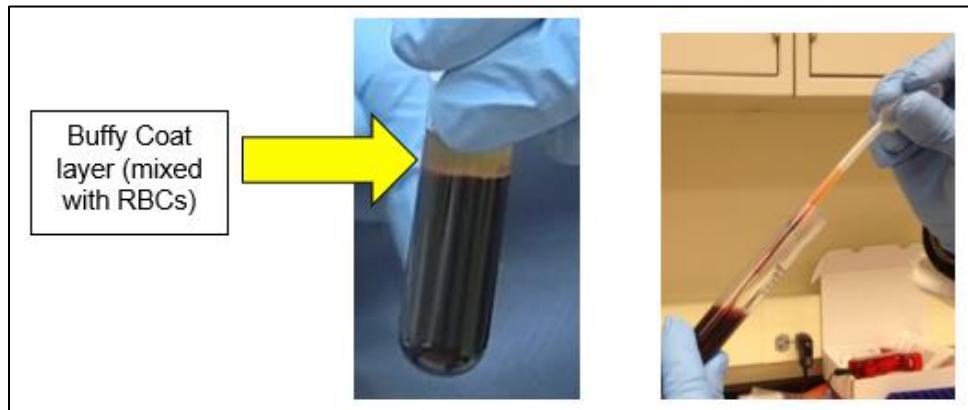
6. **CRITICAL STEP: Immediately after blood collection, gently invert/mix (180 degree turns) the EDTA tube 8-10 times.**
7. **CRITICAL STEP: Immediately after inverting the EDTA tube, place it on wet ice until centrifugation begins.**
8. Preferably within 30 minutes of blood collection, centrifuge balanced tubes for 10 minutes at 2000 x g 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 A](#) to calculate RPM.)**
  - a. Equivalent rpm for spin at 2000 x g
  - b. While centrifuging, remember to record all times, temperatures and spin rates on the Biological Sample and Shipment Notification Form.
  - c. Plasma samples need to be spun, aliquoted, and placed in the freezer within 2 hours from the time of collection.
  - d. Record time aliquoted on the Biological Sample Shipment and Notification Form.
9. Remove the plasma, being careful not to agitate the packed red blood cells at the bottom of the tube. Tilt the tube and place a disposable pipette tip along the lower side of the wall without touching the pellet (buffy coat) so that plasma is not contaminated (see below). Transfer plasma from all three EDTA tubes into the 50 ml conical tube and gently invert 3 times. Aliquot 1.5 ml per cryovial (total vials = up to 9 with 1.5 ml each and 1 residual with <1.5ml). The EDTA tube should yield, on average, 4-5 ml of plasma. Be sure to only place **plasma** in cryovials with lavender caps and labeled with "PLASMA" labels. Take caution not to disturb the red blood cells at the bottom of the tube. If there is extra plasma left, use 1 extra cryovial provided for another <1.5 ml aliquot of plasma. **If a residual aliquot (<1.5 ml) is created, document the sample number and volume on the Biological Sample and Shipment Notification Form.**



NOTE: When pipetting plasma from the plasma tube into the cryovials, be very careful to pipette the plasma top layer only, leaving the buffy coat and the red blood cell layers untouched.

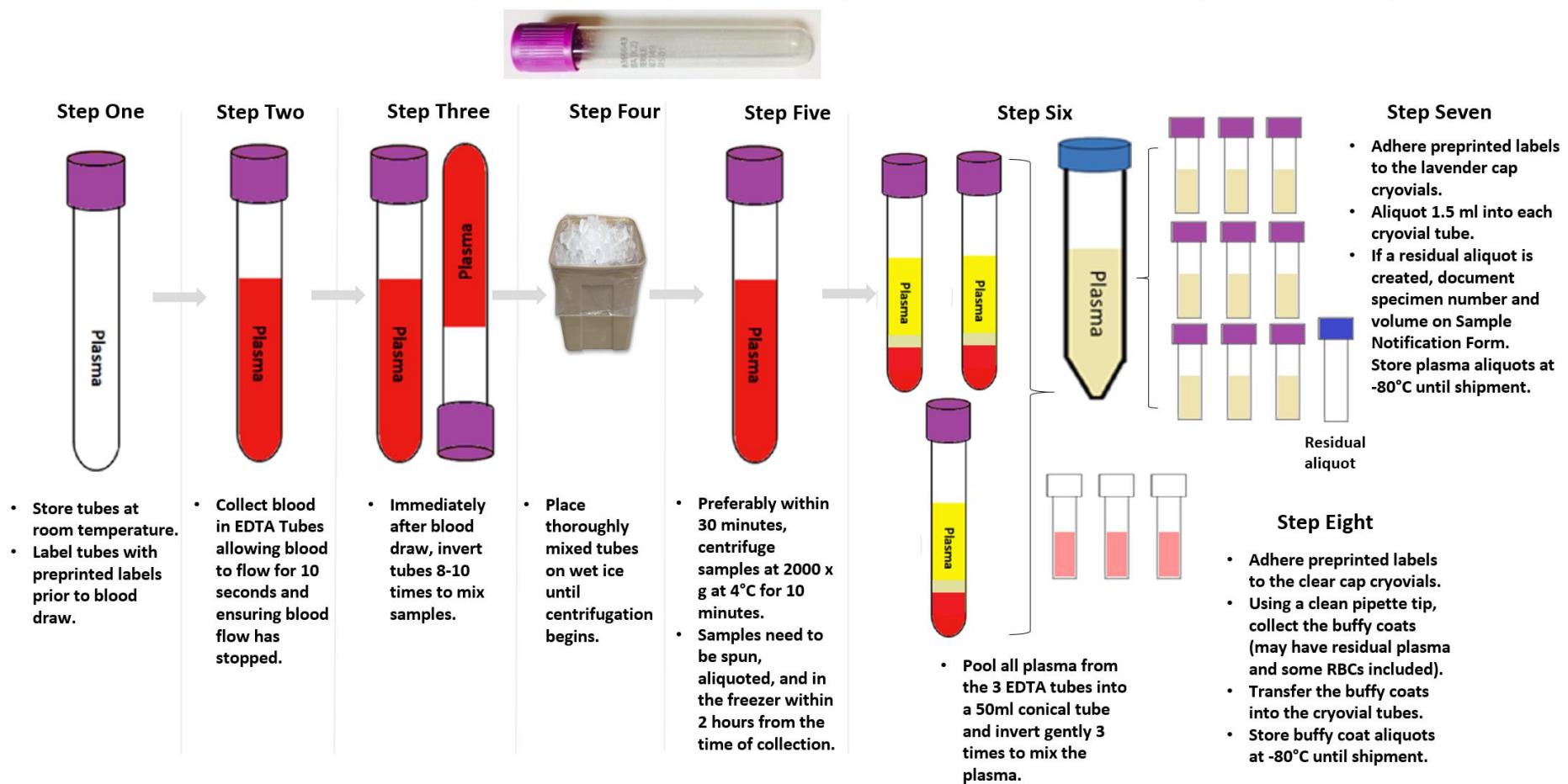


10. Place the labeled cryovials in the 81 cryovial box and place on dry ice pellets. Transfer to **-80°C Freezer when possible**. Store all samples at **-80°C until shipped** to NCRAD on dry ice pellets. Record time aliquots placed in freezer and storage temperature of freezer on Biological Sample Shipment and Notification Form.
11. After plasma has been removed from the EDTA (Lavender-Top) Blood Collection Tubes (10 ml), aliquot buffy coat layer (in the top layer of cells, the buffy coat is mixed with RBCs-see figure) into labeled cryovials with clear cap using a micropipette. Aliquot each buffy coat into a separate cryovial. The buffy coat aliquot is expected to have a reddish color from the RBCs. Be sure to place buffy coat into cryovials with the clear caps and “BUFFY COAT” label.



12. Dispose of tube with red blood cell pellet according to your site's guidelines for disposing of biomedical waste.
13. Place the labeled cryovials in the 81 cryovial box and place on dry ice pellets. Transfer to **-80°C Freezer when possible**. Store all samples at **-80°C until shipped** to NCRAD on dry ice pellets.

## Plasma and Buffy Coat Preparation (10ml Lavender-Top Tube x 3)



## 7.6 EDTA (Lavender-Top) Blood Collection Tube (6ml) for CLIA Lab Testing

**Important Note:** Ensure all tubes are not expired prior to collection and processing of samples.



1. CRITICAL STEP: **Store empty Whole Blood EDTA tubes at room temperature, 64°F - 77°F (18°C to 25°C) before use.**
2. Place completed LDS ID Label and pre-printed “**WBLD EDAT6**” Collection and Aliquot Tube Label on the 6ml lavender-top EDTA tube.
3. Using a blood collection set and a holder, collect whole blood into the 6 ml lavender top whole blood tube using your institution’s recommended procedure for standard venipuncture technique.

The following techniques shall be used to prevent possible backflow:

- a. Place participant's arm in a downward position.
- b. Hold tube in a vertical position, below the participant's arm during blood collection.
- c. Release tourniquet as soon as blood starts to flow into last collection tube.
- d. Make sure tube additives do not touch stopper or end of the needle during venipuncture.

4. Invert the tube gently 3 times.



5. Transfer the tube immediately to a **-80°C Freezer**. The sample should be frozen

and stored **UPRIGHT** in a WIRE or PLASTIC type test tube rack (DO NOT use a solid Styrofoam test tube holder).

## Whole Blood Preparation (6 mL Lavender-Top Tube)



### Step One



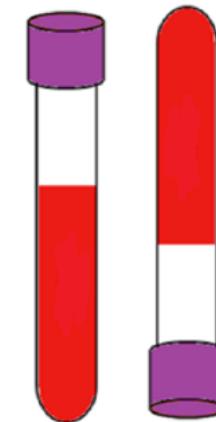
- Store tubes at room temperature.
- Label tubes with pre-printed subject labels prior to blood draw.

### Step Two



- Collect blood in tube allowing blood to flow for 10 seconds and ensuring blood flow has stopped.

### Step Three



- Immediately after blood draw, invert tube 3 times to mix sample.

### Step Four



- Immediately after inversion, freeze the sample in an -80°C freezer until ready to ship.



