



Biospecimen Exchange for Neurological Disorders

Concussion Assessment, Research, and Education for Kids **CARE4Kids**

BIOSPECIMEN COLLECTION & PROCESSING

Overview

1. Specimen uniformity and quality
2. Site Equipment
3. Procedures
 - Kit Contents and Ordering
 - Sample Labelling
 - Sample Collection and Processing
 - Shipping Samples
 - Non-Conformance
4. Contact Information

Specimen Uniformity and Quality

GENERAL REMINDERS

Specimen Standardization and Quality

Most biomarkers are sensitive to *time* and *temperature*

- Standardization of processing across sites is key
- Specimens must be processed within 2 hours of collection
- Reference the *BioSEND Biomarker Specimen Collection, Processing, and Shipment Manual* as needed
- Do not replace or supplement any kit components without first receiving approval from BioSEND/NINDS

Questions? Email biosend@iu.edu

Site Consumables and Equipment

Sites will need to supply the following items:

- Gloves
- Alcohol wipes
- Butterfly needles
- Tourniquet
- Gauze pads
- Bandages
- Microcentrifuge tube rack
- Sharps bin and lid
- Crushed ice
- Pipettes and pipette tips
- Centrifuge capable of maintaining 4°C
- -80°C Freezer
- Dry ice

Procedures

MAINTAINING SPECIMEN UNIFORMITY AND QUALITY

Biospecimen Collection Protocol

Sample type	Visit	Tube Provided	Blood Volume Collected	Sample Volume	Samples shipped to BioSEND	Cryovial Color
Plasma	T1, T3	EDTA tube (purple- top)	12ml	500ul per cryovial	Up to 12 cryovials	Purple Cap
Buffy Coat	T1, T3			750ul	1 cryovial	Clear Cap
Plasma	T1, T3	P100	2ml	200ul per cryovial	Up to 5 cryovials	Lavender Sticker
Plasma	T1, T3	Tasso™ HemoLink w/ EDTA microtainer	500ul	200ul per cryovial	1 cryovial	White Sticker
RNA	T1, T3	PAXgene™ tube	2.5ml	N/A	1 tube	n/a
RNA	T1, T3	Saliva collection kit	N/A	N/A	N/A	N/A

Kit Contents and Ordering

- All sites will be sent a Supplemental Kit with their first kit shipment
 - Contains extra blood collection tubes and processing supplies
 - May be used to replace items in study visit kits
 - Tasso+ Hemolink™ devices will be provided with the Supplemental Kit
- Study Visit Kits should be ordered as soon as visits are planned
 - Contains collection, processing, and shipping supplies specific to each visit
 - Includes barcoded labels
 - The supplies/labels in each study visit kit are intended for that visit only

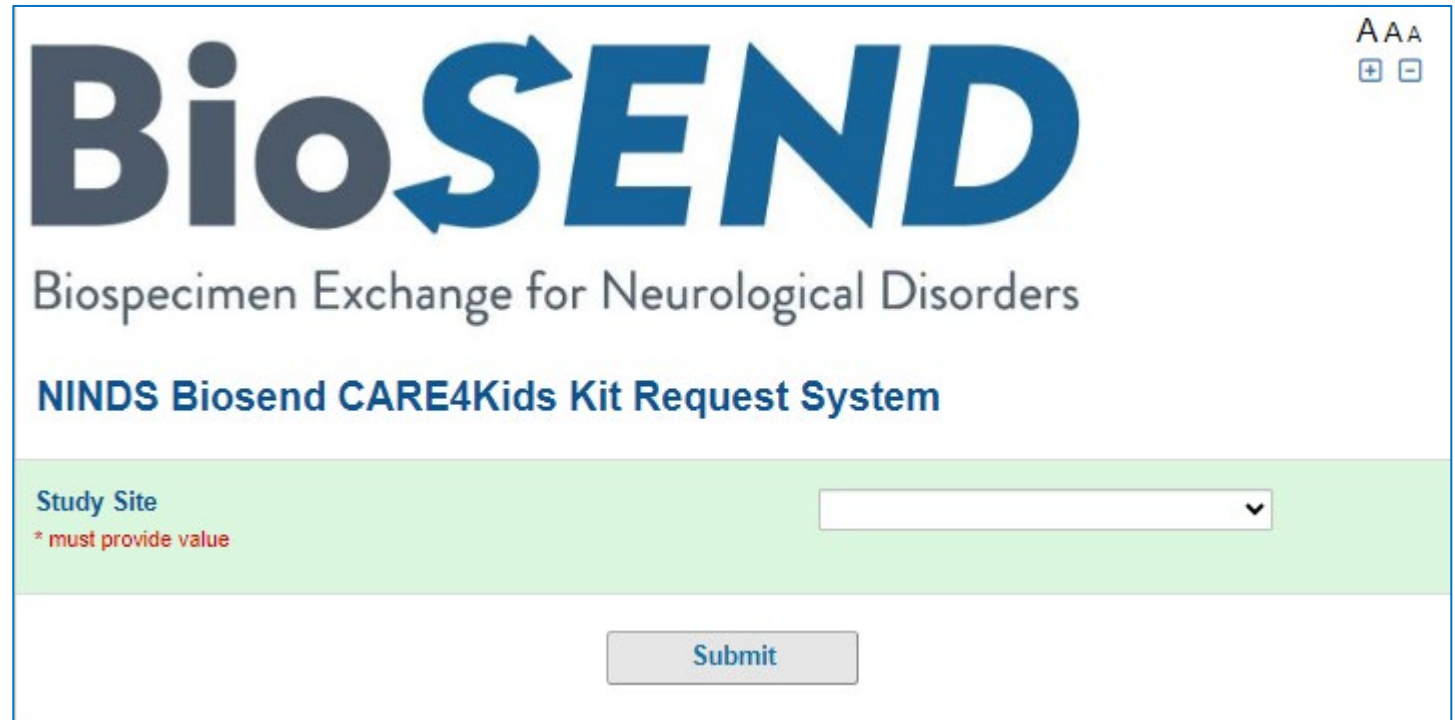
Kit Contents and Ordering – REDCap Survey

<http://kits.iu.edu/biosend/care4kids>

Order kits online through the Kit Request Module for:

- T1/T3 Blood & Saliva Collection kits
- Saliva kit (without blood supplies)
- Ambient Shipping kit
- Extra Supplies

Please provide as much notice as possible when ordering kits and/or supplies.



