Creative Proteomics
Cytokine Proteomics

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Luminex Multiplex Panel Sample Submission Guide

Sample preparation, labeling, storage, and shipping requirements for research-use-only (RUO) biological samples (e.g., serum, plasma, and cell culture supernatant).

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1. Quick Start (2-Minute Checklist)

Follow these steps to prevent the most common causes of delays and rejections:

Checklist

1. Confirm samples are for research use only (RUO), **non-infectious**, and not classified as hazardous or regulated biological materials according to applicable shipping and biosafety regulations. A biosafety declaration must be provided in the sample manifest.
2. Label every tube with a unique Sample ID (labeling rules refer to Section 2.1) and complete a sample manifest.
3. Remove cells and particulates by centrifugation prior to freezing; residual debris may interfere with assay performance.
4. Aliquot into single-use volumes; avoid multiple freeze–thaw cycles.
5. Ship samples with an appropriate cold chain (e.g., dry ice for frozen samples) to maintain sample integrity during transit.
6. Email the tracking number and sample manifest to our team immediately after shipment.
7. Contact our technical support before shipping if your matrix is unusual (e.g., tissue lysate, BALF, CSF) or contains detergents/high salt/additives.

2. Requirements at a Glance (Required vs. Recommended)

This section summarizes what is required vs recommended for a smooth submission. Samples may be delayed or rejected if required labeling or documentation is missing or inconsistent.

2.1 Labeling

- Required (must): Each tube must be labeled with a unique Sample ID, along with matrix and species, and must match the sample manifest exactly
- Recommended: Add project/quote ID, group/ treatment, timepoint, collection date; use cryo-safe labels

2.2 Documentation

- Required (must): Sample manifest that matches tube labels exactly
- Recommended: Include anticoagulant, additives/buffer notes, freeze–thaw count, and notes on hemolysis/ lipemia/filtration
- Inconsistent or incomplete documentation may result in delays or rejection of samples

2.3 Clarification

- Required (must): Centrifuge to remove cells/debris prior to freezing
- Recommended:
  - Keep samples cold (2–8°C) during processing and minimize time at room temperature
  - If samples are visibly turbid or contain particulates after thawing, clarify at 12,000–16,000 × g for 10 min at 2–8°C prior to analysis
  - Filtration should be applied only when necessary (e.g., high particulate or viscosity), as it may result in analyte loss; document all filtration steps

2.4 Aliquoting

- Required (must): Provide sufficient volume for the requested analysis; insufficient volume may result in inability to complete the assay
- Recommended: Single-use aliquots to avoid repeated freeze–thaw

2.5 Storage

- Required (must): Frozen storage before shipping (project-dependent)
- Recommended: -80°C preferred for long-term storage

2.6 Shipping

- Required (must): Leak-proof, three-layer packaging; continuous cold chain must be maintained during transit
- Recommended: Ship Mon–Tue when possible; include a printed manifest; email tracking the same day

3. Accepted Sample Types and Universal Rules

3.1 Accepted Sample Types

- Commonly accepted matrices:
  - Serum
  - Plasma
  - Cell culture supernatant
- Matrices requiring feasibility review (case-by-case):
  - CSF, BALF/lavage, vesicle/blister fluids, tissue lysates, other complex matrices
  - Samples containing detergents, high salt, high viscosity, or visible particulates

3.2 Universal Rules (Apply to All Matrices)

- Clarify samples (i.e., remove cells, debris, and particulates) prior to freezing and shipping.
- Aliquot into single-use volumes to avoid repeated freeze–thaw.
- Keep samples cold during processing (2–8°C) and minimize room-temperature exposure.
- Document critical variables: matrix, anticoagulant, timepoint(s), additives/buffer components, freeze–thaw count.
- Ensure traceability: tube labels must match the manifest exactly.

4. Matrix-Specific Requirements (Serum, Plasma, Supernatant, and Complex Matrices)

4.1 Serum

- **Recommended workflow:**
  - a) Allow complete clot formation (typically at least 30 min at room temperature).
  - b) Centrifuge at 1,000–2,000 × g for 10 min in a refrigerated centrifuge.
  - c) Transfer the clear serum to a new tube (avoid the clot and cellular layer).
  - d) Aliquot and freeze promptly.
- **Quality notes:**
  - Visibly hemolyzed (red/brown) or lipemic (milky) samples may increase background or bias some analytes. Disclose these conditions in the manifest for risk review.

4.2 Plasma

Required documentation:

- Record anticoagulant type in the manifest (EDTA, citrate, heparin, etc.).

Recommended workflow (general):

- a) Centrifuge at 1,000–2,000 × g for 10 min in a refrigerated centrifuge.
- b) Transfer plasma without aspirating the buffy coat.
- c) Aliquot and freeze promptly.