**Important Note:** Ensure all tubes are not expired prior to collection and processing of samples.

## 7.7 EDTA (Lavender-Top) Blood Collection Tube (3ml) for Whole Blood x 1

**Important Note:** Ensure all tubes are not expired prior to collection and processing of samples.

1. CRITICAL STEP: **Store empty Whole Blood EDTA tubes at room temperature, 64°F - 77°F (18°C to 25°C) before use.**
2. Place completed LDS ID Label and pre-printed “**COLLECT WBLD EDTA3**” Collection and Aliquot Tube Label on the 3ml lavender top EDTA tube. Place the (3) “**ALIQUOT WBLD EDTA3**” Collection and Aliquot Tube Labels on the (3) 2.0 ml cryovial tubes with green caps (or (2) 2.0ml cryovial tubes with green caps and (1) 2.0ml cryovial tube with blue cap if a residual is created instead of a full third aliquot).
3. Please ensure that aliquots are kept in numerical order (by specimen number) throughout the aliquoting and shipping process, from left to right.
4. Using a blood collection set and a holder, collect whole blood into the 3 ml lavender top whole blood tube using your institution’s recommended procedure for standard venipuncture technique.

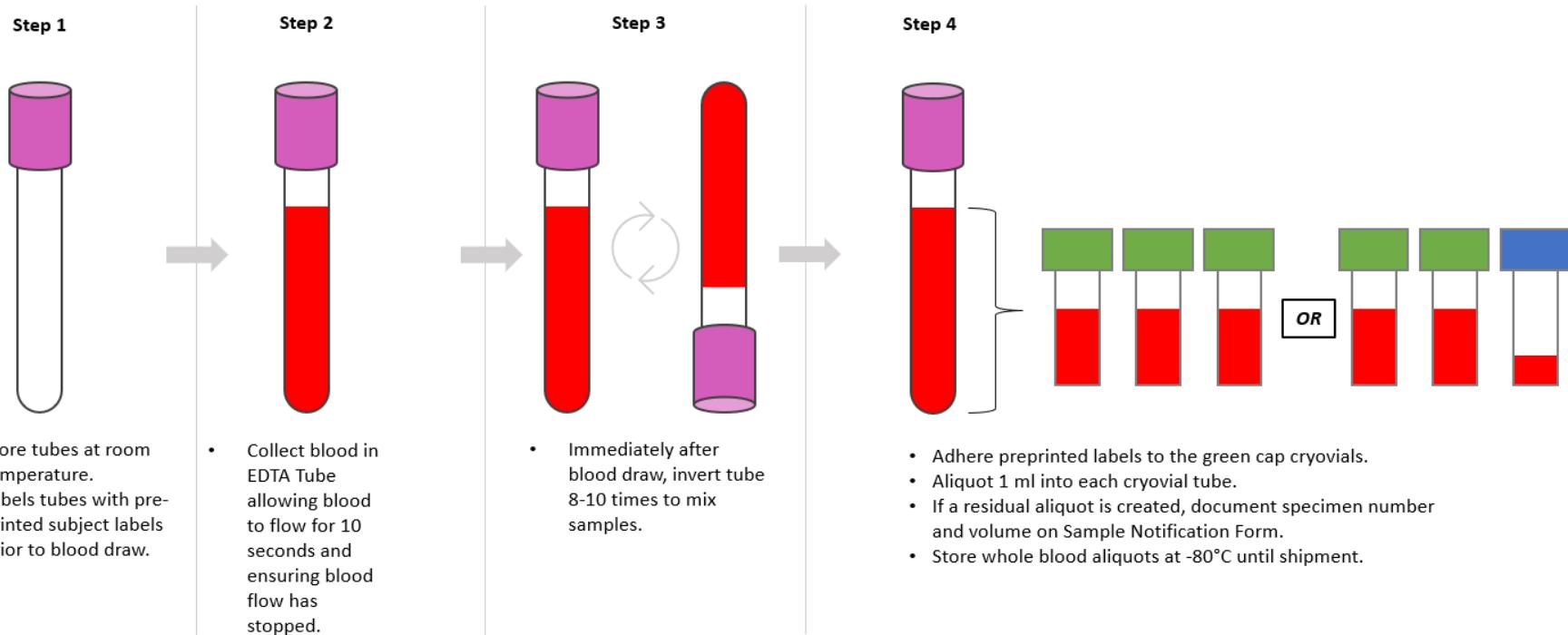
The following techniques shall be used to prevent possible backflow:

- a) Place participant's arm in a downward position.
- b) Hold tube in a vertical position, below the participant's arm during blood collection.
- c) Release tourniquet as soon as blood starts to flow into last collection tube.
- d) Make sure tube additives do not touch stopper or end of the needle during venipuncture.

5. CRITICAL STEP: **Immediately after blood collection, gently invert/mix (180 degree turns) the EDTA tube 8-10 times.**
6. Using a disposable pipette, transfer whole blood into the pre-labeled cryovials with green caps. Aliquot 1 ml of whole blood per cryovial (total vials = up to 3 with 1 ml each). Be sure to only place whole blood in cryovials with green caps and labeled with “**WBLD**” labels.
  - a. If the third aliquot contains less than 1ml of sample, place the blue cap on the cryovial.

7. Place the labeled cryovials in the 81 cryovial box and place on dry ice pellets. Transfer to -80°C Freezer when possible. Store all samples at -80°C until shipped to NCRAD on dry ice pellets. Record time aliquots placed in freezer and storage temperature of freezer on Biological Sample Shipment and Notification Form.

### Whole Blood Collection (1 x 3ml EDTA Purple Top Tube)



**Important Note:** Ensure all tubes are not expired prior to collection and processing of samples.

## 7.8 2.5 ml PAXgene™ Tube for RNA

**Important Note:** Ensure all tubes are not expired prior to collection and processing of samples.

### Whole Blood Collection for Isolation of RNA: 2.5 ml PAXgene™ RNA Tube

1. Place filled-out LDS ID Label and Collection and Aliquot “**WBLD RNAPXT10**” Tube Label on the PAXgene™ tube prior to blood draw; no processing is required for this tube. **The single tube is to be shipped to NCRAD frozen, without processing at the collection site.**
2. **CRITICAL STEP:** Store PAXgene™ RNA Tubes at room temperature **64°F - 77°F (18°C to 25°C)** before use.
3. Using a blood collection set and a holder, collect blood into the **PAXgene™ RNA Tube** using your institution's recommended procedure for standard venipuncture technique.

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

- a) Place participant's arm in a downward position.
- b) Hold tube in a vertical position, below the participant's arm during blood collection.
- c) Release tourniquet as soon as blood starts to flow into last collection tube
- d) Make sure tube additives do not touch the stopper or the end of the needle during venipuncture.

4. 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 PAXgene™ RNA Tube with its vacuum is designed to draw 2.5 ml of blood into the tube.
5. **Immediately after blood collection, gently invert/mix (180 degree turns) the PAXgene™ RNA Tube 8 – 10 times.**
6. Place the PAXgene™ RNA tube upright in a **WIRE** rack and transfer the PAXgene™ RNA tube to a **-80°C freezer**. Keep the **PAXgene™ RNA Tube in -80°C freezer** for storage until you ship using dry ice pellets to NCRAD. Complete remainder of the Biological Sample and Shipment Notification Form ([Appendix B](#)).

## RNA Preparation (2.5ml PAXgene™ Tube)

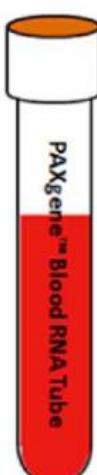


### Step One



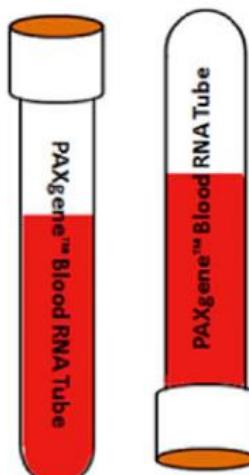
- Store tubes at room temperature.
- Label tubes with pre-printed labels prior to blood draw.

### Step Two



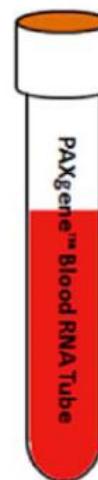
- Collect blood in PAXgene™ tube allowing blood to flow for 10 seconds and ensuring blood flow has stopped.

### Step Three



- Immediately after blood draw, invert tubes 8-10 times to mix samples.

### Step Four



- Store tubes at -80°C in a wire rack until shipment.



**Important Note:** Ensure all tubes are not expired prior to collection and processing of samples.

## **7.9    Sodium Heparin (Green-Top) Blood Collection Tube (10 ml) for Collection of Peripheral Blood Mononuclear Cells (PBMC) x 2**

**Important Note:** Ensure all tubes are not expired prior to collection and processing of samples.

**\*Important Note:** Once drawn, Sodium Heparin tubes MUST be shipped to NCRAD on the day of collection via UPS Next Day Air. This is to ensure the specimen has the most viable cells available at extraction.

These samples should only be collected Monday-Thursday. Please DO NOT collect these samples on Fridays.

