

National Institute of Neurological Disorders and Stroke
Biorepository:

BioSpecimen Exchange for Neurological Disorders, BioSEND

**Biospecimen Collection, Processing, and Shipment Manual for
Morris K. Udall Centers of Excellence for Parkinson's Disease
Research**

Udall Rochester Protocol

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1.0 PURPOSE

The purpose of this manual is to provide collection site staff (PIs, study coordinators, and the sample collection and processing teams) at various study sites with instructions for collection and submission of biological samples. It includes instructions for biospecimen submission to the BioSpecimen Exchange for Neurological Disorders (BioSEND) located at Indiana University.

This manual includes instructions for the collection, processing, aliquoting and shipping of the following samples:

- PAXGene® (for RNA extraction)
- Whole Blood (for banking)
- Plasma
- Serum
- Whole Blood (for DNA extraction)

These procedures are relevant to all study personnel responsible for processing blood specimens to be submitted to BioSEND.

2.0 ABBREVIATIONS

BioSEND	BioSpecimen Exchange for Neurological Disorders
EDTA	Ethylene Diamine Tetra-acetic Acid
IATA	International Air Transport Association
RBC	Red Blood Cells
RCF	Relative Centrifugal Force
RPM	Revolutions Per Minute

3.0 BioSEND INFORMATION

3.1 BioSEND Contacts

Tatiana Foroud, PhD, Principal Investigator

Phone: 317-274-2218

Email: tforoud@iu.edu**Claire Wegel, Project Manager**

Phone: 317-278-6158

Email: sckaiser@iu.edu**General BioSEND Contact Information**

Fax: 317-278-1100

Email: biosend@iu.eduWebsite: www.BioSEND.org**Sample Shipment Mailing Address**

BioSEND

Indiana University School of Medicine

351 W. 10th Street, TK-217

Indianapolis, IN 46202-4118

3.2 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.

For packaging and shipment details, please refer to Appendix K (Frozen Shipping Instructions).

Check the weather reports and the FedEx.com website to make sure impending weather events (blizzards, hurricanes, etc.) will not impact the shipping or delivery of the samples. FedEx® often reports anticipated weather delays on their website.

3.3 Holiday Schedules

- 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.
- **Weekend/holiday deliveries will not be accepted.**

3.4 Holiday Observations

Date	Holiday
January 1	New Year's Day
3 rd Monday in January	Martin Luther King, Jr Day
4 th Monday in May	Memorial Day
July 4	Independence Day (observed)
1 st Monday in September	Labor Day
4 th Thursday in November	Thanksgiving
4 th Friday in November	Friday after Thanksgiving
December 25	Christmas Day

Please note that between December 24th and January 2nd (or the first business day after New Year's Day) Indiana University will be open Monday through Friday for essential operations **ONLY** and will re-open for normal operations on January 2nd. If at all possible, biological specimens for submission to Indiana University should **NOT** be collected and shipped to Indiana University between December 24th and January 2nd. 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 24th by e-mailing biosend@iu.edu, so that arrangements can be made to have staff available to process incoming samples. Frozen specimens collected during this period should be held at your site to ship after the first business day in January.

Please see https://www.biosend.org/holiday_closures.html for additional information.

4.0 BioSEND SAMPLE REQUIREMENTS

NINDS approves each study for a specific biospecimen collection protocol. Studies and study sites should make every effort to meet their approved biospecimen collection requirements. The expected number of samples from each site that should be returned to BioSEND are listed in [sections 4.1-4.2](#).

If a sample is not obtained at a particular visit, this should be recorded in the notes section of the **Sample Record and Shipment Notification Form (see Appendix I)**. This form is submitted with your sample shipment to BioSEND.

4.1 Protocol Schedule for Biospecimen Submission to BioSEND – UDALL

Visit (month)	BL
Frozen Whole blood for DNA (6ml EDTA)	1
Frozen Whole blood (6ml EDTA)	1
Whole blood for RNA (PAXGene® tube, 2.5ml)	2
Plasma aliquots, 1ml	6
Serum aliquots, 1ml	6

5.0 SPECIMEN COLLECTION KITS, SHIPPING KITS AND SUPPLIES

Research specimen collection kits as well as clinical lab supplies (except dry ice and equipment listed in Section 5.7) will be provided by BioSEND. These materials include blood tubes, LP trays (when applicable), boxes for plasma/serum/CSF aliquots, as well as partially completed shipping labels to send materials to BioSEND. Barcoded kit labels, collection tube labels, and aliquot tube labels will all be provided by BioSEND. For sites collecting CSF, labels will also be included for the CSF aliquots to be returned to BioSEND. Collection tube labels and aliquot tube labels will be pre-printed with study information specific to the type of sample being drawn. BioSEND will provide a sufficient number of labels only for those specimens that are to be shipped back to the BioSEND repository (See the Protocol Schedule for Biospecimen Submission to BioSEND for your site in [Sections 4.1-4.2](#)); any tubes that will remain at the collection site should be labeled accordingly. Ensure that all tubes are properly labeled during processing and at the time of shipment according to [Section 6.2](#).

5.1 Kit Supply to Study Sites

Each individual site will be responsible for ordering the baseline and longitudinal kits from BioSEND. We advise sites to proactively confirm kits are on hand ahead of study visits.

Within the kit request module, there is a drop down menu to request kits based on the Principal Investigator at that site. Kits and individual items can be ordered as required through the kit request module.

The link to the kit request module is shown below:

- UDALL: <http://kits.iu.edu/biosend/udall>

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

5.2 Specimen Collection Kit General Contents

Collection kits contain the following (for each subject) as designated per your protocol and/or NINDS resource development agreement. Kits provide the necessary supplies to collect samples from a given subject. Do not replace or supplement any of the tubes or kit components provided with your own supplies unless you have received approval from the NINDS/BioSEND Study team to do so. *Please store all kits at room temperature until use.* Note that “supplemental” kits will be provided should you require additional supplies from those contained in the visit specific kits. See the next page for LP Kit contents.

BioSEND Supplies

Available upon request from the online kit request module ([Section 5.1](#))

General Items
25 cell cryobox
Cryovial tube (2 ml) with clear cap
Airway bill envelope
Shipping container for dry ice shipment (shipping and Styrofoam® box)
Plastic biohazard bag
Warning label packet
Blood Collection Items
PAXGene® tube (2.5 ml)
Lavender-top EDTA blood collection tube (10 ml)
Serum (red top) blood collection tube (10 ml)
Purple-top EDTA blood collection tube (6 ml)

We realize there may be instances where additional supplies are needed; therefore, one supplemental kit will be provided with the initial kit shipment for new studies. Replacement supplemental kits can be requested on the kit request website. In addition, individual supplies can be requested as well.