The screenshot shows the BioSEND NINDS Biosend CARE4Kids Kit Request System interface. At the top, the logo "BioSEND" is displayed in large blue letters, with "Bio" in a standard font and "SEND" in a bold, italicized font. Below the logo, the text "Biospecimen Exchange for Neurological Disorders" is written in a smaller, grey font. Underneath that, the title "NINDS Biosend CARE4Kids Kit Request System" is shown in a bold, dark blue font. In the top right corner, there are three small icons: "AAA", a plus sign, and a minus sign. Below the title, there is a light green horizontal bar containing the label "Study Site" in blue and a red asterisk followed by the text "* must provide value". To the right of this label is a white dropdown menu with a downward arrow. At the bottom of the form, there is a grey button with the word "Submit" in blue text.

Kit Contents and Ordering: Confirm Site Info

CARE4Kids Kit Request Module

Study Site * must provide value	Indiana Univers	Select your site from the drop-down list
Indiana University School of Medicine Carolyn Dunifon Dept. of Medical & Molecular Genetics 351 West 10th Street, TK-318 Indianapolis, IN 46202-3002 (317) 274-5751 cdunifon@iu.edu		
Verify contact information and update if needed		
Is the contact name above correct? * must provide value	☐ Yes ☒ No	reset
New Contact Name * must provide value	Claire Wegel	
Is the shipping address above correct? * must provide value	☐ Yes ☐ No	reset
Is the e-mail address above correct? * must provide value	☐ Yes ☐ No	reset
Is the phone number above correct? * must provide value	☐ Yes ☐ No	reset

Kit Contents and Ordering: Kit Types

CARE4Kids Kit Request Module

- Kits are not specific to a subject or time point. After collection, sites will indicate the subject and time point to which BioSEND should link the samples.

Which kits or supplies are you requesting?

This request will be delivered to your site by 06-20-2025.

*Please note in Comments if you need this order to arrive sooner.
Include date of visit.*

* must provide value

☒ T1/T3 Visit Kit (Blood and Saliva)

☐ Saliva kit (ONLY, no blood supplies)

☐ Ambient shipping kit (for saliva)

☐ Extra Supplies

Please specify in comments if you need kits before the standard two week shipment time.

How many T1/T3 Visit Kit(s) do you need?

* must provide value

3

Kit Contents and Ordering: T1/T3 Blood & Saliva Collection kits



Kit Contents and Ordering: Tasso Hemolink™



Kit Contents and Ordering: Saliva Supplies



Collection Volumes

Total blood volumes

Sample Type	Amount
Whole Blood for RNA	2.5 ml
Whole Blood for Plasma and Buffy Coat	12 ml
Whole Blood for Plasma (P100 protease inhibitor tube)	2 ml
Whole Blood for Plasma (Tasso Hemolink™ device with EDTA microtainer)	0.5 ml
Saliva for RNA	1 tube

Sample Labelling: Example Labels

Labels are provided by Indiana University

- Please check that all samples are properly labelled to ensure correct identification by IU
- If do not have enough labels to complete a visit, please contact IU *immediately*
- Labelling the tubes during processing prevents sample mix-ups

KIT NUMBER



1000001



C4KIDS
COLLECT

Kit: 1000001

1000000123

WBLD

EDTA6



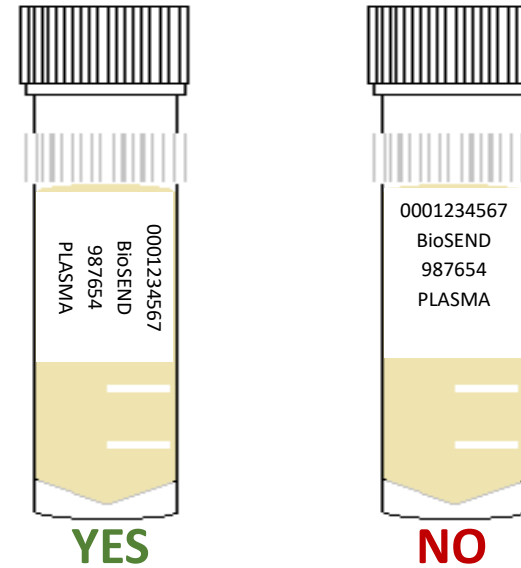
Visit: _____

Subject #:

Sample Labelling: Label Placement

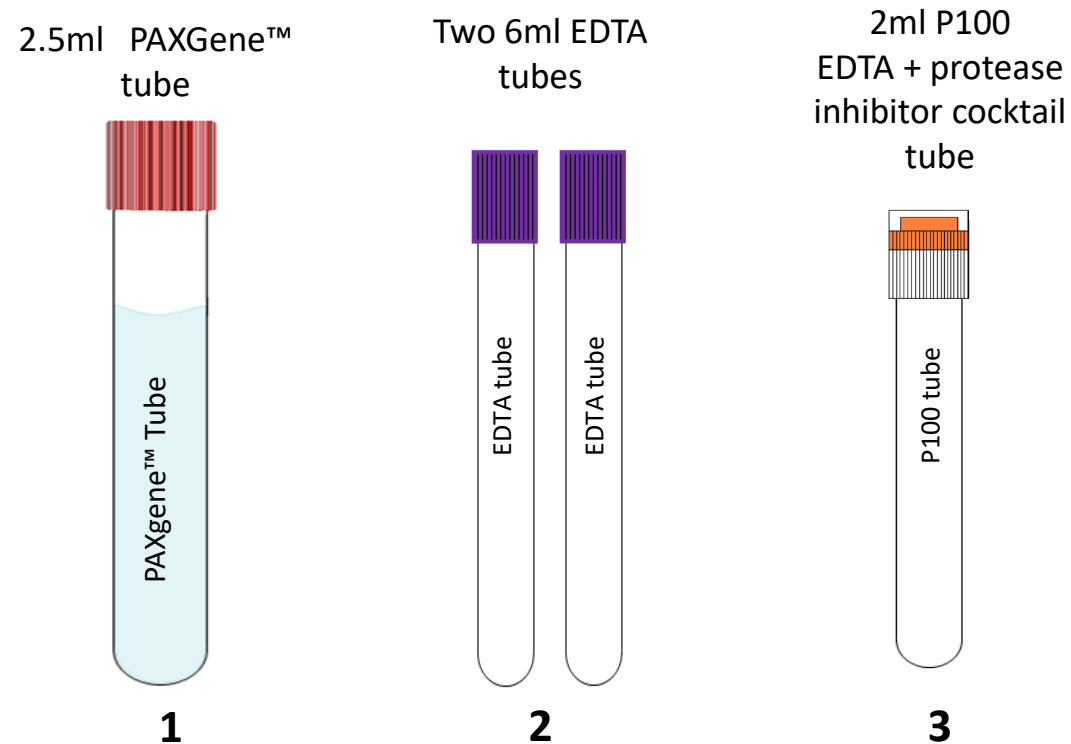
Please...

- Label all collection and aliquot tubes before cooling, collecting, processing, or freezing samples
- Label only 1 subject's tubes at a time to avoid mix-ups
- Wrap the label around the tube horizontally - label position is important for all tube types
- Make sure the label is completely adhered by rolling between your fingers