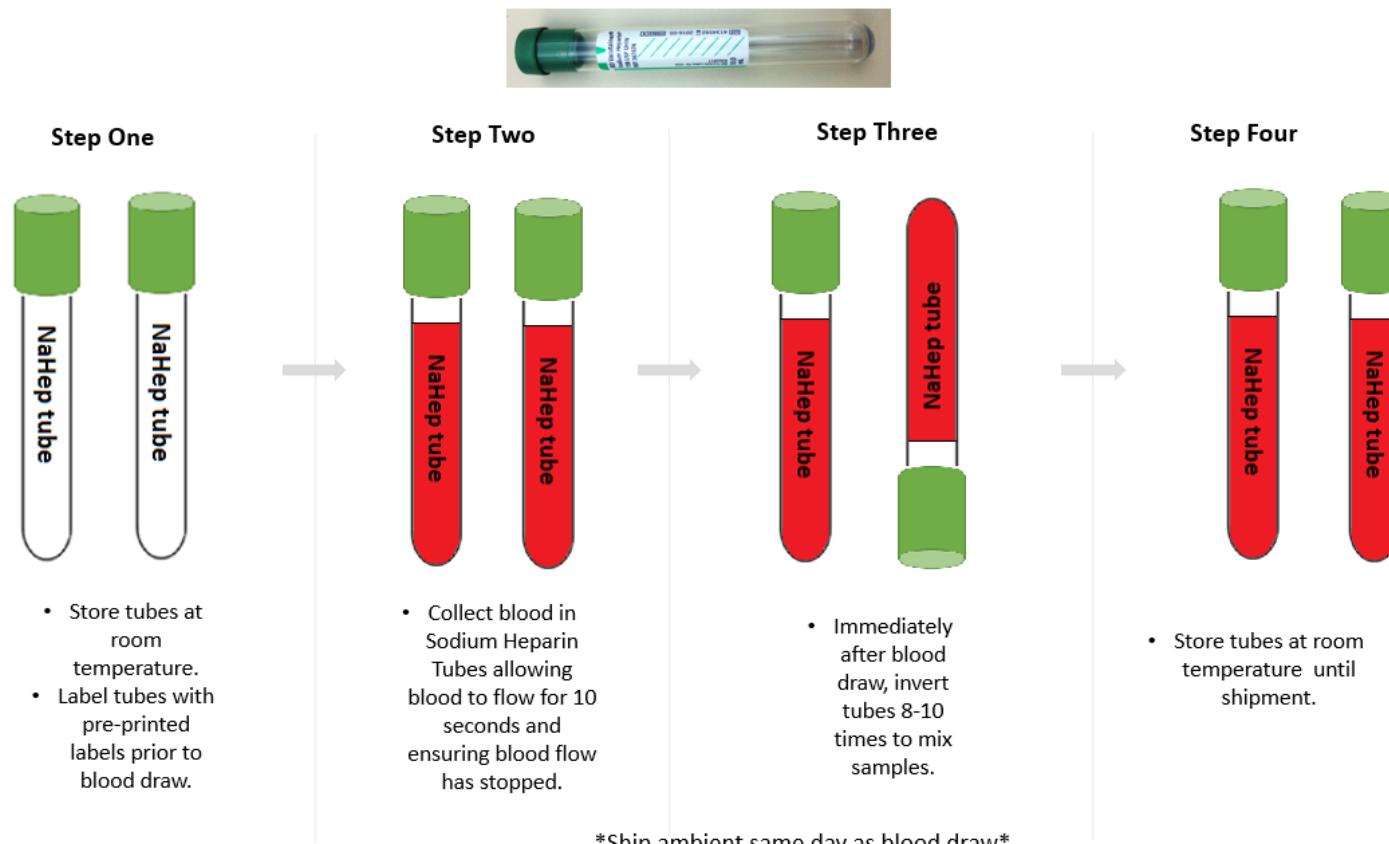
- 1. CRITICAL STEP: Store empty Sodium Heparin tube at room temperature, 64°F - 77°F (18°C to 25°C) before use.**
  
- 2. Place completed LDS ID Label and pre-printed “WBLD NAHEP10” Collection and Aliquot Tube Label on the green-top NaHep tubes. Please ensure that a full vertical (from cap to bottom) strip of the tube remains unobstructed.**
  
- 3. Using a blood collection set and a holder, collect blood into the 10 ml Sodium Heparin tubes using your institution’s recommended procedure for standard venipuncture technique.**

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

- a) Place participant’s arm in a downward position.
- b) Hold tube in a vertical position, below the participant’s arm during blood collection.
- c) Release tourniquet as soon as blood starts to flow into last collection tube.
- d) Make sure tube additives do not touch stopper or end of the needle during venipuncture.

4. Immediately after blood collection, gently invert the tubes 8-10 times to mix sample.
5. Seal the Sodium Heparin tubes in the ambient shipment kit.
6. Ship the unprocessed tubes ambient to NCRA. **Samples must be shipped the same day as collection. Samples must be received the following day after collection. Do NOT draw or ship ambient samples on Friday. Only Monday-Thursday collection and same day shipping.**

## PBMC Preparation (10ml Sodium Heparin Tube x 2)



\*Ship ambient same day as blood draw\*

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

**Important Note:** Ensure all tubes are not expired prior to collection and processing of samples.

## 8.0 Cerebrospinal Fluid Collection and Processing

**\*Important Note:** CSF samples should be collected in the morning before breakfast and after an overnight fast. There should be a minimum **6-hour fast** before collection of biomarker fluids and CSF. Only water is permitted until blood draws and the lumbar puncture are completed.

There are general guidelines to follow in regard to CSF Collection.

- Begin by confirming participant consented to lumbar puncture (LP) before scheduling the procedure and again prior to performing procedure.
- If LP and PET scan are done on the same day, LP should be completed prior to the PET scan; otherwise, there should be at least 12 hours between LP and PET scan.
- Do NOT use any extension tubing due to the tendency of manufactured plastic tubing to bind beta amyloid peptides and other important AD biomarkers.
- If LP was attempted but unsuccessful in obtaining CSF, a second attempt under fluoroscopy (if deemed appropriate by site clinician) is allowed.
- LP under fluoroscopy is permitted, if needed. Site personnel should advise the participant that use of fluoroscopy (x-rays) involves exposure to radiation.
- Participants taking an anti-platelet agent (e.g. aspirin) may, at the discretion of the site clinician, be discontinued from that agent for a period of time prior to lumbar puncture and/or continue off agent for a period of time post LP. Participants who are taking anticoagulants (e.g. warfarin (Coumadin) and/or dabigatran (Pradaxa)) may not undergo an LP and are not suitable to participate in this study.
- Each study participant or a person designated to speak for them will be contacted by phone one day after the LP to confirm participant well-being and to query about any adverse events.
- Identify a physician (e.g., anesthesiologist) able to perform a blood patch for any participant who experiences a post lumbar puncture headache. Find out ahead of time who to call to schedule and perform a blood patch at your center, should the need arise. Ensure billing procedures are in place ahead of time.
- Ensure you have at least two “Lumbar Puncture Tray Kits” and sufficient “CSF Supplemental Supply Kit” provisions on hand prior to scheduling an LP visit. Also ensure adequate site-provided supplies (see above), including pelleted dry ice. Check expiration dates on all supplies, especially lidocaine.

### **8.1 Scheduling the LP**

All LPs should be performed in the morning if possible. Availability of staff and facilities for next day blood patch should be considered when scheduling LPs. CSF amyloid levels can vary depending upon the time of day the sample is collected. It is important for the time of day of collection to remain consistent across study visits.

The LP should be rescheduled if the participant does not feel well or is febrile.

### **8.2 Performing the LP**

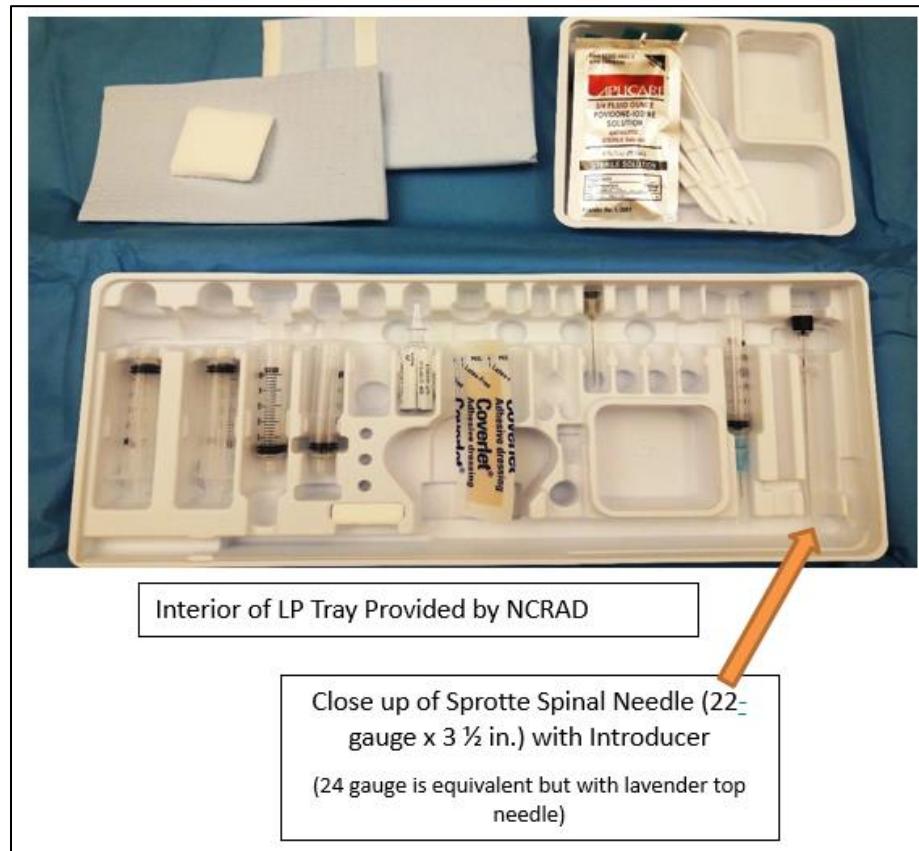
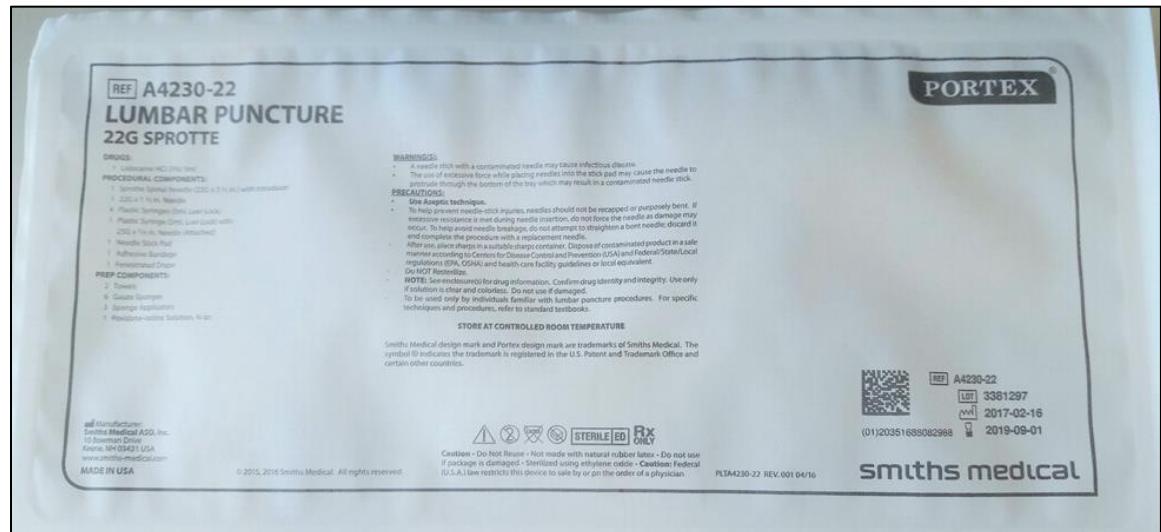
The recommended position is sitting. The same position should be used at follow-up LPs. It is critical to try to optimize positioning, and usually requires an assistant. Other positions and needles are allowed (e.g., when using fluoroscopy) but this should be recorded on the CSF Sample and Shipment Notification Form.