5.3 Specimen Collection Kit Contents – UDALL

Specimen Collection Supplies	PAXGene® (2.5ml)	EDTA (10mL)	EDTA (6mL)	Serum (10mL)	Cryovial (2ml)	Frozen Shipping Kit
Baseline visits	2	2	2	2	16	1

5.4 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
- Tourniquets
- Alcohol Prep Pads
- Gauze Pads
- Bandages
- Butterfly needles and hubs
- Microcentrifuge tube rack
- Test tube rack
- Sharps bin and lid

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 ≥ 1500 rcf (1500 x g) with refrigeration to 4°C
- -80°C Freezer

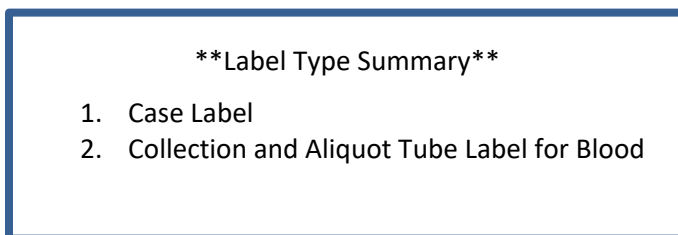
In order to ship specimens, you must provide:

- Dry ice (approximately 10 pounds per shipment)

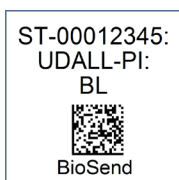
6.0 SPECIMEN LABELS

Labels must be affixed on all collection and aliquot tubes to ensure unique specimen identity. BioSEND provides labels for all samples being collected and returned to BioSEND. The site is responsible for providing labels for biospecimens that will be retained at the site. **If labels are provided but the sample is not collected, please return the unused labels to BioSEND when the specimens are shipped to BioSEND for permanent storage.**

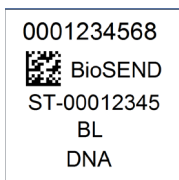
6.1 Types of Labels



Each kit contains all labels required for the return of biospecimens to BioSEND.



The **Case Labels** do not indicate a specimen type, but are affixed on BioSEND forms and on specific packing materials. See Appendices I-L for further instructions.

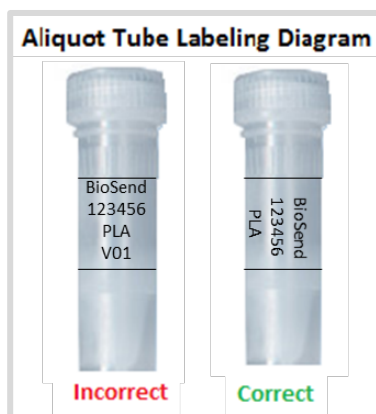


The **Collection and Aliquot Tube Labels for Blood** are placed on all blood collection and aliquot tubes. See [Appendices A-F](#) for further instructions.

6.2 Affixing Labels

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

- Place blood collection and aliquot labels on **ALL** collection and aliquot tubes **BEFORE** sample collection, sample processing, or freezing. This will help to ensure the label properly adheres to the tube before exposure to moisture or different temperatures.
- The blood collection and aliquot tube labels contain a 2D barcode on the left hand side of the label. When turned horizontally, the barcode should be closer to the top (cap end) of the tube.
- Place label **horizontally** on the tube (wrapped around sideways if the tube is upright) and **just below the ridges** of the aliquot tubes (see attached labeling diagram).



- Take a moment to ensure the label is **completely affixed** to each tube. It may be helpful to roll the tube between your fingers after applying the label.

7.0 SPECIMEN COLLECTION AND PROCESSING PROCEDURES

Consistency in sample collection and processing is essential for biomarker studies. All samples are drawn in the same order and then processed in a uniform fashion. **Please read the instructions before collecting any specimens. Have all your supplies and equipment out and prepared prior to drawing blood.**

7.1 Order of Specimen Collection

Blood collection should be performed in the following order:

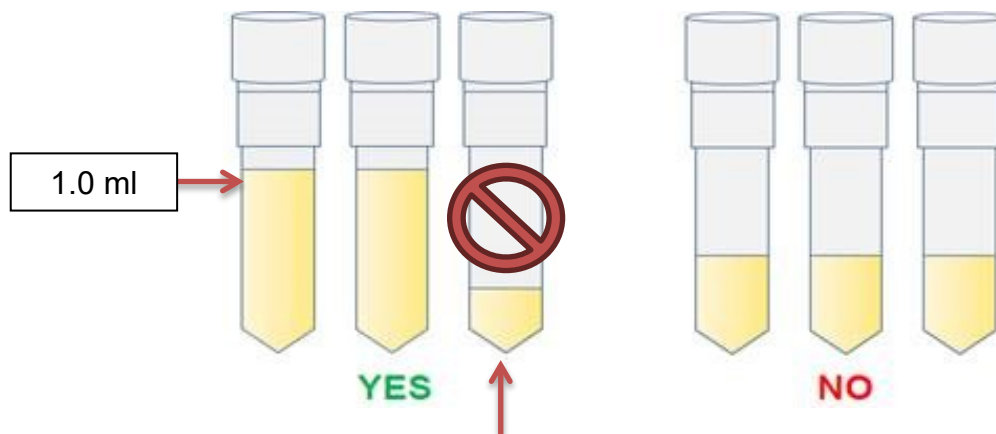
1. Serum (red top) blood collection for serum
2. PAXGene® tube for RNA
3. EDTA (purple top) blood collection for DNA (Frozen)
4. EDTA (lavender top) blood collection for plasma
5. EDTA (purple top) blood collection for Whole Blood (Frozen)

7.2 Blood Collection Protocols

1. Serum (red top) blood collection for serum (**Appendix F**)
2. PAXGene® tube for RNA (**Appendix A**)
3. EDTA (purple top) blood collection for FROZEN DNA (**Appendix E**)
4. EDTA (lavender top) blood collection for plasma (**Appendix B**)
5. EDTA (purple top) blood collection for FROZEN Whole Blood (**Appendix D**)

7.3 Filling Aliquot Tubes (Plasma and Serum)

In order to ensure that BioSEND receives a sufficient amount of sample for processing and storage, and to avoid cracking of the tubes prior to shipment, each aliquot tube should be filled to the assigned volume (refer to detailed processing instructions for average yield per sample). Over-filled tubes may burst once placed in the freezer, resulting in a loss of that sample. Each site is supplied with sufficient collection tubes to provide the specimen volume described in the Protocol Schedules for Biospecimen Submission ([see Section 4](#)). Specimens collected in addition to those described in Section 4 are collected at the site's discretion and are not returned to BioSEND.