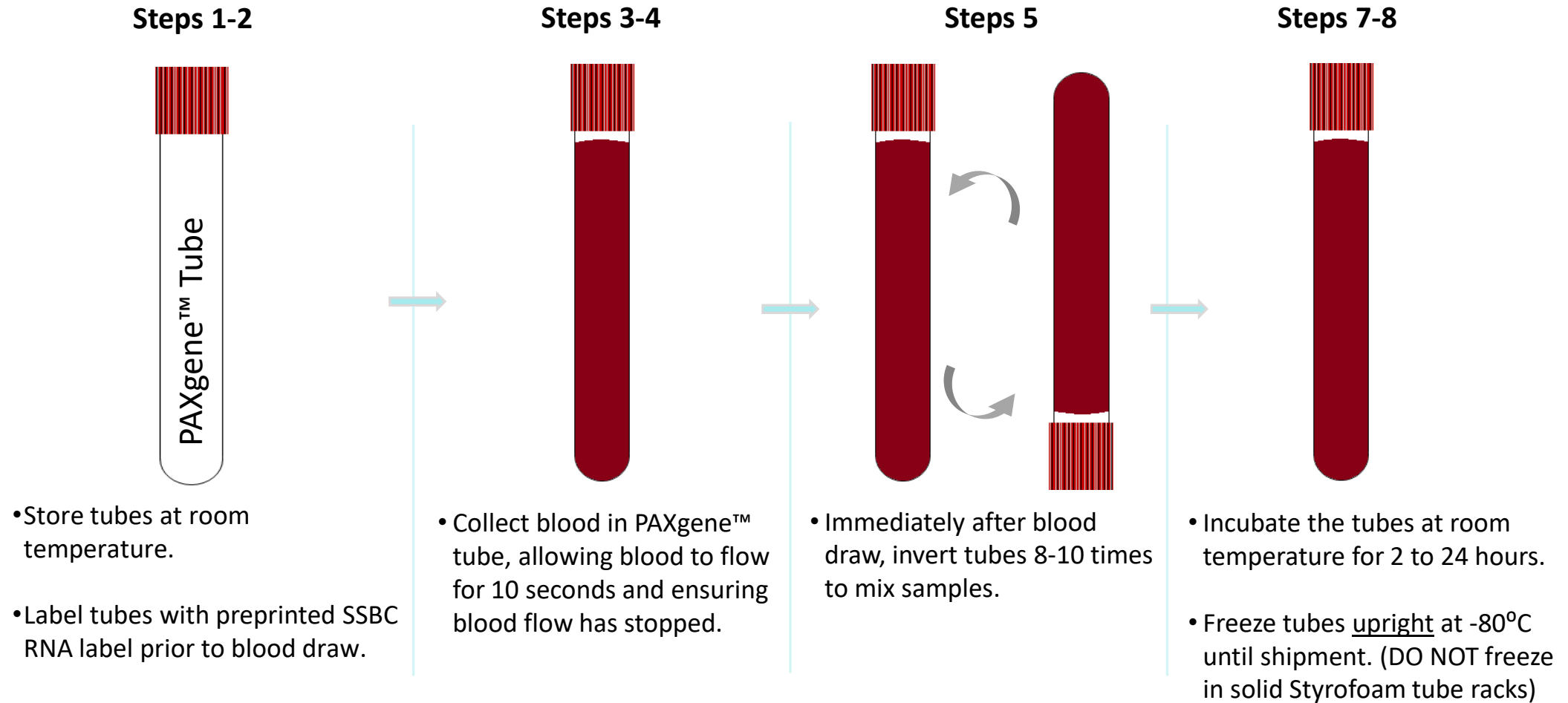
Sample Collection and Processing

Blood Tube Draw Order

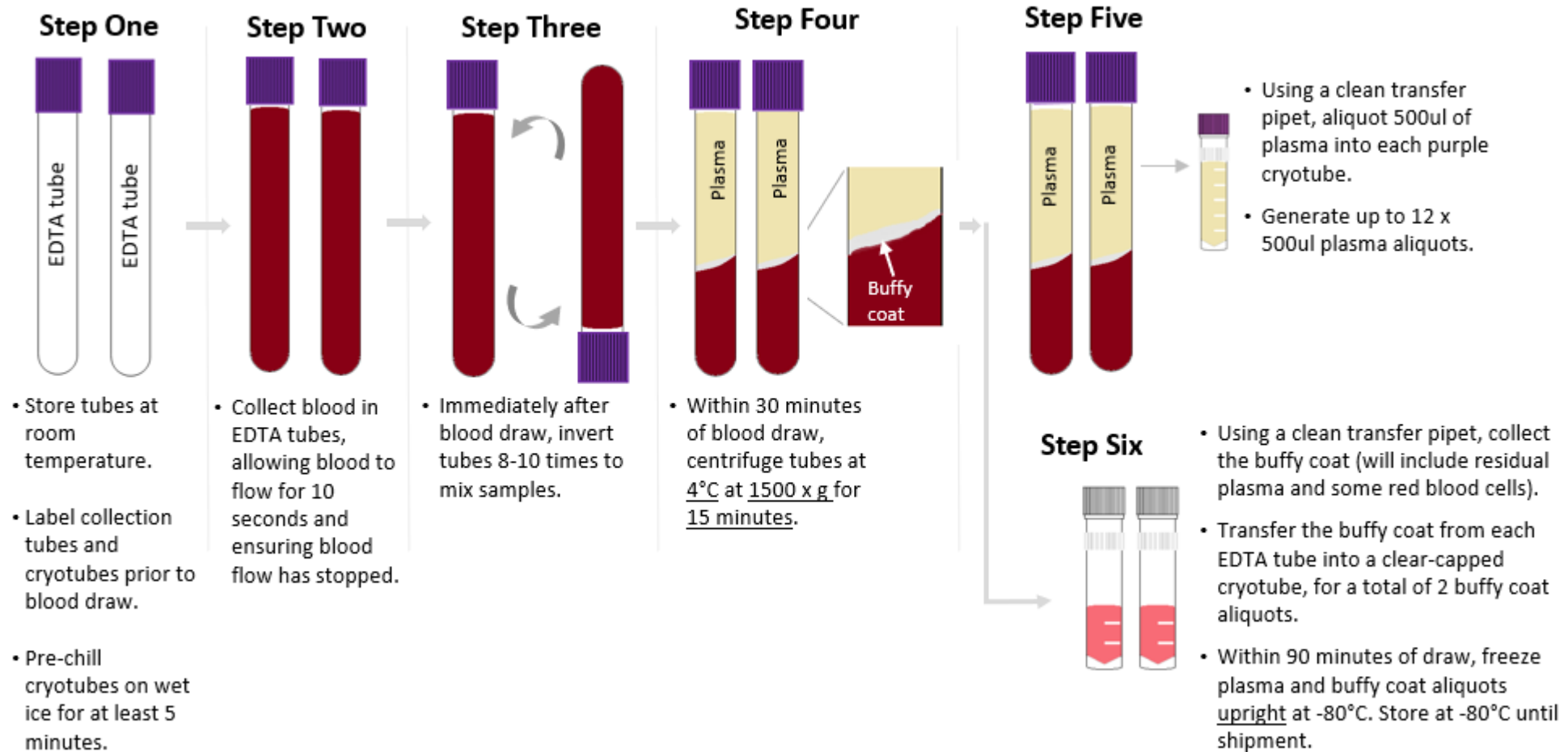


**Plasma from Tasso™ HemoLink Device collected through non-venipuncture method*

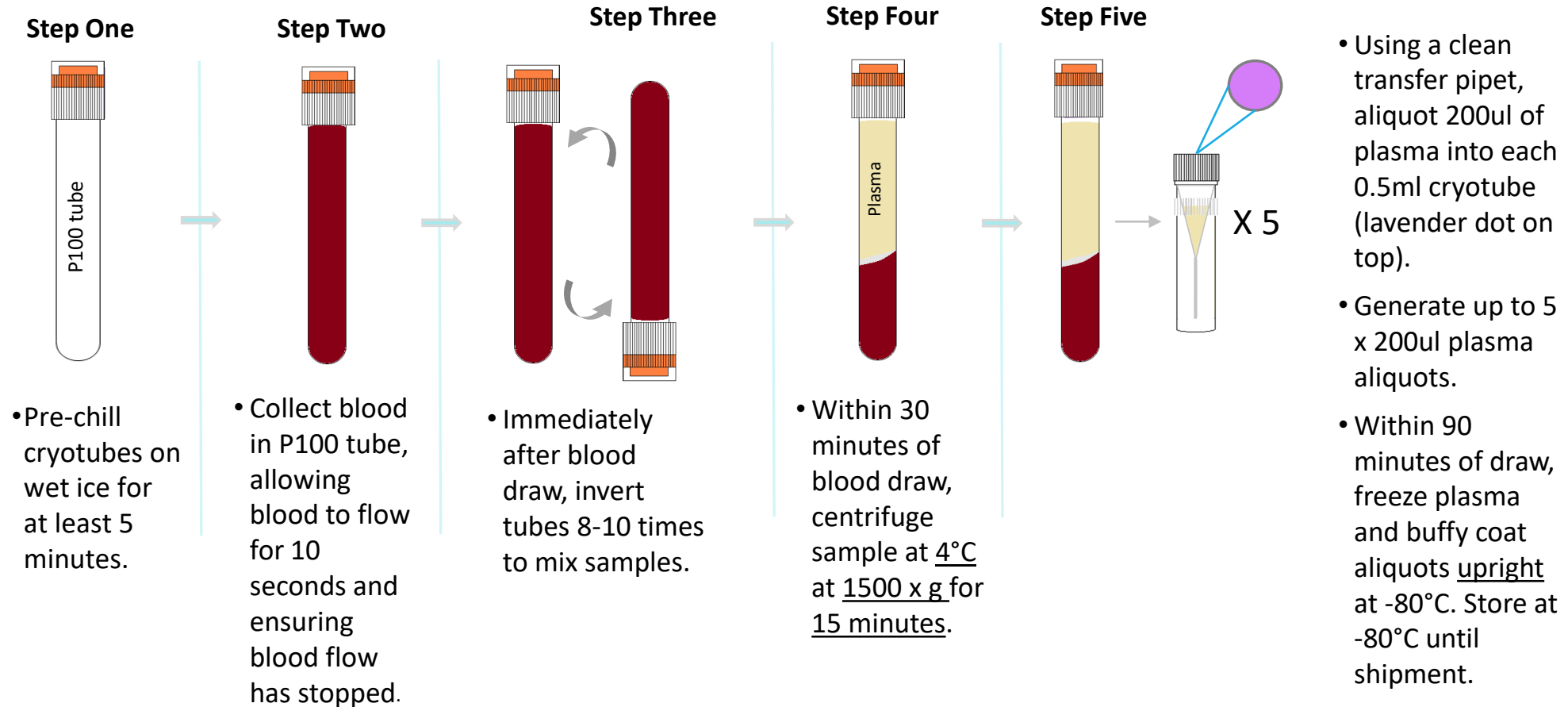
Sample Collection and Processing: Whole blood RNA