Optional (recommended for consistency):

- For improved consistency, platelet-poor plasma may be prepared by an additional centrifugation step (e.g., 2,000 × g for 15 min).

Heparin note:

- Heparin plasma may be accepted but can introduce assay- or analyte-dependent interference; if used, document clearly and request feasibility review when appropriate.

4.3 Cell Culture Supernatant

Recommended workflow:

- Centrifuge to remove cells and debris.
- If the sample remains visibly turbid or contains particulates, perform a second clarification step (centrifugation and/or filtration).
- Document media composition, cell type, stimulation reagents, and timepoints.
- Aliquot and freeze promptly.

4.4 Cell/Tissue Lysates and Other Complex Matrices (Feasibility Review Required)

Required before shipment:

- Provide processing description and buffer/additive composition (salt, detergents, inhibitors).
- For cell or tissue lysates, normalization based on total protein concentration is strongly recommended to reduce inter-sample variability (>= 400ug/mL).
- Perform thorough clarification prior to freezing.

Detergent control (recommended):

- Use low concentrations of non-ionic detergents whenever possible (typically ≤0.1–0.5%). Ionic detergents such as SDS should be minimized and may require feasibility review.

Clarification guidance (recommended):

- Remove debris by centrifugation and transfer the clarified supernatant; repeat if the sample remains visibly turbid or contains particulates.

5. Clarification: Centrifugation, Transfer, and Filtration

Particulates, residual fibrin, and cellular debris are common causes of clogging and inconsistent signals in multiplex bead-based assays. Clarification prior to freezing and shipping is strongly recommended and may be required for sample acceptance.

5.1 Pre-Freeze Clarification (Required)

- Centrifuge to pellet cells and debris (use chilled conditions when possible).
- Transfer supernatant carefully without disturbing the pellet (avoid buffy coat in plasma).

5.2 Post-Thaw Clarification (Recommended; Required if Visibly Turbid or Particulate)

- If samples are visibly turbid or contain particulates after thawing, clarify at 12,000–16,000 × g for 10 min at 2–8°C prior to analysis.

5.3 Filtration (Only When Necessary)

- Filtration should be used only for samples with high particulate content or high viscosity, as it may result in analyte loss.
- Document all filtration steps in the sample manifest, including filter type, pore size (if known), and whether filtration was performed before or after thawing.

6. Aliquoting, Storage, and Freeze–Thaw Management

6.1 Aliquoting (Recommended)

- Aliquot into single-use volumes whenever possible.
- Avoid repeated tube opening and prolonged thaw times.

6.2 Freeze–Thaw Limits (Submission Policy)

- 0–1 cycles: preferred
- 2–3 cycles: conditionally acceptable (must be documented; risk review recommended)
- > 3 cycles or unknown: high risk; may be rejected or require written acknowledgement of risk

6.3 Thawing and Mixing (Recommended)

- Thaw samples completely and mix gently but thoroughly before processing.
- Do not vortex unless specifically validated for your matrix/analytes.

6.4 Storage (Recommended)

- Keep samples frozen prior to shipping.
- -80°C is preferred for long-term storage.

7. Tubes, Labeling, and Sample Manifest (Submission Documentation)

7.1 Tubes (Required)

- Samples must be aliquoted into 0.5–0.65 mL snap-cap microcentrifuge tubes compatible with our receiving workflow.
- Compatible tubes should have approximate dimensions of ~3.0 cm in height and ~0.9 cm in diameter.
- Example compatible tubes (for reference only; equivalent tubes may also be used) include:
  - VWR Microcentrifuge Tubes, Cat# 87003-290 (0.65 mL)
  - Eppendorf 0.5 mL Safe-Lock Tubes™, Fisher Scientific Cat# 05-402-18.

7.2 Labeling (Required)

Minimum tube label:	Strongly recommended on the label:	Avoid:
Sample ID (unique)	Project/quote ID	Duplicate IDs
Matrix	Group/treatment	Adhesive stickers or labels that may detach during frozen storage or shipment
Species	Timepoint	Handwriting that smears at low temperature
	Collection date	Parafilm sealing of sample tubes
	Anticoagulant (for plasma)	

7.3 Sample Manifest (Required)

The manifest must match tube labels exactly.

Required fields:	Recommended fields:
Sample ID	Group/treatment, timepoint
Matrix	Notes on hemolysis/lipemia, high viscosity, filtration, additives, or other relevant sample conditions
Anticoagulant (if applicable)	
Species	
Volume (µL or mL)	
Storage temperature	
Freeze–thaw cycles	
Biosafety declaration (including any applicable hazard information)	

8. Shipping and Packaging (Domestic and International)

8.1 Timing (Recommended)

- Plan shipments to arrive on a business day.
- Avoid weekend/holiday delays whenever possible.
- Ship Monday-Thursday when feasible.