Please note: It is critical for the integrity of future studies using these samples that study staff **not submit** residual aliquot tubes (anything under 1.0 ml) to BioSEND.

8.0 Packaging and Shipping Instructions

ALL study personnel responsible for shipping should be certified in biospecimen shipping. If not available at your University, training and certification is available through the CITI training site (Course titled “Shipping and Transport of Regulated Biological Materials” at <https://www.citiprogram.org/>).

8.1 Sample Record and Shipment Notification Form

All sample shipments to BioSEND must include the shipment notification Form(s). The completed forms are:

- Emailed to BioSEND@iu.edu at the time the samples are being shipped
- And the original document should be Included in the shipment with the samples

8.2 Shipping Instructions

Frozen Shipment (baseline). Reference Appendix K for frozen shipping instructions.

- Frozen PAXGene® Tubes
- Frozen EDTA 6ml Whole Blood
- Frozen EDTA 6ml Whole Blood for DNA
- Frozen 1 ml aliquots of plasma
- Frozen 1 ml aliquots of serum

*****Important Note*****

Include samples for only one subject per shipping container.

For frozen shipments, include no more than two packing envelopes per shipping container in order to have room for a sufficient amount of dry ice to keep samples frozen up to 24 hours.

8.3 Shipping Address

All samples are shipped to the BioSEND laboratory:

BioSEND
Indiana University School of Medicine
351 W. 10th Street, TK-217
Indianapolis, IN 46202-4118

9.0 Data Queries and Reconciliation

Appendix I must be completed the day that samples are collected to capture information related to sample collection and processing. This form includes information that will be used to reconcile sample collection and receipt, as well as information essential to future analyses.

The NINDS DMR data collection team will be collaborating with BioSEND to reconcile information captured in the database compared to samples received and logged at BioSEND. Information that appears incorrect in the NINDS DMR database 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. If applicable, a non-conformance report will be provided to sites.

Data discrepancies with samples shipped and received at BioSEND may result from:

- Missing samples
- Incorrect samples collected and shipped
- Damaged or incorrectly prepared samples
- Unlabeled or mislabeled samples
- Discrepant information documented on the BioSEND Sample Form compared to information entered into the NINDS DMR database.
- Samples frozen and stored longer than three months at the site

10.0 APPENDICES

- Appendix B: Whole Blood Collection for Isolation of Plasma
- Appendix D: Whole Blood Collection for banking
- Appendix E: Whole Blood Collection for Isolation of DNA
- Appendix F: Whole Blood Collection for Isolation of Serum
- Appendix I: Sample Record and Shipment Notification Form
- Appendix K: Frozen Shipping Instructions
- Appendix O: Low Fat Diet Menu Suggestions
- Appendix Q: UPS ShipExec™ Thin Client Instructions

Appendix A – Whole Blood Collection for Isolation of RNA

Whole Blood Collection for Isolation of RNA: 2.5 ml PAXgene® tubes are provided by BioSEND for the collection of blood for RNA isolation.



See training video for blood collection for RNA: (<http://www.preanalytix.com/videos/rna-tube-collection-video/>)

1. **CRITICAL STEP:** Store PAXgene® tube(s) at room temperature 64°F - 77°F (18°C to 25°C) before use.
2. Place pre-printed Collection and Aliquot “RNA” label on the PAXgene® tube(s) prior to blood draw. **Please refer to the protocol collection schedule to determine how many of the PAXgene® tube(s) are to be shipped to BioSEND from your site.**
3. Using a blood collection set and a holder, collect blood into the PAXgene® tube(s) using your institution's recommended procedure for standard venipuncture technique.



The following techniques shall be used to prevent possible backflow:

- a. Place donor's arm in a downward position.
 - b. Hold tube in a vertical position, below the donor's arm during blood collection.
 - c. Release tourniquet as soon as blood starts to flow into tube.
 - d. Make sure tube additives do not touch stopper or 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® 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® tube(s) 8 – 10 times. Do not shake the tube!**
 6. Place the PAXgene® tube(s) upright in a **WIRE** or **PLASTIC** rack. Do **NOT** use a Styrofoam rack. This will cause the PAXgene® tube(s) to crack when frozen. **Allow the filled PAXgene® tube(s) to incubate upright at room temperature for 24 hours.**
 7. Complete the **Sample Record and Shipment Notification** form (Appendix I).

8. After samples have incubated at room temperature for 24 hours, transfer the WIRE or PLASTIC rack with the PAXgene® tubes to **-80°C freezer**. Store all samples at **-80°C until shipped** to BioSEND on dry ice.
9. Ship the PAXgene® tubes to BioSEND according to **Appendix K - Frozen Shipping Instructions**.

PAXgene® Preparation (2.5ml Tube)



Step One



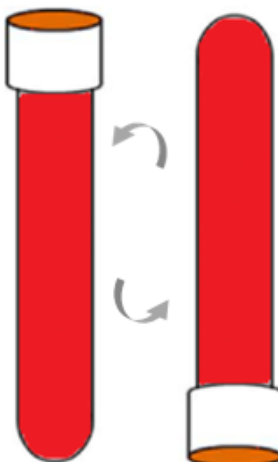
- Store tubes at room temperature.
- Label tubes with pre-printed subject labels prior to blood draw.

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.
- Repeat steps two and three for additional tubes, per protocol.

Step Four



- Incubate tubes upright at room temperature for 24 hours before freezing samples.

Step Five



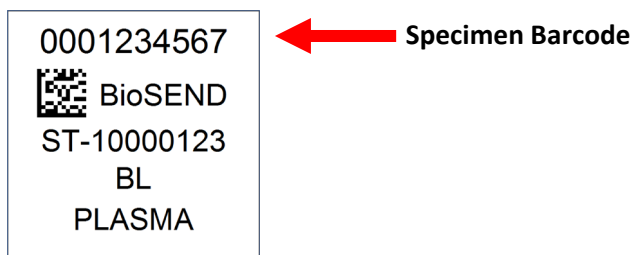
- After 24 hour incubation at room temperature, store tube(s) at -80°C in a wire rack until shipment.

Appendix B – Whole Blood Collection for Isolation of Plasma

Whole Blood Collection for Isolation of Plasma: 10 ml Purple-Top EDTA (glass) tube(s) and cryovials are provided by BioSEND for the collection of plasma.