On the bedside table nearest where the person performing the lumbar puncture will sit, place a pair of sterile gloves (in their packaging) and a blue pad. Remove the contents of the lumbar puncture tray from the outer plastic packaging, leaving the contents wrapped in their sterile drape. Leave everything wrapped until the person performing the lumbar puncture is seated.

Feel the outside of the lumbar puncture kit (still wrapped up) to determine which end contains the spongy swabs. Turn this end toward the person performing the lumbar puncture and begin un-wrapping the kit.

### **8.3 LP Tray Kit Images**

Exterior of LP Tray provided by NCRAD which contains the 22-gauge Sprotte Needle with Introducer



**TOUCH ONLY THE OUTSIDE OF THE PAPER WRAPPER**

When you grab an edge to unfold it, touch only the folded under portions of the outside of the wrapper. Also, don't let the outside of the wrapper touch any part of the inside.

- If you touch any part of the paper wrapper, or if any non-sterile object outside of the wrapper touches any part of the inside of the wrapper, throw the kit away and start over.
- If you are in any doubt as to whether the inside of the wrapper has been touched, throw the kit away and start over.

### **Cleaning the Lumbar Puncture Site**

The lumbar puncture site is cleaned with Povidone-Iodine Topical Solution according to best standard medical practices.

Once the kit is successfully unwrapped, open the bottle of Povidone-Iodine Topical Solution somewhere away from the kit. Use an alcohol swab to remove any loose chunks of dried material off the bottle top. You don't want anything to fall onto the open and sterile lumbar puncture kit. Pour enough Povidone-Iodine Topical Solution into the prep well to cover the bottom, about  $\frac{1}{4}$  inch deep.

### **Maintaining the Sterile Field**

An important aspect of assisting with a successful lumbar puncture is keeping the field sterile. If there are multiple staff members in the room, please be sure they do not accidentally contaminate the sterile field. Once the person performing the lumbar puncture has donned sterile gloves, additional help may be needed to obtain or un-wrap any new tubes, needles, or supplies.

### **Unwrapping the Sterile 15- and 50-ml Conical Tubes**

Note that the 15-ml and 50-ml tubes into which CSF is collected and transferred come individually wrapped and are sterile inside and out. These wrappers should be peeled open by an assistant (not touching the tube) and the tube carefully dropped onto the LP tray or elsewhere in the sterile field in a manner that avoids contamination. Any additional needles or other individually wrapped sterile items can be handled the same way.

- Do not drop any packaging onto the tray or sterile field.
- Do not let the item touch the outside of the packaging on its way to the tray.

### **Lidocaine, Syringe with Needle, Gauze Pads**

Anesthesia is usually achieved within 2 minutes after injecting the lidocaine. Occasionally, the person performing the lumbar puncture will need to use more lidocaine to numb up a particular spot, or they may need to move to another spot entirely.

Next, hold the lidocaine bottle upside down and at a slight angle toward the person performing the lumbar puncture so that they can plunge the needle into the bottle and extract some lidocaine without touching you or the bottle. Use two hands to stabilize the bottle. If the person performing the LP requires additional sterile gauze, open the gauze pad the same way as the syringe and needle, by holding open the package so the person performing the lumbar puncture can grab the gauze without touching you or the package.

### General CSF Collection Methods

LPs for CSF collection should be performed using a small caliber atraumatic needle. CSF should be obtained via gravity flow using the 22-gauge Sprotte needle, although aspiration through this or smaller needles is allowable. Prior approval from the Clinical Core is required before the aspiration method can be utilized. Sites must designate the method of CSF collection for data tracking purpose. It is recommended that CSF be obtained from participants in a sitting position. Alternate needles, positions, or methods (e.g., use of fluoroscopy) should be noted on the CSF Sample and Shipment Notification Form.

#### Collection of CSF by Gravity

After the spinal needle is placed in the intrathecal space and the stylet is withdrawn, CSF should flow freely. **Discard first 1-2mls of CSF if blood tinged. If not blood tinged, collect first 1-2 mLs of CSF into a 15ml conical tube and pipette into the yellow cap cryovial for local lab. Collect 15-20ml CSF total into the remaining (2) 15ml conical tubes.**

**Reminder:** If the CSF is blood-tinged, the first 1-2 ml of CSF should be discarded (or more if needed) to clear the blood before collecting the 15-20 ml for CSF analysis. **15 ml is the required MINIMUM for CSF biomarker analysis.** If 15 ml is not obtained and provided to the NCRAD, document the reason for under-collection on the comments section of the CSF Sample and Shipment Notification Form.

Up to 20ml of CSF can be collected for the LEADS protocol. Any additional CSF collected will require a separate informed consent document that is connected to

a specific protocol. We recommend that the additional non-LEADS CSF collected does not exceed 10ml for a total of 30ml.

### **Washcloths, Band-Aids, and Clean Up**

After the person performing the lumbar puncture collects the last of the CSF, remove the needle and introducer and wash the Povidone-Iodine Topical Solution off the participant. A warm, wet washcloth can be used. A Band- Aid should be applied to the puncture site. Next, discard the LP kit following local guidelines, and dispose of sharp components in an appropriate sharps container.

### **Step by Step Summary of CSF Collection Procedure**

Ensure all samples collected are appropriately labeled.

1. Print CSF Sample and Shipment Notification Form.
2. Confirm all supplies, including pelleted dry ice and wet ice, are available.
3. Label the (13) orange cap cryovials and (1) blue cap cryovial with provided LEADS “**ALIQUOT CSF**” labels. Do **NOT** open and label the 15-ml and 50-ml tubes that will be kept sterile to collect the CSF.
4. Pre-cool the centrifuge and pre-cool all (14) labeled tubes on wet ice. Do **NOT** pre-cool the 15-ml and 50-ml tubes that will be kept sterile to collect the CSF.
5. Measure vitals (participant lying down).
6. Record the time of LP and associated information on the CSF Sample and Shipment Notification Form.
7. Collect 15-20 ml CSF at the L3/L4 position (or adjacent position) using a 22 gauge Sprotte spinal needle via gravity flow with participant in upright position (or document alternate method on CSF Sample and Shipment Notification Form) following these steps:
  - a. Collect initial 1-2 ml (if bloody, collect CSF until cleared of blood) using the 15ml conical tube. If not bloody, transfer first 1-2ml into yellow cap cryovial for local lab.
  - b. Collect an additional 15-20 ml CSF into the **UNLABELED-STERILE** 15-ml polypropylene tubes from the “CSF Supply Kit”. 15 ml is the required **MINIMUM**.
  - c. If using aspiration, use **ONLY** the polypropylene syringes included in the “Lumbar Puncture Collection Kit” and transfer **DIRECTLY** into the **UNLABELED-STERILE** 15-ml polypropylene tube from the “CSF Supply Kit”. There are four 6 ml Luer lock polypropylene syringes in the

“Lumbar Puncture Collection Kit.” Note this on the CSF Sample and Shipment Notification Form.

9. As one person takes the immediate post procedure vital signs, a second person should process the CSF as follows:

Place samples upright on wet ice and ensure samples are kept on wet ice for the entire time prior to processing. Preferably within 15 minutes of collection, centrifuge briefly at low speed (2000 x g, 10 min, 4°C) to pellet any cellular debris.

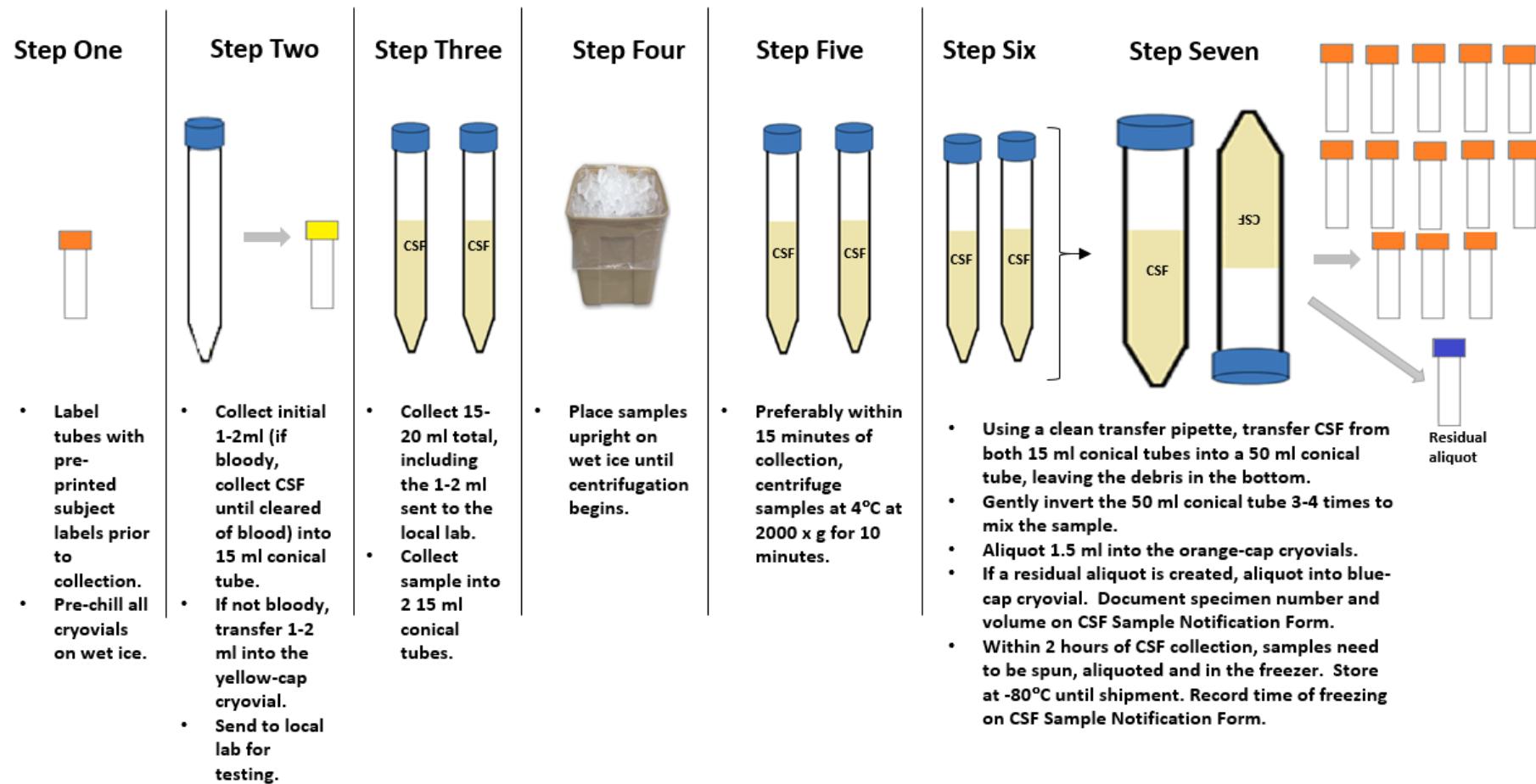
Using a clean transfer pipette, transfer CSF from both 15ml conical tubes into a 50ml conical tube, leaving the debris at the bottom of each 15ml centrifuged tube. Gently invert the 50ml conical tube 3-4 times to mix the sample.