Sample Collection and Processing: Plasma & Buffy Coat



Sample Collection and Processing: Plasma (P100)



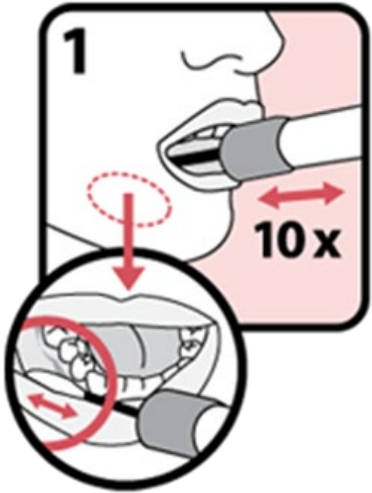
Tasso+ HemoLink™ Device

Collection instructions – please follow manufacturer's guide outlined in Appendix D

- Within 30 minutes of blood collection, centrifuge tube for 15 minutes at 1500 RCF (x g) at 4°C.
- Remove the plasma by tilting the tube and placing the pipette tip along the lower side of the wall.
- Using a disposable tipped micropipette, transfer plasma into the 0.5ml (white dot) cryotube.
- Aliquot 200 ul into cryotube.

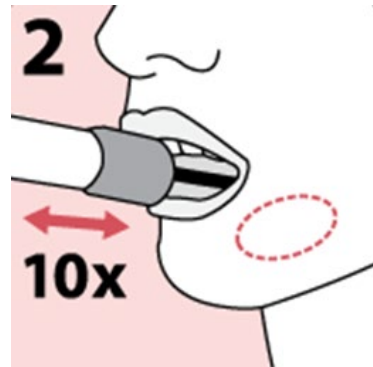
Saliva for RNA Collection (ship to Penn State)

Step One



- Write Care4Kids ID on the Subject ID label and affix it to the saliva tube. **Be careful not to cover pre-printed barcode on saliva tube.**
- Place sponge in the back of the mouth between cheek and lower gums where saliva typically pools. Gently rub the gums 10 times in small circles and avoid rubbing the teeth.

Step Two



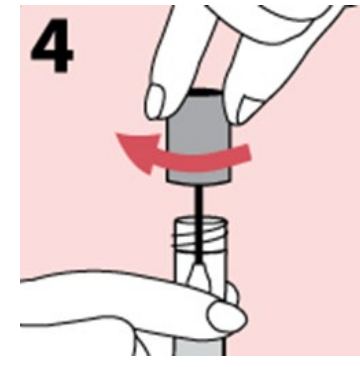
- Repeat motion on the opposite side of the mouth between the cheek and lower gums for an additional 10 times.

Step Three



- Hold the tube upright to prevent the liquid inside the tube from spilling. Unscrew the cap from the collection tube without touching the sponge. **BE CAREFUL:** cap can stick when performing this step so ensure you have a firm grip before attempting.

Step Four



- Turn the cap upside down, insert the sponge into the tube and close cap tightly. Invert the capped tube and shake vigorously 15 times.

Step Five

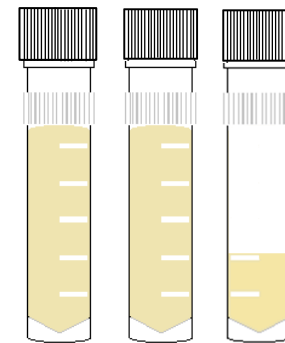


- Invert the capped tube and shake vigorously 15 times.

Sample Collection and Processing: Aliquots

Filling biomarker plasma aliquots:

- Fill as many cryovials as possible to 0.5 ml (Plasma) or 0.2ml (P100 or Tasso)
- Over-filled vials may burst in freezer!
- Ship ALL material to IU, even if final vial is less than standard volume