1. **CRITICAL STEP:** Store empty Purple-Top EDTA tubes at room temperature 64°F – 77°F (18°C to 25°C) prior to use.
2. Place pre-printed collection and aliquot “**PLASMA**” label on 10 ml purple-top EDTA tube(s) and on six of the 2 ml cryovial tubes. The six labeled cryovials will be shipped to BioSEND. Any remaining cryovials can be retained by the site and labeled per site standards. Labels for aliquots kept by the site are not provided by BioSEND.
3. Please ensure that aliquots for BioSEND are kept in numerical order (by specimen barcode) throughout the aliquoting and shipping process.

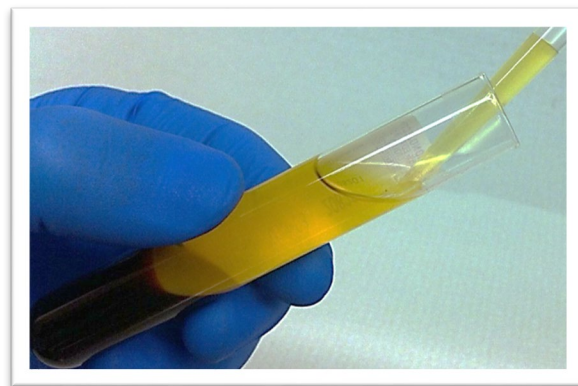
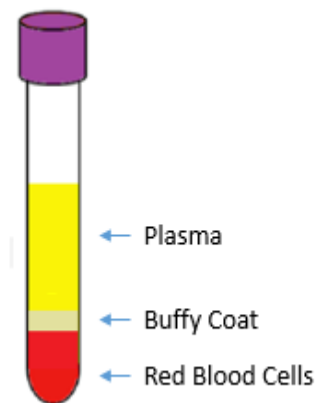


4. Pre-chill the labeled cryovials on wet ice for at least 5 minutes.
5. Set centrifuge to 4°C to pre-chill before use. Time needed to pre-chill the centrifuge to 4°C will depend on your centrifuge model.
6. Using a blood collection set and a holder, collect blood into the **purple top 10 ml EDTA (glass) tube(s)** using your institution's recommended procedure for standard venipuncture technique.

The following techniques shall be used to prevent possible backflow:

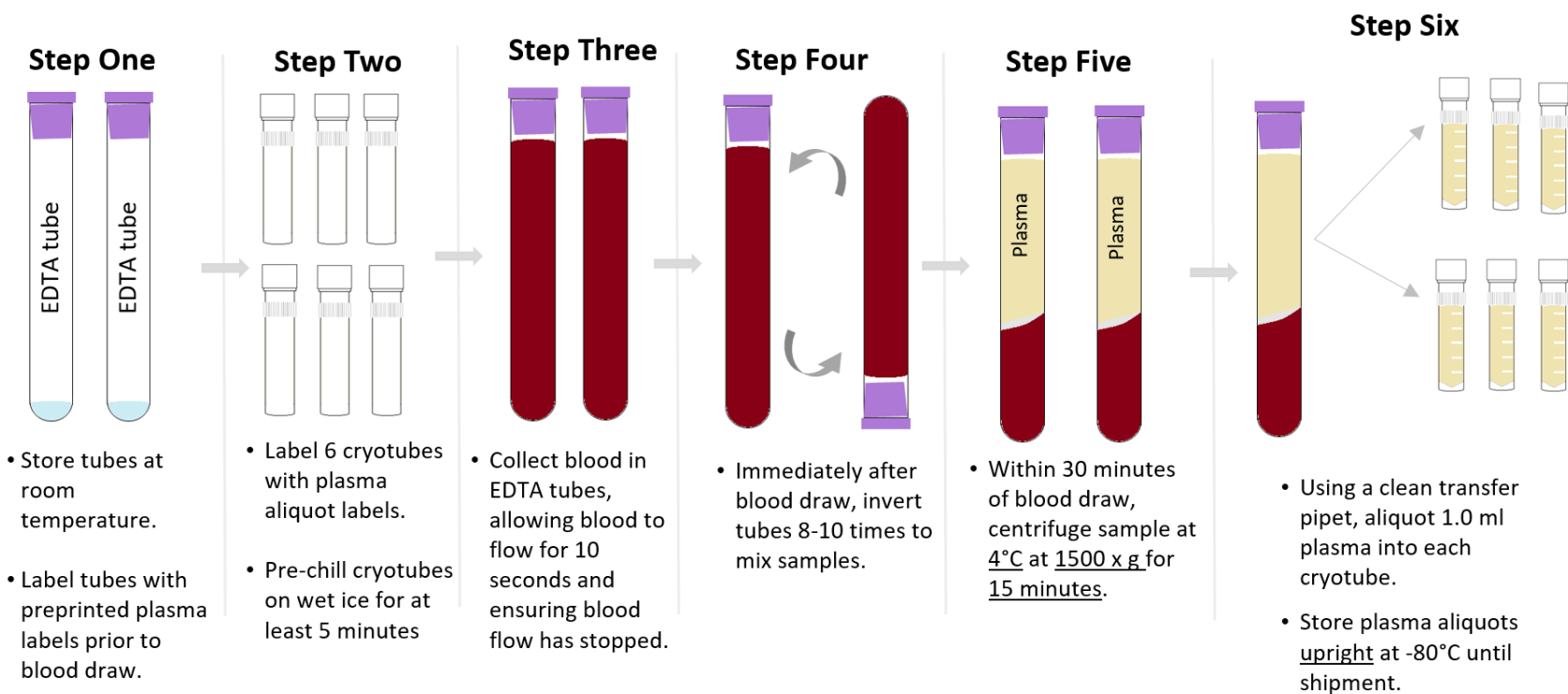
- a. Place donor's arm in a downward position.
- b. Hold tube in a vertical position, below the donor's arm during blood collection.
- c. Release tourniquet as soon as blood starts to flow into the tube.
- d. Make sure tube additives do not touch stopper or end of the needle during venipuncture.

7. 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 vacuum is designed to draw 10 ml of blood into the tube.
8. **CRITICAL STEP:** Immediately after blood collection, gently invert/mix (180 degree turns) the Lavender-Top EDTA tube(s) 8 – 10 times. Do not shake the tubes!
9. Within 30 minutes of blood collection, centrifuge balanced tubes for 15 minutes at 1500 RCF (x g) at 4°C. **It is critical that the tubes be centrifuged at the appropriate speed and temperature to ensure proper plasma separation (see worksheet in Appendix H to calculate RPM in your particular rotor).**
10. Remove the plasma by tilting the tube and placing the pipette tip along the lower side of the wall. **Use caution not to touch the buffy coat or packed red blood cells at the bottom of the tube so that the plasma is not contaminated** (see below). Using a disposable tipped micropipette, transfer plasma into the pre-labeled cryovials. Aliquot 1.0 ml per cryovial. Send 6 1.0 ml aliquots to BioSEND. If you cannot obtain the requested number of aliquots, please note “low volume draw” on the Sample Record and Shipment Notification form (Appendix I) under “Notification of Problems”. Each 10 ml EDTA tube should yield, on average, 4 ml of plasma.