Aliquot 1.5ml into the orange-cap cryovials. If a residual aliquot is created, aliquot into blue cap cryovial. Document specimen number and volume on CSF Sample Notification Form.

Within 2 hours of CSF collection, samples need to be spun, aliquoted and in the freezer. Store CSF aliquots at -80°C until shipment. Record time of freezing on CSF Sample and Shipment Notification Form.

10. Provide food and drink to participant (participant may lay flat to minimize the chance of a post-LP headache).
13. Enter collection data into the ATRI Data Portal website on day of visit.

## CSF Preparation (15-20 ml total)



## **WELLNESS CHECK PHONE CALL**

The Wellness Check to assess for side effects should occur according to the protocol. See protocol [section 7.1](#).

## **SUGGESTED MANAGEMENT OF POST-LUMBAR PUNCTURE HEADACHE**

Classic post-lumbar puncture (low pressure) headache is worse when the participant is upright (sits or stands) and improves when the participant is recumbent with the head **no higher** than the spinal cord.

Safety and comfort of the LEADS LP is maximized by the use of atraumatic needles. The LEADS protocol requires use of a 22-gauge Sprotte needle. Lumbar puncture is a standard procedure for collection of CSF but may be associated with pain during the performance of the procedure, comparable to the level of pain experienced during a blood draw. This is usually temporary and confined to the lower back. A persistent low-pressure headache may develop after lumbar puncture, probably due to leakage of CSF. If a post-LP headache persists it may need additional treatment, e.g. with fluids and analgesics. Uncommonly, a blood patch (injection of some of the participant's blood to patch the CSF leak) may be needed.

**Prevention:** Use of a small and atraumatic needle with careful technique are helpful in preventing lumbar puncture headache. Having the participant refrain from exercise or strenuous activities (especially heavy lifting) for 24 hours after the LP may minimize the chance of a lumbar puncture headache.

### **Treatment of headache after a lumbar puncture:**

- Limit physical activity as much as possible for at least 24 hours post-procedure.
- Increase oral fluid intake. Caffeine may be helpful.
- Routine analgesics such as acetaminophen may be used.

Post-lumbar puncture headache often resolves with the above treatment. If the headache persists after 24 hours of this management, it will likely require a blood patch. A blood patch *typically* relieves the headache instantly.

Prior approval from the ATRI Coordinating Center is not necessary to perform a blood patch. Participants will be responsible for costs related to the performance of a blood patch.

## 9.0 Incomplete or Difficult Blood Draws and Redraws

**\*Important Note:** If challenges arise during the blood draw process, it is advised that the phlebotomist discontinue the draw. Attempt to process and submit any blood-based specimens that have already been collected to NCRA.

Redraws will be scheduled for samples submitted to NCRA.

Situations may arise that prevent study coordinators from obtaining the total amount scheduled for biofluids. In these situations, please follow the below steps:

1. If the biofluids at a scheduled visit **are partially** collected:
  - a. Attempt to process and submit any samples that were able to be collected during the visit.
  - b. Document difficulties on the ‘Biological Sample and Shipment Notification Form’ prior to submission to NCRA.
    - i. Indicate blood draw difficulties at the bottom of the ‘Biological Sample and Shipment Notification Form’ within the “Notes” section.
    - ii. Complete the ‘Biological Sample and Shipment Notification Form’ with tube volume approximations and number of aliquots created.
  - c. Contact a NCRA coordinator and alert them of the challenging blood draw.
2. If the biofluids at a scheduled visit **are not** collected:
  - a. Contact the LEADS Global Coordinator and a NCRA Coordinator to alert them of the challenging blood draw or circumstances as to why biofluids were not collected.

Schedule participant for a re-draw visit as quickly as possible.

## 9.1 Re-Draw Instructions and Timeframes

Sample Collection-Blood eCRF is a log form. Select 'Add a new record' to enter a record. Enter one record per Date of Collection and specify samples collected. At least one sample type must be marked as collected on this date to successfully submit the form.

If a re-draw is necessary and occurs BETWEEN TWO VISITS, add a new record in the visit PRIOR to the re-draw timeframe, making sure to include the re-draw Date of collection and Kit Number. If a sample was missed during a regularly scheduled visit, but a sample was collected PRIOR to NEXT scheduled visit, enter in the EDC as a re-draw. Also, provide reason for re-draw in the Comments section.

## 10.0 Packaging and Shipping Instructions

**ALL** study personnel responsible for shipping should be certified in biofluid shipping (i.e. IATA certification). The ATRI Clinical Monitor will review training and certification through the study. If not available at your institution, please contact NCRAD with questions and information regarding resources.

Sample Type	Processing/ Aliquoting	Tubes to NCRAD	Ship
<b>Whole blood (Plain Red-Top Serum Tube) for isolation of serum</b>	1.5 ml serum aliquots per 2.0 ml cryovial (red cap); residual volume placed in 2.0 ml cryovial with blue cap	Up to 4	Frozen
<b>Whole blood (10 ml Lavender-Top EDTA) for isolation of plasma &amp; buffy coat (for DNA extraction)</b>	1.5 ml plasma aliquots per 2.0 ml cryovial (lavender cap); residual volume placed in 2.0 ml cryovial with blue cap	Up to 10	Frozen
	1 ml buffy coat aliquot per 2.0 ml cryovial (clear cap)	3	Frozen

<b>Whole blood (6 ml Lavender-Top EDTA) for CLIA lab testing</b>	N/A	1	Frozen
<b>Whole blood (3 ml Lavender-Top EDTA) for long read sequencing</b>	1 ml whole blood aliquot per 2.0 ml cryovial (green cap)	3	Frozen
<b>Whole blood for RNA extraction</b>	N/A	1	Frozen
<b>Whole blood for PBMC</b>	N/A	2	Ambient/ same day
<b>CSF Collection</b>	1.5 ml CSF aliquots per 2.0 ml cryovial (orange cap); residual volume placed in 2.0 ml cryovial with blue cap; 1-2 ml for local lab placed in 2.0 ml cryovial with yellow cap.	Up to 14	Frozen

## 10.1 Frozen Packaging Instructions

The most important issue for shipping is to maintain the temperature of the samples. The frozen samples must never thaw; not even the outside of the tubes should be allowed to defrost. This is best accomplished by making sure the Styrofoam container is filled completely with pelleted dry ice.

### IMPORTANT

Frozen samples **MUST** be shipped Monday-Wednesday only

Specimens being shipped to NCRAD should be considered as Category B UN3373 specimens and as such must be tripled packaged and compliant with IATA Packing Instructions 650. *See the Latest Edition of the IATA Regulations for complete documentation.*

#### 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 shipping manifest of specimens being shipped 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
  - UPS Dry Ice label, and net weight of dry ice contained

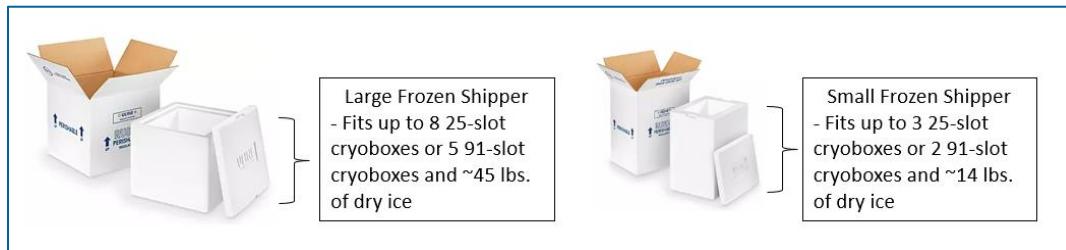


Specimens being shipped to NCRAD should be considered as Category B UN3373 specimens and as such must be tripled packaged and compliant with IATA Packing Instructions 650. *See the Latest Edition of the IATA Regulations for complete documentation.*

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.

#### 10.1.1 Frozen Packaging Instructions

1. Please note that we offer two Frozen Blood Shipping Supply Kits. The Large Frozen Shipper (17x17x17") can fit samples from up to 5 participants. The Small Frozen Shipper (11x9x15") can fit samples from up to 2 participants. Typically, batch shipping should be performed every (3) three months or when specimens from 5 participants accumulate, whichever is sooner.