8.2 Temperature Control (Required as Applicable)

- Frozen samples: ship on dry ice in a rigid insulated container.
- Use sufficient dry ice for transit plus potential delays.

8.3 Packaging (Required)

Three-layer packaging:

- Primary container: leak-proof sealed screw-cap tube
- Secondary container: sealed bag with absorbent material
- Outer container: rigid insulated shipper with an outer cardboard

Include in the box (required):

- Printed manifest (and email a copy on the day of shipment)
- Biosafety or hazard declaration, if applicable

International shipments (required as applicable):

- Include a proforma/commercial invoice and use a compliant description such as “non-infectious research sample (RUO)” in accordance with applicable shipping and customs regulations.

9. Acceptance, Conditional Acceptance, and Rejection Criteria

9.1 Samples May Be Rejected If:

- Leakage or damaged containers (risk of contamination or sample compromise)
- Missing/illegible labels or mismatch between tube IDs and manifest
- Insufficient volume for the requested work and no backup aliquot
- Temperature excursion indicating prolonged thawing
- Excessive/unknown freeze–thaw history without risk acknowledgement
- Visible contamination or severe hemolysis/lipemia where data quality risk is deemed unacceptable

9.2 Conditionally Acceptable (Risk Review Recommended):

- Mild hemolysis or lipemia (must be disclosed in the manifest)
- Complex matrices with complete buffer/additive disclosure (subject to feasibility review)
- 2–3 documented freeze–thaw cycles

9.3 Salvage Options

- Depending on matrix and sample condition, additional clarification (re-centrifugation/filtration), controlled dilution, or resubmission of backup aliquots may be recommended. Some degradation is not reversible; the best mitigation is proper clarification, single-use aliquots, and maintained cold chain.

10. FAQ for Submission

Q: Serum vs plasma—what should I use?

A: Use one matrix consistently within a study. Plasma requires anticoagulant documentation. Serum requires complete clotting and removal of fibrin/clots.

Q: Do you accept heparin plasma?

A: Heparin may be accepted but can introduce analyte- or assay-dependent interference. Document clearly and request feasibility/risk review when appropriate.

Q: Do I have to centrifuge before shipping?

A: Yes. Clarification is strongly recommended and may be required; it reduces particulates that can clog filters and improves consistency.

Q: What centrifugation conditions should I use to separate serum/plasma?

A: Use a refrigerated centrifuge at 1,000–2,000 × g for 10 min.

Q: How should I clarify thawed samples?

A: If samples are visibly turbid or contain particulates after thawing, clarify at 12,000–16,000 × g for 10 min at 2–8°C prior to analysis.

Q: How many freeze–thaw cycles are acceptable?

A: Avoid multiple freeze–thaw cycles. 0–1 is preferred; 2–3 is conditional with documentation; >3 or unknown is high risk.

Q: My samples look visibly turbid or contain particulates after thawing—what should I do?

A: Re-centrifuge to clarify. If visibly turbid or contain particulates persists, contact our technical support team and consider filtration (document the step).

Q: When should I ship?

A: Plan shipments to arrive on a business day and avoid weekend/holiday delays. Monday to Thursday with overnight priority shipping is recommended when possible.

Q: Do you accept unusual matrices (CSF/BALF/tissue lysate)?

A: Often possible after feasibility review. Provide buffer/additive information and clarify thoroughly before freezing.

11. Appendices (Checklists and Templates)

Appendix A — Printable Submission Checklist

- ✓ Tubes labeled with unique Sample ID
- ✓ Manifest completed and matches tube labels
- ✓ Samples clarified (centrifuged; filtered if needed)
- ✓ Single-use aliquots prepared
- ✓ Freeze–thaw count documented
- ✓ Samples stored frozen (-80°C preferred) until shipment
- ✓ Shipment planned to arrive on a business day
- ✓ Three-layer packaging with absorbent material
- ✓ Tracking number + manifest emailed on the day of shipment

Appendix B — Sample Manifest Template (CSV/XLSX Recommended)

Sample ID	Matrix/Anticoagulant	Species	Group/Treatment	Timepoint	Volume	Storage temp	Freeze–thaw cycles	Notes	Biosafety/Hazard

Appendix C — Shipment Notification Email (Copy/Paste)

Subject: Shipment Notification – Luminex Panel Samples

- ✓ Carrier & Tracking #: …
- ✓ Ship date / ETA: …
- ✓ Temperature condition: Dry ice (xx kg) / Cold packs
- ✓ # of tubes: …
- ✓ Manifest attached: Yes (CSV/XLSX/PDF)
- ✓ Notes: (anticoagulant type, hemolysis/lipemia, complex matrix, filtration performed)