11. Complete the **Sample Record and Shipment Notification form (Appendix I)**.
12. Place the labeled cryovials in the 25 slot cryobox. Place the cryobox UPRIGHT on dry ice. Transfer to **-80°C freezer as soon as possible, within 2 hours of blood draw**. Store all samples at **-80°C until shipped** to BioSEND on dry ice.
13. Ship the frozen plasma aliquots to BioSEND according to **Appendix K – Frozen Shipping Instructions**.

Plasma Preparation –10 ml EDTA (Purple Top) Tube




Appendix D – Whole Blood Collection (No Processing)

One 6 ml Purple-Top EDTA Tube is provided by BioSEND for Whole Blood collection (to be shipped to BioSEND FROZEN; no processing required).



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 pre-printed specimen label (WBLD) on the 6 ml purple top EDTA tube prior to blood draw.
3. Using a blood collection set and a holder, collect whole blood into the 6 ml purple-top whole blood tube using your institution's recommended procedure for standard venipuncture technique.

0001234567
 BioSEND
ST-10001234
BL
WBLD

The following techniques shall be used to prevent possible backflow:

- a. Place donor's arm in a downward position.
 - b. Hold tube in a vertical position, below the donor's arm during blood collection.
 - c. Release tourniquet as soon as blood starts to flow into tube.
 - d. Make sure tube additives do not touch stopper or end of the needle during venipuncture.
4. **CRITICAL STEP:** Immediately after blood collection, gently invert/mix (180 degree turns) the EDTA tube 8-10 times. Do not shake the tube!
 5. Complete the **Sample Record and Shipment Notification form (Appendix I)**.
 6. Place the Purple-Top EDTA in a **WIRE** or **PLASTIC** rack. Do **NOT** use a Styrofoam rack. This will cause the Purple-Top EDTA tube to crack when frozen. Place the Purple-Top EDTA tube immediately to a **-80°C Freezer**.
 7. Ship the whole blood tube to BioSEND according to **Appendix K - Frozen Shipping Instructions**.

Whole Blood (6 ml Lavender Top Tube)



Step One



- Store tube at room temperature.
- Label tube with pre-printed 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 tubes three times to mix samples.

Step Four



- Transfer to -80°C freezer. Store upright and keep frozen until shipment BioSend.

Appendix E – Whole Blood Collection for Isolation of DNA (No Processing)

One 6 ml Purple-Top EDTA Tube is provided by BioSEND for the collection of Whole Blood from which DNA will be extracted. This tube should be shipped to BioSEND FROZEN; no processing required).



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 pre-printed Collection and Aliquot “DNA” label on the 6 ml EDTA tube prior to blood draw.
3. Using a blood collection set and a holder, collect whole blood into the 6 ml purple top whole blood tube using your institution’s recommended procedure for standard venipuncture technique.

0003456123
BioSEND
ST-10001234
BL
DNA

The following techniques shall be used to prevent possible backflow:

- a. Place donor's arm in a downward position.
 - b. Hold tube in a vertical position, below the donor’s arm during blood collection.
 - c. Release tourniquet as soon as blood starts to flow into tube.
 - d. Make sure tube additives do not touch stopper or end of the needle during venipuncture.
4. **CRITICAL STEP:** Immediately after blood collection, gently invert/mix (180 degree turns) the EDTA tube 8-10 times.
 5. Complete the **Sample Record and Shipment Notification form Appendix I).**
 6. Place the Purple-Top EDTA in a **WIRE** or **PLASTIC** rack. Do **NOT** use a Styrofoam rack. This will cause the Purple-Top EDTA tube to crack when frozen. Place the Purple-Top EDTA tube immediately to a **-80°C Freezer**.
 7. Ship the whole blood tube to BioSEND according to **Appendix K - Frozen Shipping Instructions**.

DNA Preparation (6 ml Lavender Top Tube)



Step One



- Store tube at room temperature.
- Label tube with pre-printed 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 tubes three times to mix samples.

Step Four



- Transfer to -80°C freezer. Store upright and keep frozen until shipment BioSend.

Appendix F – Whole Blood Collection for Isolation of Serum

Whole Blood Collection for Isolation of Serum: 10 ml red-top serum (glass) tubes and cryovials are provided by BioSEND for the collection of serum.

1. **CRITICAL STEP:** Store empty serum determination (red-top) tubes at room temperature 64°F – 77°F (18°C to 25°C) prior to use.
2. Place pre-printed specimen labels noted as “**SERUM**” on the serum determination red-top tubes and on six of the 2 ml cryovials prior to blood draw. Six cryovials will be shipped to BioSEND; the remaining cryovials will be retained by the site and labeled accordingly.
3. Pre-chill labeled cryovials on wet ice for at least 5 minutes or longer.
4. Set centrifuge to 4°C to pre-chill before use. Time needed to pre-chill the centrifuge to 4°C will depend on your centrifuge model.
5. Using a blood collection set and a holder, collect blood into the **10 ml red-top serum (glass) tubes** using your institution’s recommended procedure for standard venipuncture technique.

The following techniques shall be used to prevent possible backflow:

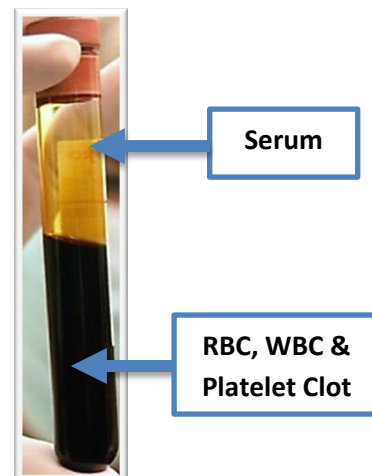
- a. Place donor’s arm in a downward position
 - b. Hold tube in a vertical position, below the donor’s arm during blood collection
 - c. Release tourniquet as soon as blood starts to flow into tube.
 - d. Make sure tube additives do not touch stopper or end of the needle during venipuncture.
6. Allow 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.
 7. **CRITICAL STEP:** Immediately after blood collection, gently invert/mix (180 degree turns) the serum determination tube 8-10 times. **Do not shake the tubes!**
 8. **CRITICAL STEP:** Allow blood to clot at room temperature for at least 30 minutes.
 - ❖ Within 30 to 60 minutes from blood collection, centrifuge balanced tubes for 15 minutes at 1500 RCF (x g) at 4°C. **It is critical that the tubes be centrifuged at the appropriate speed and temperature to ensure proper serum separation.**

9. Remove the serum by tilting the tube and placing the pipette tip along the lower side of the tube wall. **Use caution to pipet only the serum layer and not the red blood cell layer.** Using a disposable tipped micropipette, transfer serum into the pre-labeled cryovials. Aliquot 1.0 ml per cryovial. Send 6 1.0 ml aliquots to BioSEND. Each 10 ml Serum tube should yield, on average, 4.5 ml of serum.

