sCellTisu™

Ambient Solid-Tissue Stabilization Medium for Single-Cell Multi-Omics

RESEARCH USE ONLY (RUO)

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1. PRODUCT OVERVIEW & MECHANISM

sCellTisu™ is an ambient transport and stabilization solution designed for solid human and murine tissue biopsies destined for single-cell RNA sequencing (scRNA-seq), single-nucleus RNA sequencing (snRNA-seq), and spatial transcriptomics.

Unlike crosslinking fixatives (formalin/PFA) or harsh precipitants (standard RNAlater™), sCellTisu™ stabilizes cellular physiology through a proprietary, non-crosslinking organic-osmoprotective stabilization matrix. It halts transcriptional activation and denatures endogenous ribonucleases while preserving the extracellular matrix (ECM) in a native, enzymatically accessible conformation. Following a brief centrifugal washout, the preservative is removed completely, restoring tissue digestion kinetics, cell viability (≥ 88%), and surface epitope integrity for microfluidic single-cell partitioning.

2. CORE VALUE & UNIQUE SELLING PROPOSITIONS (USPS)

- **Guaranteed Enzymatic Dissociability:** Zero aldehyde crosslinking. Avoids insoluble methylene bridge networks; tissue digests smoothly using standard dissociation cocktails without mechanical micro-shearing.
- **Instant Transcriptional & Ischemic Arrest:** Stops warm ischemia and cold-shock transcriptional artifacts within minutes of immersion, completely suppressing stress markers (*FOS*, *JUN*, *ATF3*, *HSP90*).
- **Irreversible Ambient RNase Inactivation:** Incorporates a stable, non-volatile catalytic ribonuclease reducer alongside multi-dentate ion scavengers to neutralize ribonucleolytic disulfide linkages and lock RNA integrity (RIN ≥ 8.0; DV200 ≥ 85%) for up to 72 hours at 15°C–25°C.
- **Complete Cold-Chain Elimination:** Eliminates wet ice, dry ice dewars, and temperature-logged freight. Mitigates courier delays and avoids costly logistical failures.
- **Broad Platform Interoperability:** Validated for 10x Genomics Chromium (3', 5', Multiome), BD Rhapsody™, Smart-seq3, and spatial arrays (10x Visium).

3. THE CLINICAL CHALLENGE VS. SCELLTISU™ SOLUTION

Parameter	Wet Ice	Flash-Frozen (LN_2)	Formalin / FFPE	sCellTisu™
Transit Stability	< 2–4 hours window	Sublimation hazard (-80°C)	Ambient storage	**Ambient (15°C–25°C), 72h**
ECM Crosslinking	None	None	Heavy covalent methylene	**Zero (Fully reversible)**
Enzymatic Dissociation	High (if fresh)	Unusable (requires snRNA)	Severely refractory	**100% Retained post-wash**
Single-Cell Viability	Rapid linear decline	Lysis upon thawing	0% viable cells	**≥ 88% after 72h storage**
Stress Artifacts	High induction	Low (rapid freeze)	Severe adduct distortion	**Instant metabolic lock**

4. PHYSICAL & CHEMICAL SPECIFICATIONS

Physical Appearance	Clear, colorless, particulate-free sterile liquid
Working pH (at 22°C)	7.35 ± 0.05 (Physiological isotonic zwitterionic buffer system)
Active Stabilizer Matrix	Proprietary patent-pending multi-component stabilization matrix (Non-crosslinking polyol/cosolvent system, irreversible catalytic RNase-arresting complex, multidentate cation scavenger, macromolecular membrane osmoprotectants)
Biological Additives	**100% BSA-Free**, Animal-Free, Detergent-Free, Serum-Free
Sterility & Endotoxin	0.22 µm PES vacuum-filtered; Autosterile (intrinsically bacteriostatic & fungicidal)
Recommended Ratio	1:10 to 1:20 tissue-to-volume ratio
Ambient Shelf Life	18 months from Date of Manufacture (stored sealed at 15°C–25°C)

5. EMPIRICAL PERFORMANCE BENCHMARKS (72H STORAGE AT 22°C)

Quality Metric	0h Fresh Tissue (Control)	sCellTisu™ (72h Ambient)	Conventional Dehydration Reagent
Cell Recovery Yield	$1.20 \times 10^5 \pm 0.15$ cells/mg	**$1.14 \times 10^5 \pm 0.11$ cells/mg**	$0.32 \times 10^5 \pm 0.07$ cells/mg (Incomplete digestion)
Post-Wash Viability (AO/PI)	91.5% ± 2.0%	**88.5% ± 2.6%**	52.3% ± 5.8% (Extensive cell shear)
RNA Integrity Number (RIN)	9.2 ± 0.3	**8.6 ± 0.4**	6.1 ± 0.7
Ambient RNA Leakage (SoupX)	2.2%	**2.9%**	16.4% (Severe background contamination)
Immediate Early Genes (*FOS/JUN*)	High induction (> 4.2-fold)	**Basal control (0.02-fold shift)**	Variable transcriptional induction

6. TWO-PHASE OPERATIONAL PROTOCOL

Phase A: Clinical Collection & Specimen Immersion

Excise needle core biopsy (14G–18G) or slice surgical tissue into pieces ≤ 3 mm thickness. Immediately submerge tissue into a pre-filled vial of sCellTisu™ at a minimum 1:10 ratio. Invert 3–5 times. Seal vial tightly and ship under ambient conditions (15°C–25°C). Do not freeze or place on ice.

Phase B: Receiving Core Laboratory Rehydration & Single-Cell Digestion

1. **Decant & Washout (2 Cycles):** Transfer tissue into 5 mL cold (4°C) 1× DPBS supplemented with standard wash buffer (0.04%–1.0% BSA). Invert gently for 3 minutes, pellet at 200 × g for 2 minutes, and discard supernatant to thoroughly wash away transport matrix components.
2. **Enzyme Digestion:** Resuspend washed tissue in your laboratory's standard dissociation cocktail (e.g., Collagenase IV, Dispase II, or Liberase TL). *Crucial Step:* Supplement the reaction cocktail with standard divalent cation reactivation supplements (physiological Ca^{2+}/Mg^{2+} supplementation) to restore full enzymatic digestion kinetics. Incubate at 37°C for 25–40 minutes.
3. **Straining:** Pass cell suspension through a 40 µm nylon mesh. Quantify viability via AO/PI staining and load directly onto the microfluidic cartridge.

7. ORDERING INFORMATION

Catalog No.	Product Description	Packaging Configuration
RVN-SCT-1.5	sCellTisu™ Ambient Stabilization Vials (1.5 mL)	10 pre-filled leak-proof vials
RVN-SCT-3.0	sCellTisu™ Ambient Stabilization Vials (3 mL)	10 pre-filled leak-proof vials