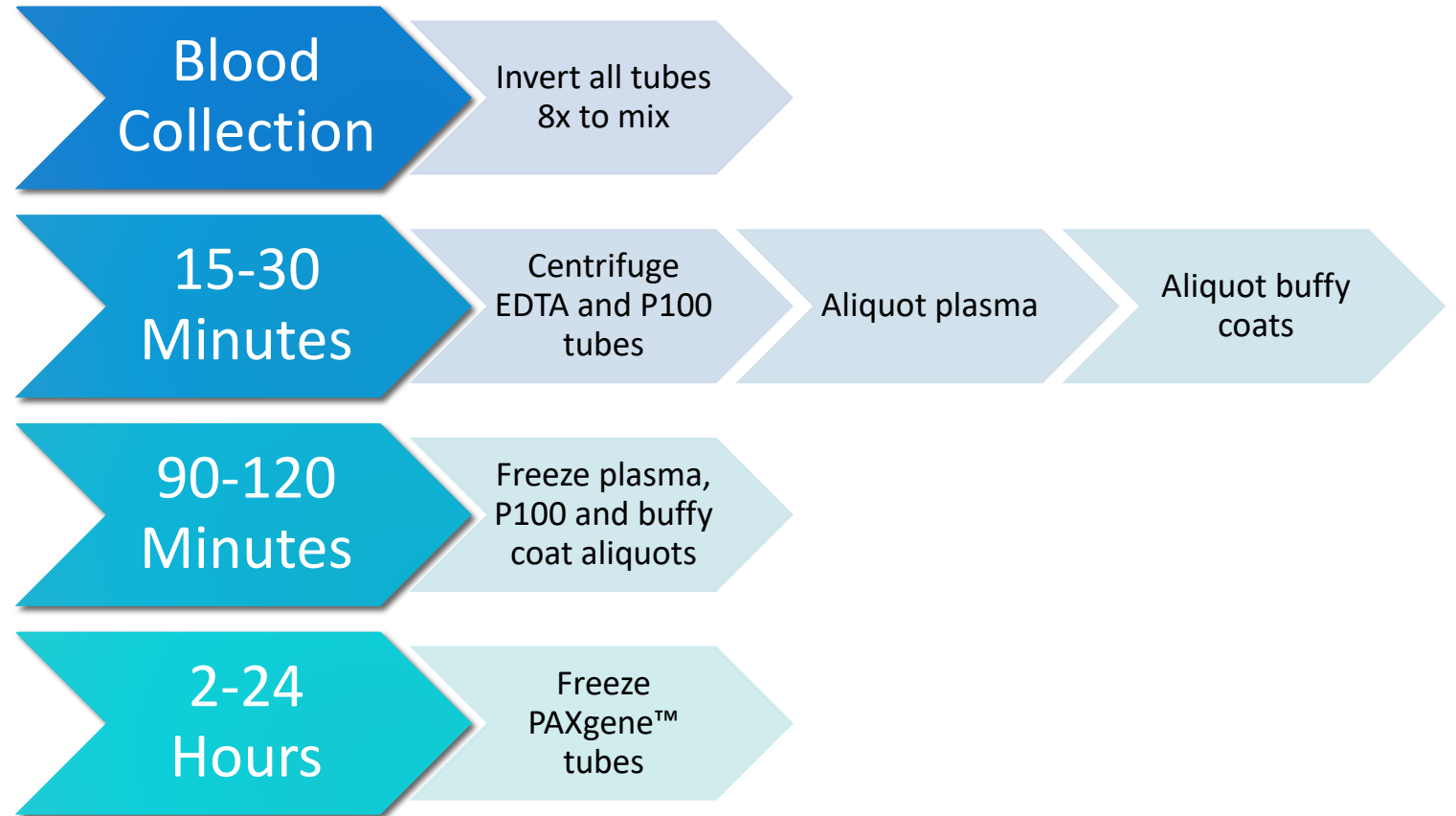
YES



NO

Sample Collection and Processing: Timeline

Timeline for blood processing



Sample Collection and Processing: Issue #1

Troubleshooting Blood Collection

Issue #1: Tube with little/no vacuum

- Always check expiration date on the tube before beginning blood draw and discard expired tubes
- Store tubes at “room temperature” – extreme temperature can affect vacuum
- Keep extra vacutainer tubes from supplemental kit nearby during blood draw to replace “bad” tubes
- If this is a frequent occurrence, report tube type and lot number to IU.

Sample Collection and Processing: Issue #2

Troubleshooting Blood Collection

Issue #2: Hemolyzed plasma caused by incorrect collection

Cause: Blood Collection Methods	Corrective Action
Improper venipuncture site	Draw from median cubital, basalic, and cephalic veins from antecubital region of arm
Prolonged tourniquet use	Tourniquet should be released after no more than 1 min, excessive fist clenching should be avoided
Not allowing alcohol to dry on skin before venipuncture	Without touching, allow the venipuncture site to air dry
Use of too large/small bore needle resulting in excess force applied to blood	Avoid using too small/large needle. Needle size dependent on the subject's physical characteristics & amount of blood to be drawn. Most commonly used sizes are 19 – 23.
Pulling/pushing plunger too fast while drawing/transferring blood	Avoid drawing the syringe plunger too forcefully when collecting blood
Ensure all blood collection assemblies are fitted securely, to avoid frothing	

For more information, visit: http://www.bd.com/vacutainer/pdfs/techtalk/TechTalk_Jan2004_VS7167.pdf

Sample Collection and Processing: Issue #2 continued

Troubleshooting Blood Collection

Issue #2: Hemolyzed plasma caused by incorrect processing

Cause: Sample Processing Methods	Corrective Actions
Vigorous mixing/shaking	Gently invert blood collection tube when mixing additive with specimen, follow guidelines in Biologics Manual regarding number of times to invert each type of tube
Not allowing serum to clot for recommended time	Serum tubes without clot activator should be allowed to clot for 60 min in a vertical position
Exposure to excessive heat or cold	Keep samples at ambient temperature until processing
Prolonged contact of serum/plasma with cells	Do not store uncentrifuged samples beyond recommended time

For more information, visit: http://www.bd.com/vacutainer/pdfs/techtalk/TechTalk_Jan2004_VS7167.pdf

Sample Collection and Processing: Online Form

Specimen Collection and Processing Form

Direct Link:

<https://redcap.link/Care4KIDSSampleForm>

First page captures basic subject and visit information



Biospecimen Exchange for Neurological Disorders

Protocol: Care4Kids

Please complete the Specimen Collection and Processing Form, below.

Returning?

AAA



Page 1 of 2

Study Site

Email address of staff member completing this form

Note: A copy of the completed sample form and the shipping manifests will be sent to this address.

CARE4Kids Subject ID:

8 characters remaining

Subject's sex (used for DNA quality control)

Visit

IU Kit Number

7 characters remaining

Next Page >>

Save & Return Later

Sample Collection and Processing Form

Second page captures processing information

Blood Collection and Processing	
Date of venipuncture blood collection	 Today M-D-Y
Time of venipuncture blood collection	 Now H:M Use 24 Hour clock.
Was EMLA used?	Yes No reset
Date participant last ate	 Today M-D-Y
Time participant last ate	 Now H:M Use 24 Hour clock.
1. RNA (PAXGene™ tube, 2.5 mL)	
Was blood collected for RNA?	Yes No reset
Number of PAXGene™ tubes collected for RNA	

Sample Collection and Processing Form

PDF form of responses will be emailed to you. Print a copy of the Frozen Shipping Manifest and include with shipment to BioSEND.