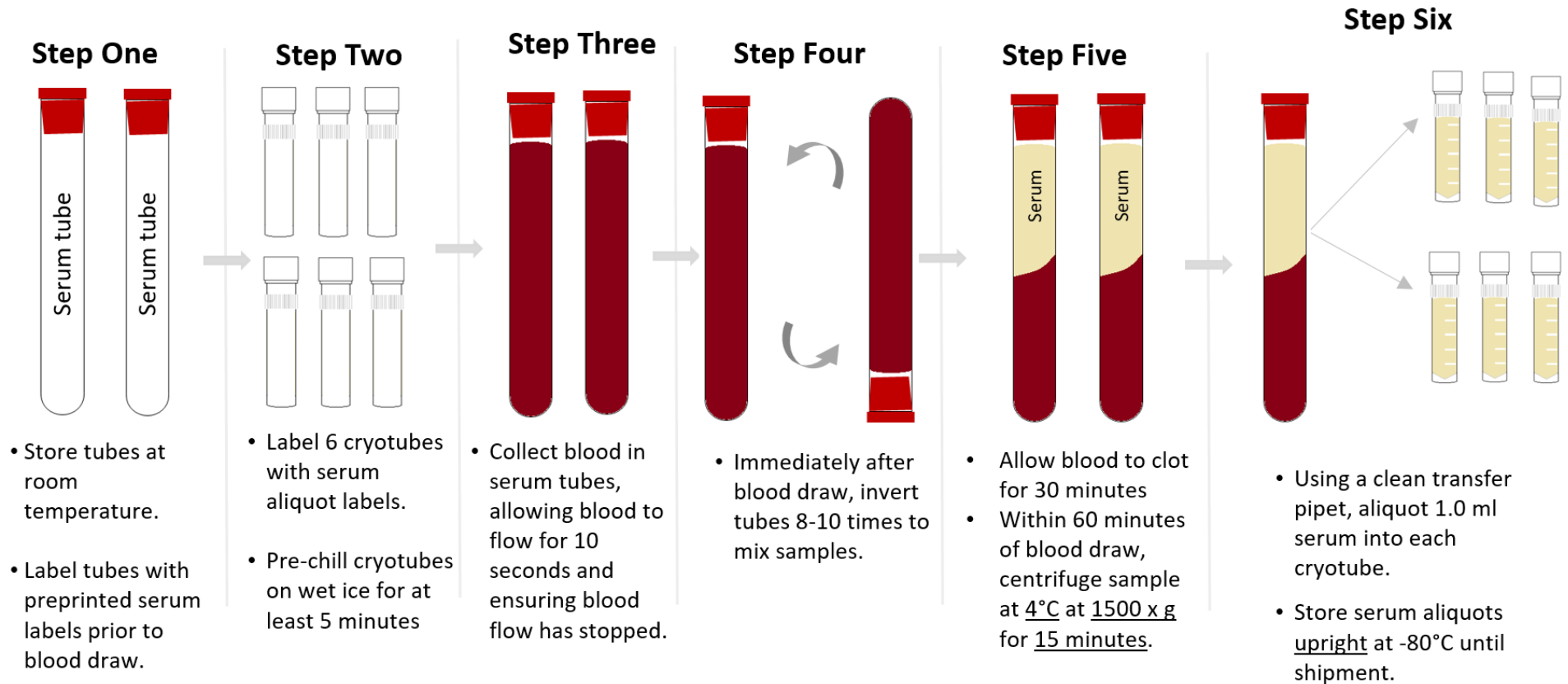
10. Complete the **Sample Record and Shipment Notification form (Appendix I)**.

11. Place the labeled cryovials in the 25 slot cryovial box. Place the cryobox UPRIGHT on dry ice. Transfer to **-80°C Freezer as soon as possible**. Store all samples UPRIGHT at **-80°C until shipped** to BioSEND on dry ice.

12. Ship the frozen serum aliquots to BioSEND according to **Appendix K – Frozen Shipping Instructions**.



Serum Preparation –10 ml Serum (Red Top) Tube



Sample Record and Shipment Notification

Study:

Site Name:

Principal Investigator:

Coordinator:

Telephone:

Email:

Please list only ONE subject per Sample Record Summary and Shipment Notification Form

GUID:

Subject ID (ST# from pre-printed labels):

Sex:

Visit Type:

Instructions: Ship Frozen Shipments Monday- Wednesday. Ambient Shipments may be shipped Monday- Thursday provided they are received at Indiana University within five days of collection. This form must be completed for shipment of all research samples. Notify Indiana University at biosend@iu.edu and the DMR in advance of shipment. Place a copy in the shipment box. Ensure all frozen shipments are completely filled with dry ice.

Date Sample(s) Shipped:

Tracking Number:

Completed by Submitter/Site			
Dates of Draw	Specimen Type	Number of Tubes/ Aliquots sent to BioSEND	Notation of Problems
	DNA		
	RNA		
	Buffy Coat		
	Plasma		
	Serum		
	CSF		
	Whole Blood		

**Contact Information: Indiana University; Email: biosend@iu.edu Ph: 317-278-0594
Data Management Resource (DMR); Email: PDBP-OPS@mail.nih.gov**

Appendix K – Frozen Shipping Instructions

IMPORTANT!

Frozen samples must be shipped Monday – Wednesday only,
using Next Day Air delivery

Please be aware of holidays and inclement weather and plan your shipments accordingly. Reach out to biosend@iu.edu if you have any questions

Specimens being shipped to BioSEND are Category B UN3373 specimens and as such must be triple packaged and compliant with IATA Packing Instructions. *See the latest eEdition 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.