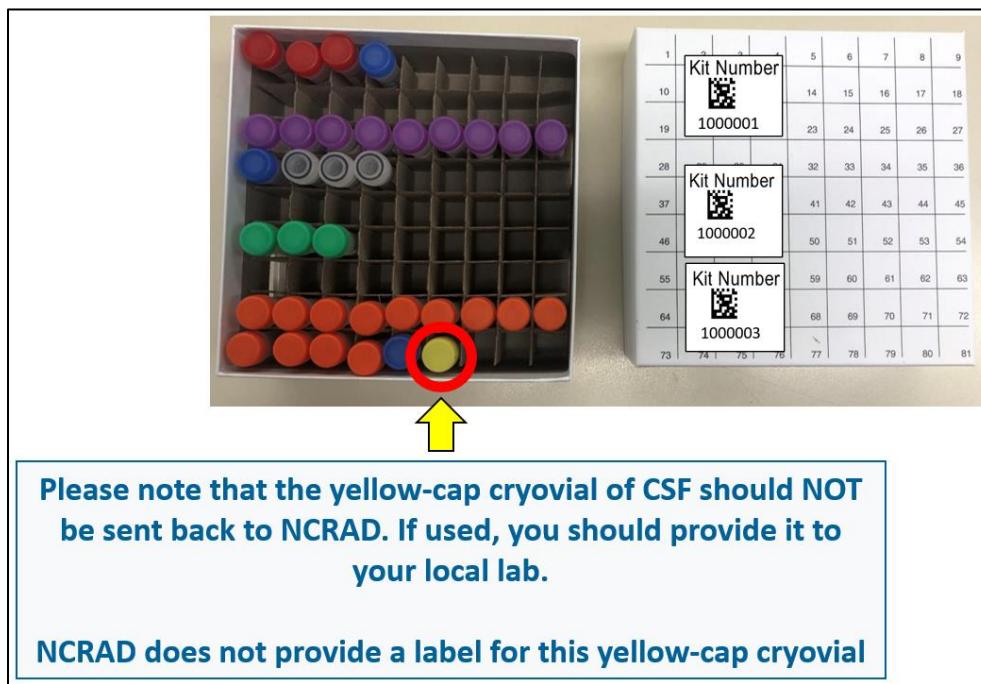


2. On the day of scheduled pick-up, begin packaging specimens on pelleted dry ice **~1 hour before UPS arrives**. Hold samples in -80°C freezer until it is time to package the specimens on pelleted dry ice for shipment. If storage in a -80°C freezer until UPS pick-up is not possible, package shipments not more than 4 hours before the expected pick-up time.
  - i. **Important Note:** If shipping samples same day of collection, place samples upright on pelleted dry ice for 2 hours before shipment to ensure samples are completely frozen.
3. Notify NCRAD of shipment by emailing NCRAD coordinators at: [alzstudy@iu.edu](mailto:alzstudy@iu.edu)  
Attach the following to the email:

- a. Completed Biological Sample and Shipment Notification Form to the email notification.  
(See [Appendix B](#) for an example of the NCRAD sample form)
- b. If email is unavailable please call NCRAD and do not ship until you've contacted and notified NCRAD coordinators about the shipment in advance.

4. Place all frozen labeled aliquots of serum, plasma, buffy coat, whole blood, and CSF aliquots from the same participant in the cryovial cryobox.

- a. Each 81-slot cryobox will hold approximately 34 cryovial samples. Place plasma, buffy coat, serum, whole blood (when applicable), and CSF aliquots within one cryobox. (4 serum, 10 plasma, 3 buffy coat, 3 whole blood (when applicable), and 14 CSF) per participant blood draw and CSF draw (see below).



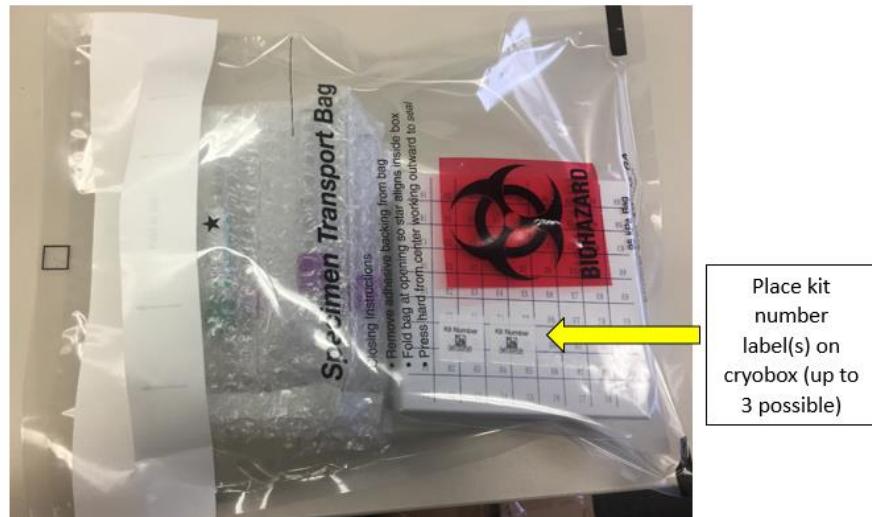
- b. Cryoboxes should contain all of the specimens from the same patient, per time point.

5. Label the outside of the cryoboxes with the appropriate kit number label(s). There are up to three kit labels used per cryobox, one for blood components, one for long read sequencing components, and one for CSF. Place serum, plasma, buffy coat, whole blood, and CSF aliquots within one cryobox and place within a biohazard bag. The biohazard bags are large enough to contain one cryobox and up to 2 frozen blood tubes from one participant's visit.

- i. **Remember:** whole blood for long read sequencing will only be collected once over the entire course of a participant's participation in LEADS.

6. Place the cryobox in the clear plastic biohazard bag (do NOT remove the absorbent material found in the bag). Place frozen 6ml EDTA tube and PAXgene™ tube in provided bubble wrap

tube sleeves, seal, and place in biohazard bag. Seal biohazard bag according to the instructions on the bag.



7. Place approximately 2-3 inches of dry ice pellets in the bottom of the Styrofoam shipping container.
8. Place the biohazard bag into the provided Styrofoam-lined shipping container on top of the dry ice pellets. Please ensure that cryoboxes are placed so the cryovials are upright in the shipping container (as pictured below).
9. Fully cover the cryoboxes and tubes with approximately 2 inches of dry ice pellets.
10. The inner Styrofoam shipping container must contain approximately 30-45 lbs (or 21kg) of pelleted dry ice. The dry ice pellets should entirely fill the inner box to ensure the frozen state of the specimens.

Full Shipping Container with Batched Samples and Dry Ice Pellets:



11. Replace the lid on the Styrofoam carton. Place the completed Biological Sample and Shipment Notification Form in the package on top of the Styrofoam lid for each patient specimen, and close and seal the outer cardboard shipping carton with packing tape.
12. Complete the UPS Dry Ice Label
  - a. Net weight of dry ice in kg (must match amount on the airbill)
  - b. Do not cover any part of this label with other stickers, including pre-printed address labels.
13. Apply all provided warning labels and the pre-printed UPS return label to the outside of package, taking care not to overlap labels.

**IMPORTANT**

Complete the UPS Dry Ice label or UPS may reject or return your package.

14. Hold packaged samples in -80°C freezer until time of UPS pick-up/drop-off.

15. For U.S. Domestic LEADS sites, specimens should be sent to the below address via **UPS Next Day Air**. Frozen shipments should be sent **Monday through Wednesday** to avoid shipping delays on Thursday or Friday. UPS does not replenish dry ice if shipments are delayed or held over during the weekend.

NCRAD  
351 West 10<sup>th</sup> Street  
TK-217  
Indianapolis, IN 46202  
Phone: 1-800-526-2839

16. Use UPS tracking to ensure the delivery occurs as scheduled and is received by NCRAD. Please notify NCRAD by email ([alzstudy@iu.edu](mailto:alzstudy@iu.edu)) that a shipment has been sent and include the UPS tracking number in your email.

**\*Important Note:** For frozen shipments, include no more than five cryovial boxes (separated by patient within 5 biohazard bags) per shipping container in order to have room for a sufficient amount of pelleted dry ice to keep samples frozen up to 24 hours.

The labeled, processed, aliquoted, and frozen cryovials of serum, plasma, buffy coat, whole blood, and CSF will be shipped to NCRAD as outlined above.

**SHIP ALL FROZEN SAMPLES MONDAY - WEDNESDAY ONLY!**

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

Remember to complete the Biological Sample and Shipment Notification Forms (Appendix B and Appendix C, include a copy in your shipment AND notify the NCRAD Study Coordinator by email at [alzstudy@iu.edu](mailto:alzstudy@iu.edu) (include UPS tracking number in email) IN ADVANCE to confirm the shipment.

## **10.2 Ambient Packaging Instructions**

**\*Important Note:** For ambient Sodium Heparin (Green-Top) Blood Collection Tube (2x10 ml) shipments, include no more than two tubes per shipping canister and include only tubes from one participant. The ambient PBMC samples must be shipped the day of blood draw.

The labeled, unprocessed, sodium heparin PBMC tubes will be shipped to NCRAD as outlined below.

**IMPORTANT**  
**AMBIENT SAMPLES MUST BE SHIPPED**  
**MONDAY-THURSDAY ONLY!**  
**Do NOT draw blood for ambient shipments on Fridays!**

### **Packing and Labeling Guidelines**

- The primary receptacle (sodium heparin 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 (sodium heparin tube) 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 shipping manifest of specimens being shipped 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"

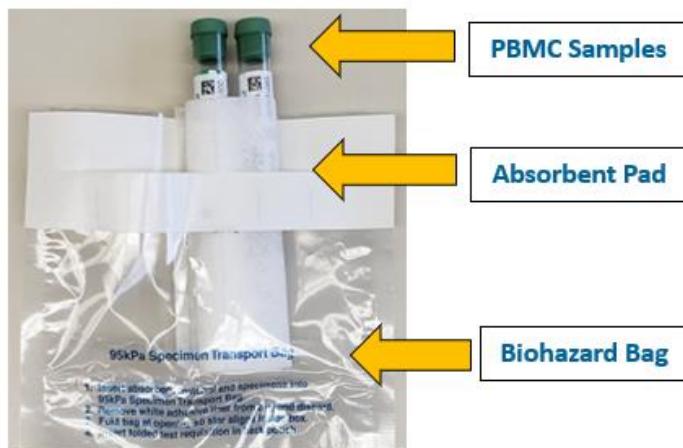
- UN3373

Ambient Sodium Heparin (Green-Top) 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.