CARE4Kids Frozen Shipping Manifest

Please verify/update the information below. When you click the "Submit" button below, a PDF copy of the Frozen Shipping Manifest will be emailed to you for Subject [subj_id].

Please print a copy of that document and include it in the Kit #[kit_num] shipping container.

Study Site:

- ☐ Children's National Hospital
- ☐ Seattle Children's Hospital
- ☐ University of California - Los Angeles
- ☐ University of Rochester
- ☐ University of Texas - Southwestern
- ☐ Wake Forest University
- ☐ Washington University

CARE4Kids Subject ID:

Visit:

- ☐ T1
- ☐ T3

IU Kit Number:

Date of blood collection:

PLASMA EDTA

Number of PLASMA EDTA aliquots shipped:

Number of BUFFY COAT aliquots shipped:

PLASMA P100

Number of PLASMA P100 aliquots shipped:

PLASMA TASSO

Number of PLASMA TASSO aliquots shipped:

RNA

Number of PAXGene™ tubes shipped

Sample Collection and Processing Form

PDF form of responses will be emailed to you. **Print a copy of the Ambient Shipping Manifest and include with shipment to Penn State.**

CARE4KIDS Ambient Shipping Manifest

Please verify/update the information below. When you click the "Submit" button below, a PDF copy of the Ambient Shipping Manifest will be emailed to you for Subject [subj_id].

Please print a copy of that document and include it in the Kit #[kit_num] shipping container to ship to PENN STATE.

Study Site:

CARE4KIDS Subject ID:

Subject Sex (used for DNA quality control):

Visit:

IU Kit Number:

Date/Time of saliva collection:

Date participant last ate

Time participant last ate

Number of saliva sample collected

Shipping Information - Please Complete.

Saliva samples should be sent to Penn State.

Date of Shipment

Did/will you use the IU UPS interface to generate the shipping label?

☐ Yes
☐ No

Which shipping service did you use?

☐ UPS
☐ FedEx
☐ World Courier
☐ Other

What is the shipment tracking number?

Sample Collection and Processing Form

Submission of the Shipping Manifest portion of the form serves as shipment notification to BioSEND

- Must be completed prior to shipment
- If samples are shipped and not received, BioSEND will follow-up with courier. It is recommended that sites also track shipment to ensure safe delivery

Shipping Frozen Samples: Tips

Packing and Shipping Frozen Samples

- All blood samples ship frozen on dry ice
- Frozen samples should be shipped **only** Monday through Wednesday
- Always fill carton to **top** with dry ice
- Do not pack shipment until the day of pickup



Shipping Samples

Packing and Shipping Frozen Samples

Class 9 Dry Ice Label should not be covered with other stickers and must be completed, or UPS will reject/return your package!

Shipper's Declaration not Required.

Dry Ice amount must be in kilograms.

Note: 2 lbs. = 1 kg.

Airwaybills / airbills must have the following:
1. Dry Ice; 9; UN 1845
2. $\frac{\text{Number}}{\text{(Number pks)}} \times \frac{\text{wt}}{\text{(wt)}} \text{ Kg}$

Net weight of dry ice in kg

Dry Ice kg.

Your name & address

Shipper's Name and Address

UN 1845

Consignee Name and Address

IU information and address

9

06426 1/01 RRD

Shipping Samples: Frozen

Do not ship more than 4 biohazard bags in a single shipper (equivalent to two subject-visits).

- Allows room for dry ice to keep samples frozen in transit
- Minimizes loss in the rare but unfortunate event of courier issues



Shipping Samples – UPS: <https://kits.iu.edu/UPS>

**INDIANA UNIVERSITY**
SCHOOL OF MEDICINE

and Affiliated Biorepositories

Search for address

↓

Code

Company

Contact

Address 1

Address 2

Address 3

City

State/Province

Postal Code

Country/Territory

Ship From

Clear

Icahn School of Medicine - Mt. Sinai

Kenny Persaud

1425 Madison (Icahn Building)

Icahn L4 39

New York

NY

10029

United States

Shipment Information

Study Group

Weight

Dry Ice Weight

Description of Return

Pickup Request

SSBC

20

10

LB

LB

Biologic Specimens

Choose Study

↓

Enter weight

↑

Click "Ship"

↓

Reset

Ship

Shipping Samples via UPS

IU UPS ShipExec Shipping Portal

- Print out UPS air waybill
- Ensure all elements (barcode, return address, etc.) printed clearly
- Fold and insert UPS air waybill into clear plastic sleeve on package

JOHN SMITH INDIANA UNIVERSITY 410 WEST 10TH STREET INDIANAPOLIS IN 46202	2 LBS	1 OF 1
RS		
SHIP TO: SCHOOL OF MEDICINE 317-278-2694 INDIANA UNIVERSITY TK 217 351 W 10TH ST INDIANAPOLIS IN 46202		
	IN 461 9-01	
		
UPS NEXT DAY AIR		1
TRACKING #: 1Z 976 R8W 84 3985 8595		
 SAMPLE		
BILLING: P/P DESC: Biological Specimens RETURN SERVICE		
Reference No.1: 4087277		
XOL 20.03.09 NV45 83.0A 12/2019		 TM