IATA Packing and Labeling Guidelines

- The primary receptacle (cryovials or blood collection tubes) must be leak proof and must not contain more than 1 L total.
- The secondary packaging (plastic canister or 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 (cryovials or blood collection tubes) and the secondary packaging. The absorbent material must be of sufficient quantity 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 listing the 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 persons (shipper and recipient)
 - ✓ The words "Biological Substance, Category B"
 - ✓ UN3373
 - ✓ Class 9 label including UN 1845, and net weight of dry ice contained

BioSEND Packaging and Shipment Instructions – Frozen Shipments

1. Generate airway bill and schedule courier pick-up, as needed.
 - For instructions on generating airway bills and scheduling using the UPS ShipExec™ Thin Client system, see Appendix Q.
2. Record the tracking number onto the Sample Record and Shipment Notification form (Appendix I).
3. Make a copy of the Sample Record and Shipment Notification form.
4. Place all frozen labeled cryotubes in the cryobox. Only include specimens from one subject in each cryobox.
5. Place the cryobox in a clear plastic biohazard bag (do NOT remove the absorbent material found in the bag), and seal the biohazard bag according to the instructions on the bag. Affix a Case Label to the outside of the biohazard bag.



6. Place approximately 2-3 inches of dry ice in the bottom of the Styrofoam® shipping container.
7. If your protocol is collecting frozen whole blood, DNA, or RNA, place labeled tubes in bubble sleeves and seal.
8. Place the tubes in a clear plastic biohazard bag (do NOT remove the absorbent material found in the bag), and seal the biohazard bag according to the instructions on the bag. Affix a Case Label to the outside of the biohazard bag.
9. Place the biohazard bag containing the cryobox into the provided Styrofoam® shipping container on top of the dry ice. Please ensure that the cryobox is placed so that the cryovials are upright in the shipping container (as pictured).



10. Fully cover the cryobox with approximately 2 inches of dry ice. Do not include more than 2 subjects' worth of samples in a single shipper.
11. If including additional biohazard bags in package, include a layer of dry ice (approximately 2 inches) between each biohazard bag.
12. The inner Styrofoam® shipping container must contain approximately 10 lbs (or 4.5 kg) of dry ice. The dry ice should entirely fill the inner box to ensure the frozen state of the specimens.
13. Replace the lid on the Styrofoam® container. Place the completed Sample Record 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.
14. Print a copy of your UPS® airway bill generated through the UPS ShipExec™ Thin Client system (see Appendix Q). Place airway bill into the provided airway bill envelope and affix envelope to package.
15. Complete the Class 9 UN 1845 Dry Ice Label (black and white diamond) with the following information:
 - Your name and return address
 - Net weight of dry ice in kg (this amount must match the amount recorded on the airway bill)
 - Consignee name and address:

BioSEND
IU School of Medicine
351 W. 10th Street
TK-217
Indianapolis, IN 46202

- Do not cover any part of this label with other stickers, including pre-printed address labels.

IMPORTANT!

Complete the required fields on your airway bill and Class 9 Dry Ice labels, or courier may reject or return your package.

16. Apply all provided warning labels (UN3373, Dry Ice Label and Fragile Label), taking care not to overlap labels with each other or with airway bill.
17. Hold packaged samples in -80°C freezer until time of courier pick-up/drop-off.
18. Specimens should be sent to the address below. Frozen shipments should be sent Monday through Wednesday only to avoid shipping delays on Thursday or Friday.

BioSEND
IU School of Medicine
351 W. 10th Street
TK-217
Indianapolis, IN 46202

19. **Notify BioSEND by email (biosend@iu.edu) that a shipment has been sent and attach the Sample Record and Shipment Notification form to your email. Do not ship until you've contacted and notified BioSEND staff about the shipment in advance.**
20. Use courier tracking system to ensure the delivery occurs as scheduled and is received by BioSEND.

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

Appendix P– Bulk Frozen Shipping Instructions

Use these instructions when shipping samples from multiple subjects and potentially multiple draw dates, together in one shipment container. Please discuss the option of bulk shipping with BioSEND before using this method.

IMPORTANT!

FROZEN SAMPLES MUST BE SHIPPED MONDAY THROUGH WEDNESDAY ONLY USING PRIORITY OVERNIGHT DELIVERY

Please be aware of holidays and inclement weather, and plan your shipments accordingly.

All samples are shipped frozen EXCEPT whole blood for DNA.

Specimens being shipped to BioSEND are Category B UN3373 specimens and as such must be triple packaged and compliant with IATA Packing Instructions. *See the latest eEdition 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.

IATA Packing and Labeling Guidelines

- The primary receptacle (cryovials or blood collection tubes) must be leak proof and must not contain more than 1 mL total.
- The secondary packaging (plastic canister or 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 (cryovials or blood collection tubes) and the secondary packaging. The absorbent material must be of sufficient quantity 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 listing the 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 persons (shipper and recipient)
 - ✓ The words "Biological Substance, Category B"
 - ✓ UN3373
 - ✓ Class 9 label including UN 1845, and net weight of dry ice contained

BioSEND Packaging and Shipment Instructions – Bulk Frozen Shipments

1. Contact FedEx® to confirm service is available and schedule package to be picked up.
2. **Record the FedEx® tracking number (found at the top of the FedEx® airbill) onto the Sample Record and Shipment Notification form (Appendix I).**
3. Make a copy of the Sample Record and Shipment Notification form.

4. Place all frozen labeled 1 ml aliquots of plasma, serum, and CSF in the cryobox.



- Each cryobox holds 25 aliquots. Only include specimens from one subject in each cryobox.
- If a CSF draw was also completed at the visit, include the CSF aliquoted specimens (10 cryovials). These should be included in the same cryobox as the plasma and serum aliquots.

5. Place the cryobox in the clear plastic biohazard bag (do NOT remove the absorbent material found in the bag), and seal the biohazard bag according to the instructions on the bag. Affix a Case Label to the outside of the biohazard bag.



6. Insert PAXgene™ tubes and/or 6ml EDTA whole blood tube into the bubble wrap tube shuttle, and place the tube shuttle in the 2 plastic biohazard bag. Seal the biohazard bag according to the instructions on the bag. Affix a Case Label to the outside of the biohazard bag.