#### *10.2.1 NCRAD Packaging Instructions (Ambient Shipments)*

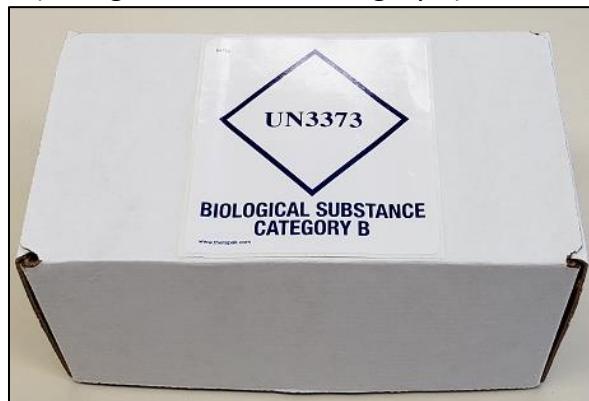
1. **Place refrigerant pack in the freezer 24 hours prior to shipment.**
2. Notify NCRAD of shipment by emailing NCRAD coordinators at: [alzstudy@iu.edu](mailto:alzstudy@iu.edu)
  - a. Complete and attach the Biological Sample and Shipment Notification Form to the email. (See [Appendix B](#) for an example of the form)
3. 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.



4. Remove as much air as possible from the plastic biohazard bag and seal the bag according to the directions printed on the bag.
5. Place Kit Number Label on biohazard bag.
6. Place the refrigerant pack into the cooler on top of the filled biohazard bag.



7. Place the lid onto the cooler.
8. Place the cooler in the provided small IATA Shipping Box.
9. Place an extra copy of the emailed “Biological Sample and Shipment Notification Form” within the shipping box along with a list of contents form.
10. Close shipping box. Label the outside of the cardboard box with the enclosed UN3373 (Biological Substance Category B) label.



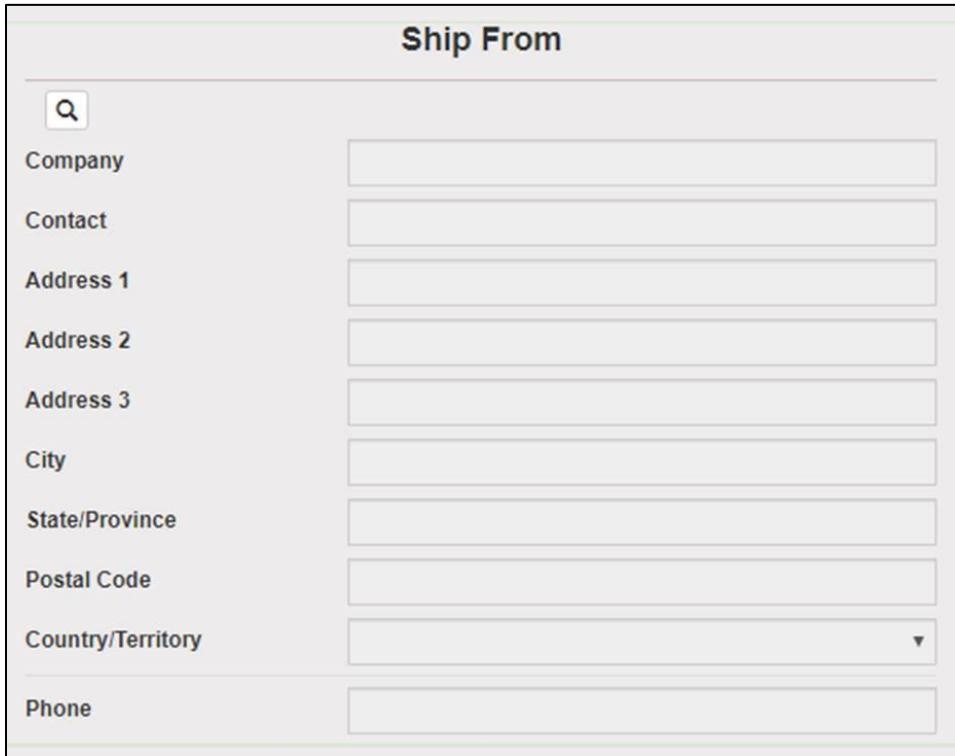
11. Place the closed, labeled shipping box within a UPS Laboratory Pak. **Seal the UPS Laboratory Pak.**
12. Use UPS tracking to ensure the delivery occurs as scheduled and is received by NCRAD.

In addition to tracking and reconciliation of samples, the condition and amount 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 pelleted dry ice to avoid thawing in the shipment process.

### 10.3 Frozen and Ambient Shipping Instructions (U.S. Domestic LEADS sites only)

1. Log into the ShipExec Thin Client at:  
<https://thinclient.shipexec.com/Account/Login?ReturnUrl=%2F>
  - a. If a new user or contact needs access, please reach out to your study contact for access.
2. Click “Shipping” at the top of the page and select “Shipping and Rating”  

3. Select your study from the “Study Group” drop down on the right side of the main screen. Choosing your study will automatically filter the address book to only addresses within your study.
4. Click on the magnifying glass icon in the “Ship From” section to search for your shipping address.
  - a. Search by Company (site), Contact (name), or Address 1 (first line of your site’s street address). Click Search.
  - b. Click Select to the left of the correct contact information.



The form is titled "Ship From" and contains the following fields:

Field	Value
Company	[Search input]
Contact	[Search input]
Address 1	[Search input]
Address 2	[Search input]
Address 3	[Search input]
City	[Search input]
State/Province	[Search input]
Postal Code	[Search input]
Country/Territory	[Search input]
Phone	[Search input]

5. Verify that both the shipping information AND study reference are correct for this shipment.

- a. If wrong study contact or study reference, click Reset in the bottom right of the screen to research for the correct information.
6. Enter Package information.
  - a. Ambient shipments
    - i. Enter the total weight of your package in the "Weight" field and leave the "Dry Ice Weight" field empty.
  - b. Frozen shipments
    - i. Enter the total weight of your package in the "Weight" field.
    - ii. Enter the dry ice weight in the "Dry Ice Weight" field.
    - iii. If the "Dry Ice Weight" field is higher than the "Weight" field, you will receive an error message after clicking "Ship" and need to reenter these values.
  - c. Click "Ship" in the bottom right of the page when complete.
7. If your site does not already have a daily UPS pickup, you will need to schedule one
  - a. Click the blue "Pickup Request" button. Enter the earliest pickup time and latest pickup time in 24-hr format.
    - i. Users must schedule pickup **minimum 1 hour before "Earliest Time Ready"**
      1. "Earliest Time Ready" has to be after current time of day even if scheduling pickup for later date.
  - b. Give a name & phone number of someone who the UPS driver can call if having issues finding the package
  - c. Give the Floor and Room Number (if needed) to be as descriptive as possible where this package needs to be picked up from. Click Save
8. Print the airbill that is automatically downloaded.
  - a. To reprint airbill, click History at the top left of the page.
  - b. Click Detailed Report from the dropdown menu on the right side of the page.
  - c. Enter tracking number if known. Otherwise, search by ship date. Click Search.
  - d. Click print icon on right side of the tracking number line.
9. Fold airbill, and place inside plastic UPS sleeve.
10. Peel the back off of the UPS sleeve, and stick the sleeve to the package.
11. A UPS Pickup is automatically scheduled at the address you are shipping from, and the pickup is charged to NCRAD.

If shipment occurs too late in the day for an automatic UPS pickup, you will receive an email stating that the pickup could not be scheduled, and you will need to make other arrangements.

**Note:**

- The “Pickup No.” is the reference number to your specific pickup request in case there are any issues with your package being picked up by UPS.
- Check Pickup request by going to UPS.com, click on the Shipping, select Schedule a Pickup, and look on the right side of screen to click on “Pickup Status”. Enter the Pickup No. listed on the receipt into PRN field and submit.

ShipExec™ Shipment Receipt

Transaction Date: Tuesday, December 8, 2020

Pickup No: 2929602E9CP

Address Information		
Ship To: John Smith Indiana University 980 W. Walnut Street Indianapolis, IN 46202	Shipper: lubg Iu School Of Medicine 351 W 10Th St Indianapolis, IN 46202	Ship From: lubg Iu School Of Medicine 351 W 10Th St Indianapolis, IN 46202

Shipment Information

Service: UPS Next Day Air (UPS Adapter)

Package Information

Pkg No	Tracking No	Packaging Type	Actual Wt	Billable Wt	Insured Value
1	1Z976R8W8430841976	Customer Packaging	20.0	20	0.00

## 11.0 Data Queries and Sample Reconciliation

The Laboratory worksheets must be completed on the day that samples are collected since they capture information related to the details of the sample collection and processing. These forms include information that will be used to reconcile sample collection and receipt, as well as information essential to future analyses.

The Alzheimer’s Therapeutic Research Institute (ATRI) data collection team will be collaborating with NCRAD to reconcile information captured in the database compared to samples received and logged at NCRAD. Information that appears incorrect in the ATRI Data Portal will be queried through the standard system. Additional discrepancies that may be unrelated to data entry will be resolved with the Principal Investigator in a separate follow up communication.

Data queries or discrepancies with samples shipped and received at NCRAD may result from:

- Missing samples
- Incorrect samples collected and shipped.
- Damaged or incorrectly prepared samples
- Unlabeled samples, samples labeled with incomplete information, or mislabeled samples.
- Discrepant information documented on the Biological Sample and Shipment Notification Form and logged at NCRAD compared to information entered into the ATRI database.
- Samples that are frozen and stored longer than one quarter at the site.
- Use of an incorrect Biological or CSF Sample and Shipment Notification Form

## 12.0 Appendices List

[Appendix A: Rate of Centrifugation Worksheet](#)

[Appendix B: Biological Sample and Shipment Notification Form](#)

[Appendix C: CSF Sample and Shipment Notification Form](#)

## Appendix A

### Rate of Centrifuge Worksheet

Please complete and return this form by fax or email to the NCRAD Project Manager if you have any questions regarding sample processing. The correct RPM will be sent back to you.