Shipping Ambient Samples: Tips

Packing and Shipping Ambient Samples

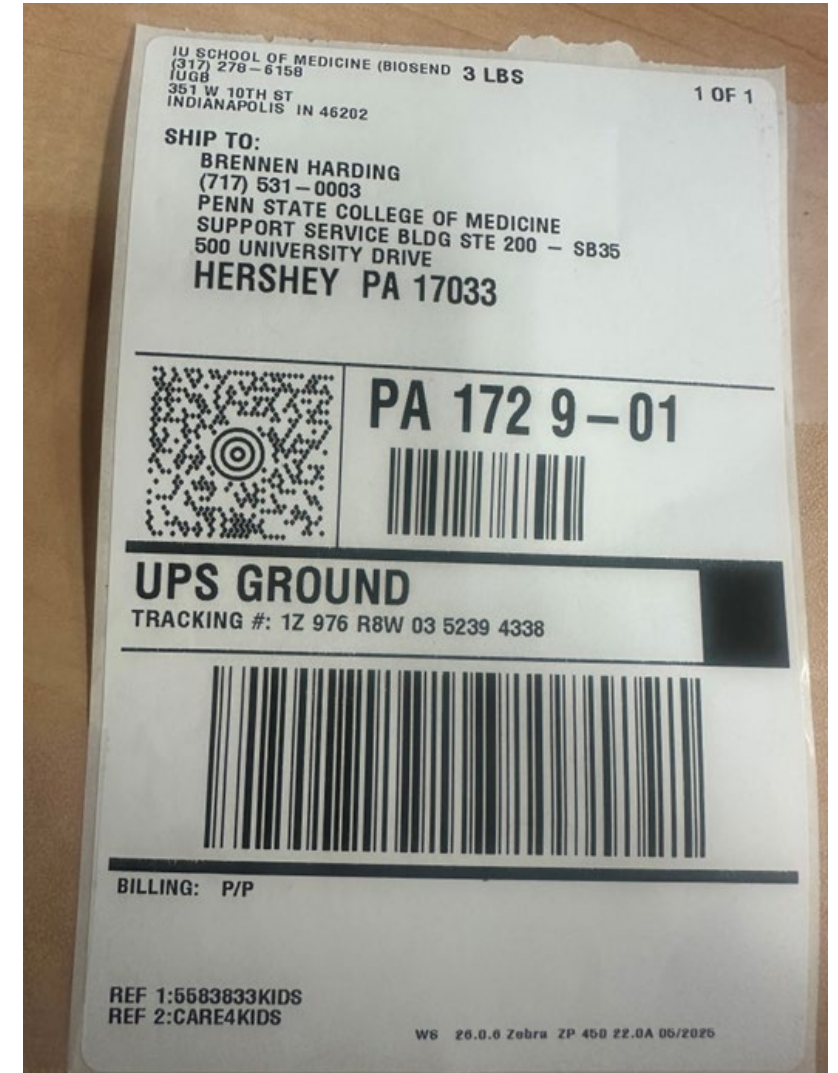
- Saliva samples ship ambient to Penn State with the pre-printed UPS airway bill provided by BioSEND
- Ambient Saliva samples should be batched and shipped to Penn State every 3 weeks
- Please review Appendix R (Saliva Collection for RNA) and Appendix L (Ambient Shipping Instructions).



Shipping Samples via Pre- Printed airwaybill

Ambient Saliva shipping to Penn State

- Please make sure to mark Ambient Shipping Manifest is marked shipped in RedCap and print a copy to include with shipment.
- Place saliva tube(s) in biohazard bag(s) and place in ambient shipper.
- Place the ambient shipper and ambient shipping manifest(s) in the UPS clinpak and seal.
- Attach the UPS pre-printed airway bill addressed to Penn State, UN3373, and Human example label to the clinpak and ship.



Shipping Samples: Closures

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
June 19	Juneteenth (observed)
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

Please also consider weather when shipping. UPS will post service updates on their webpage. Reach out to BioSEND if you are unsure if it is safe to ship.

Non-Conformance

Non-conformance to standard procedures may reduce the utility of the biospecimens:

- Not processing plasma within 2 hours of collection allows for breakdown of certain proteins and small molecules
- Over/under centrifuging changes specimen composition



Non-Conformance Reporting con't

Most common non-conformance issues:

- Shipment notification not sent
- Samples shipped for weekend/holiday delivery
- Sample form incomplete/inaccurate
- Low volume
- Unlabeled or mislabeled tube(s)
- Sample hemolysis



Non-Conformance and Inventory Reporting

Most common non-conformance issues:

- BioSEND will notify sites directly of any issues upon receipt
- BioSEND will email sites a monthly inventory report of all samples received from that site to date
- ***If you are experiencing issues, please reach out to us for help! It is much easier to prevent an issue before sample collection & shipment than trying to fix it after the fact***

BioSEND.org

On the website, you can:

- Access your study's kit request module and sample submission form
- Download the most recent version of the Manual of Procedures
- View a recording of this training
- Find information about holiday closures
- Access shipping resources

Study Resources

KIT REQUEST MODULE

Please follow the below link to access the Kit Request Module. This link will direct you to a REDCap database where study coordinators and staff may request kits, individual supplies, and/or labels. Please allow a total of two weeks for kit requests to be fulfilled.

[Kit Request System →](#)

SPECIMEN COLLECTION AND PROCESSING FORM

Please use the below link to access the collection and processing form for this protocol. This form must be completed prior to shipment. We also ask that all shipments include a physical copy of the shipping manifest portion of the form.

[Specimen Collection and Processing Form →](#)

MANUAL OF PROCEDURES

The below downloadable manual was created specifically for the DxCTEII study. Please feel free to explore the manual through the hyperlinked 'Table of Contents'. Questions concerning any part of the manual may be directed to biosend@iu.edu for further clarification.

[Manual of Procedures ↓](#)

TRAINING SLIDES

These slides correspond to the BioSEND DxCTEII protocol training. Training is available upon request by contacting biosend@iu.edu.

[Training Slides ↓](#)

SAMPLE SHIPPING

BioSEND can receive samples Monday-Friday, excluding holidays. Frozen samples should be shipped M-W. Ambient samples may be shipped on Th.

[Generate UPS airbill or schedule pickup →](#)
[Check holiday closures →](#)
[What do I do for Friday blood draws →](#)

Contacts

Indiana University

General Questions/Shipment Notifications:

biosend@iu.edu

317-278-6158

Request kits:

<http://kits.iu.edu/biosend/care4kids>