7. Place approximately 2-3 inches of dry ice in the bottom of the large Styrofoam shipping container.

8. Place the biohazard bag containing the cryobox into the provided Styrofoam® shipping container (large) on top of the dry ice. Please ensure that the cryobox is placed so that the cryovials are upright in the shipping container. **Please include only 5-10 cryoboxes.**

9. Fully cover the cryobox with approximately 2 inches of dry ice.

10. Place the biohazard bag containing the PAXgene™ tubes and/or 6ml EDTA whole blood tube on top of the 2nd layer of dry ice and cover with another 2-3 inches of dry ice. **Please include only 5-10 biohazard tube bags.**

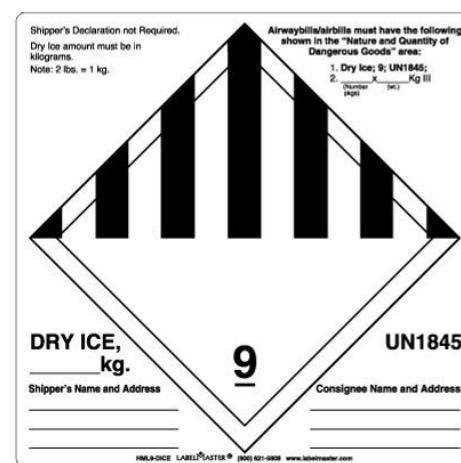


11. The inner Styrofoam® shipping container must contain approximately 45 lbs (or 20 kg) of dry ice. The dry ice should entirely fill the inner box and be placed on top of the bags to ensure the frozen state of the specimens.
12. Replace the lid on the Styrofoam® container. Place the completed Sample Record 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.
13. Complete the FedEx® return airbill with the following information:
 - a. Section 1, "From": fill in your name, address, phone number.
 - b. Section 6, "Special Handling and Delivery Signature Options": under "Does this shipment contain dangerous goods?" check the boxes for "Yes, Shipper's Declaration not required" and "Dry Ice". Enter the number of packages (1) x the net weight of dry ice in kg.



14. Complete the Class 9 UN 1845 Dry Ice Label (black and white diamond) with the following information:
 - a. Your name and return address
 - b. Net weight of dry ice in kg (this amount must match the amount recorded on the airbill)
 - c. Consignee name and address:

BioSEND
IU School of Medicine
351 W. 10th Street
TK-342
Indianapolis, IN 46202



- d. Do not cover any part of this label with other stickers, including pre-printed address labels.

IMPORTANT!

Complete the required fields on the FedEx return airbill and Class 9 Dry Ice labels, or FedEx may reject or return your package.

15. Apply all provided warning labels (UN3373, Dry Ice Label and Fragile Label) as well as the completed FedEx return airbill to the outside of package, taking care not to overlap labels.
16. Hold packaged samples in -80°C freezer until time of FedEx® pick-up/drop-off.

17. Specimens should be sent to the address below via **FedEx® Priority Overnight**. Frozen shipments should be sent Monday through Wednesday only to avoid shipping delays on Thursday or Friday. FedEx does not replenish dry ice if shipments are delayed or held over during the weekend.

BioSEND
IU School of Medicine
352 West 10th St., TK-342
Indianapolis, IN 46202

18. **Notify BioSEND by email (biosend@iu.edu) that a shipment has been sent and attach the Sample Record and Shipment Notification form to your email. If email is unavailable please call BioSEND. Do not ship until you've contacted and notified BioSEND staff about the shipment in advance.**

19. Use FedEx® tracking to ensure the delivery occurs as scheduled and is received by BioSEND.

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

IMPORTANT!

Bulk frozen shipments, should include no more than ten cryovial boxes (separated by patient within biohazard bags) and ten biohazard tube bags per shipping container in order to have room for a sufficient amount of dry ice to keep samples frozen up to 24 hours.

Appendix Q - UPS ShipExec™ Thin Client Instructions

- 1) Log in to the UPS ShipExec™ Thin Client website: <https://kits.iu.edu/UPS> or <https://kits.iu.edu/ups>.
 - a. To request an account, complete the following survey:
<https://redcap.uits.iu.edu/surveys/?s=88TTWY3KAF>
- 2) Find the “Shipping” dropdown menu in the top left corner of the screen and click on “Shipping and Rating”.
- 3) Once the Indiana University page loads, look for the “Study Group” dropdown menu under “Shipment Information” on the right side of the screen. Choose your study from the dropdown menu.
- 4) After selecting your study, click on the magnifying glass icon on the left side of the screen under “Ship From”.
- 5) An address book and filters will populate the screen. On the right side of the screen, a list of all the site addresses within the study you selected should populate.
 - a. Filter the list down more by looking to the left side of the screen and searching for their address by filling in the “Company”, “Contact”, or “Address 1” fields. Click on the Search button when ready.
 - b. Once you have found your site address, click on the “Select” button to the left of the address.
- 6) Make sure your address populated in the fields under “Ship From” on the main page.
 - a. If you accidentally selected the wrong address, click on the “Reset” button on the bottom right of the screen. After the page reloads and clears the information, select your study again from the “Study Group” menu and click on the magnifying glass icon again to search for your correct address.
 - b. To change the address for your site and study group, please complete the following survey:
<https://redcap.uits.iu.edu/surveys/?s=88TTWY3KAF>
- 7) Enter the total weight of your package in the “Weight” field on the right side of screen under the name of your study.
 - a. Leave the “Dry Ice Weight” field empty or enter “0” if shipping an ambient sample.
- 8) Enter the weight of the dry ice for frozen shipments in the “Dry Ice Weight” field.
 - a. The “Dry Ice Weight” field can never be higher than the “Weight” field.
 - b. **(Steps 9-10 can be skipped if you do not need to schedule a pickup)**
- 9) After entering the weights, click on the blue “Pickup Request” button.
- 10) When the Create Pickup Request box pops up, enter information into all the fields provided.
 - a. Enter the “Earliest Time Ready” and “Latest Time Ready” in 24-hour format.
 - i. Schedule pickup at a minimum 1 hour before the “Earliest Time Ready”
 - b. Choose a name and phone number that is the best contact if the UPS driver has question related to picking up your package
 - c. Entering the “Room Number” and “Floor” will help the UPS driver locate your package
 - i. The “Floor” field only allows numerical characters while the “Room Number” field is free text.
 - d. Click “Save” when done.
- 11) Once you are certain that all the correct information has been entered, click the “Ship” button in the bottom right corner of the screen.
- 12) If no red error messages pop up at the top of your screen after clicking on “Ship”, then you should have 2 downloaded PDF files: Shipment Receipt & UPS Package Label

- a. Shipment Receipt will list a “Pickup No.” that references your specific package if there is ever an issue with UPS picking up your package
- 13) Print out the UPS airway bill to any printer at your location.
 - a. Fold the UPS airway bill and slide it inside the plastic UPS sleeve.
 - b. Peel the back off the plastic UPS sleeve and stick the sleeve to your package, making sure it is laying as flat as possible along the surface of the package.
- 14) Place your package in the spot designated in your pickup request, or wherever your daily UPS pickups occur.
- 15) If you need to reprint your airway bill or void your shipment, click on “History” at the top of the main screen.
 - a. If your shipment does not automatically pop up, enter the date of shipment and then click “Search”.
 - b. To reprint your airway bill, click on the printer icon to the far left under “Action”
 - c. To void your shipment, click on the “X” icon to the far left under “Action”
 - i. If you created an airway bill that you no longer need, you must void the shipment to ensure your study will not be charged for the shipment.