#### Submitter Information

**Name:**

**Site:**

**Submitter e-mail:**

#### 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:

$$RCF = \left( \frac{RPM}{1,000} \right)^2 \times r \times 1.118 \quad \Rightarrow \quad RPM = \sqrt{\frac{RCF}{r \times 1.118}} \times 1,000$$

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

Comments:

**Please send this form to NCRAD Study Coordinator**

**317-321-2003 (Fax)**      [alzstudy@iu.edu](mailto:alzstudy@iu.edu)

## Appendix B

Participant ID: LDS \_\_\_\_\_

### Biological Sample and Shipment Notification Form

Please email or fax the form on or prior to the date of shipment

To: Kelley Faber	Email: alzstudy@iu.edu	Phone: 1-800-526-2839													
<b>General Information:</b> From: _____ Phone: _____ Email: _____ Date: _____ Study: LEADS: <input type="checkbox"/> CI Participant <input type="checkbox"/> CN Participant Visit (circle one): BASELINE M12 M24 M36 M48 M60 M72 M84 Early Termination Sex: <input type="checkbox"/> M <input type="checkbox"/> F Year of Birth: _____ Tracking #: _____															
Kit #: _____ <div style="text-align: center;">KIT BARCODE</div> Kit # (Only if 3ml EDTA tube used): _____ <div style="text-align: center;">KIT BARCODE</div>															
<b>Blood Collection:</b> 1. Date Drawn (MM/DD/YYYY): _____ 2. Time of Drawn (24 hour clock): _____ [HHMM] 3. Last time subject ate (MM/DD/YYYY): _____ 4. Last time subject at (24 hour clock): _____ [HHMM]															
<b>Blood Processing:</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"> <b>RNA (PAXgene Tube)</b>          Total Volume of blood drawn (1x 2.5 mL PAXgene) _____ mL          RNA tube): _____          Time PAXgene RNA tube placed in freezer (24 hour clock): _____ [HHMM]          Storage temperature of freezer: _____ °C       </td> <td style="width: 50%;"> <b>Plasma &amp; Buffy Coat (Lavender Top Tube – 10mL)</b>          Time spin started (24 hour clock): _____          Duration of centrifuge: _____ [HHMM]          Temp of centrifuge: _____ °C          Rate of centrifuge: _____ xg          Original volume drawn (3x10 mL EDTA tubes): _____       </td> </tr> <tr> <td colspan="2"> <b>Serum (Red Top Tube)</b>          Time spin started (24 hour clock): _____ [HHMM]          Duration of centrifuge: _____ minutes          Temp of centrifuge: _____ °C          Rate of centrifuge: _____ xg          Original volume drawn (1x10 mL Serum tube): _____ mL          Original volume drawn (1x10 mL Serum tube): _____ mL          Time aliquoted: _____ [HHMM]          Number of 1.5 mL serum aliquots created: _____          If applicable, volume of residual serum aliquot (less than 1.5 mL-Blue cap): _____ mL          If applicable, specimen number of residual serum aliquot (last four digits): _____          Time aliquots placed in freezer (24 hour clock): _____ [HHMM]          Storage temperature of freezer: _____ °C       </td> </tr> <tr> <td colspan="2"> <b>EDTA (Lavender Top Tube – 3mL)</b>          3mL EDTA tube for LRS collected? <input type="checkbox"/> Yes <input type="checkbox"/> No          Original volume drawn (1x3mL EDTA tube): _____ mL          Time aliquoted: _____ [HHMM]          Whole blood aliquot #1 (last four digits): _____          Whole blood volume #1: _____ mL          Whole blood aliquot #2 (last four digits): _____          Whole blood volume #2: _____ mL          Whole blood aliquot #3 (last four digits): _____          Whole blood volume #3: _____ mL          Whole blood aliquot #4 (last four digits): _____          Whole blood volume #4: _____ mL       </td> </tr> <tr> <td colspan="2"> <b>PBMC (NaHep Green Top Tube)</b>          Original volume drawn (2x10mL PBMC tube): _____ mL       </td> </tr> <tr> <td colspan="2"> <b>EDTA (Lavender Top Tube – 6mL)</b>          6mL EDTA tube for CLIA testing collected? <input type="checkbox"/> Yes <input type="checkbox"/> No          Original volume drawn (1x6mL EDTA tube): _____ mL       </td> </tr> <tr> <td colspan="3"> <b>Notes:</b>          _____          _____       </td> </tr> </table>			<b>RNA (PAXgene Tube)</b> Total Volume of blood drawn (1x 2.5 mL PAXgene) _____ mL RNA tube): _____ Time PAXgene RNA tube placed in freezer (24 hour clock): _____ [HHMM] Storage temperature of freezer: _____ °C	<b>Plasma &amp; Buffy Coat (Lavender Top Tube – 10mL)</b> Time spin started (24 hour clock): _____ Duration of centrifuge: _____ [HHMM] Temp of centrifuge: _____ °C Rate of centrifuge: _____ xg Original volume drawn (3x10 mL EDTA tubes): _____	<b>Serum (Red Top Tube)</b> Time spin started (24 hour clock): _____ [HHMM] Duration of centrifuge: _____ minutes Temp of centrifuge: _____ °C Rate of centrifuge: _____ xg Original volume drawn (1x10 mL Serum tube): _____ mL Original volume drawn (1x10 mL Serum tube): _____ mL Time aliquoted: _____ [HHMM] Number of 1.5 mL serum aliquots created: _____ If applicable, volume of residual serum aliquot (less than 1.5 mL-Blue cap): _____ mL If applicable, specimen number of residual serum aliquot (last four digits): _____ Time aliquots placed in freezer (24 hour clock): _____ [HHMM] Storage temperature of freezer: _____ °C		<b>EDTA (Lavender Top Tube – 3mL)</b> 3mL EDTA tube for LRS collected? <input type="checkbox"/> Yes <input type="checkbox"/> No Original volume drawn (1x3mL EDTA tube): _____ mL Time aliquoted: _____ [HHMM] Whole blood aliquot #1 (last four digits): _____ Whole blood volume #1: _____ mL Whole blood aliquot #2 (last four digits): _____ Whole blood volume #2: _____ mL Whole blood aliquot #3 (last four digits): _____ Whole blood volume #3: _____ mL Whole blood aliquot #4 (last four digits): _____ Whole blood volume #4: _____ mL		<b>PBMC (NaHep Green Top Tube)</b> Original volume drawn (2x10mL PBMC tube): _____ mL		<b>EDTA (Lavender Top Tube – 6mL)</b> 6mL EDTA tube for CLIA testing collected? <input type="checkbox"/> Yes <input type="checkbox"/> No Original volume drawn (1x6mL EDTA tube): _____ mL		<b>Notes:</b> _____ _____		
<b>RNA (PAXgene Tube)</b> Total Volume of blood drawn (1x 2.5 mL PAXgene) _____ mL RNA tube): _____ Time PAXgene RNA tube placed in freezer (24 hour clock): _____ [HHMM] Storage temperature of freezer: _____ °C	<b>Plasma &amp; Buffy Coat (Lavender Top Tube – 10mL)</b> Time spin started (24 hour clock): _____ Duration of centrifuge: _____ [HHMM] Temp of centrifuge: _____ °C Rate of centrifuge: _____ xg Original volume drawn (3x10 mL EDTA tubes): _____														
<b>Serum (Red Top Tube)</b> Time spin started (24 hour clock): _____ [HHMM] Duration of centrifuge: _____ minutes Temp of centrifuge: _____ °C Rate of centrifuge: _____ xg Original volume drawn (1x10 mL Serum tube): _____ mL Original volume drawn (1x10 mL Serum tube): _____ mL Time aliquoted: _____ [HHMM] Number of 1.5 mL serum aliquots created: _____ If applicable, volume of residual serum aliquot (less than 1.5 mL-Blue cap): _____ mL If applicable, specimen number of residual serum aliquot (last four digits): _____ Time aliquots placed in freezer (24 hour clock): _____ [HHMM] Storage temperature of freezer: _____ °C															
<b>EDTA (Lavender Top Tube – 3mL)</b> 3mL EDTA tube for LRS collected? <input type="checkbox"/> Yes <input type="checkbox"/> No Original volume drawn (1x3mL EDTA tube): _____ mL Time aliquoted: _____ [HHMM] Whole blood aliquot #1 (last four digits): _____ Whole blood volume #1: _____ mL Whole blood aliquot #2 (last four digits): _____ Whole blood volume #2: _____ mL Whole blood aliquot #3 (last four digits): _____ Whole blood volume #3: _____ mL Whole blood aliquot #4 (last four digits): _____ Whole blood volume #4: _____ mL															
<b>PBMC (NaHep Green Top Tube)</b> Original volume drawn (2x10mL PBMC tube): _____ mL															
<b>EDTA (Lavender Top Tube – 6mL)</b> 6mL EDTA tube for CLIA testing collected? <input type="checkbox"/> Yes <input type="checkbox"/> No Original volume drawn (1x6mL EDTA tube): _____ mL															
<b>Notes:</b> _____ _____															

Version 1.2026

## Appendix C


 Participant ID: LDS            


### CSF Sample and Shipment Notification Form

*Please email or fax the form on or prior to the date of shipment.*

To: Kelley Faber Email: <a href="mailto:alzstudy@iu.edu">alzstudy@iu.edu</a> FAX: 317-321-2003 Phone: 1-800-526-2839			
<b>General Information:</b>			
From: _____	Date: _____		
Phone: _____	Email: _____		
Study: LEADS <input type="checkbox"/> CI Participant <input type="checkbox"/> CN Participant	Kit #: _____	KIT BARCODE	
Visit (circle one): <input type="checkbox"/> BASELINE <input type="checkbox"/> M12 <input type="checkbox"/> M24 <input type="checkbox"/> M36 <input type="checkbox"/> M48 <input type="checkbox"/> Early Termination			
Sex: <input type="checkbox"/> M <input type="checkbox"/> F	Year of Birth: _____	CSF Collected? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Tracking #: _____		Gauge needle used for LP: <input type="checkbox"/> 22G <input type="checkbox"/> 24G	
<b>CSF Collection:</b>			
1. Date of Collection: _____	2. Time of Collection: 24 hour clock: _____ [HHMM]		
3. Last time subject ate: Date: _____	4. Last time subject ate: 24 hour clock: _____ [HHMM]		
5. Collection process: <input type="checkbox"/> Gravity Method OR <input type="checkbox"/> Aspiration			
<b>CSF Processing:</b>			
Time spin started: 24 hour clock: _____	[HHMM]		
Duration of centrifuge: _____	minutes		
Temp of centrifuge: _____ °C	Rate of centrifuge: _____ x g		
Total amount of CSF collected (mL): _____	mL		
Time aliquoted: _____	[HHMM]		
Number of 1.5 mL aliquots created (up to 14 total): <b>(Orange cap cryovials):</b> _____	x 1.5 mL		
If applicable, volume of CSF residual aliquot (less than 1.5 mL): <b>(Blue cap cryovial):</b> _____	mL		
If applicable, specimen number of residual aliquot tube: <b>(Last four digits):</b> _____			
Time frozen: _____	[HHMM]		
Storage temperature of freezer: _____	°C		
<b>Notes:</b> _____			

Ver: 01.2026