

BeatBox Tissue Kit 24x & iST 8x

Formalin-fixed, paraffin-embedded (FFPE) tissue | FFPE punches

Introduction

Formalin-fixed, paraffin-embedded (FFPE) tissues are a valuable source of information, but also a challenging matrix for bottom-up proteomic studies. The PreOmics® FFPE sample preparation solution provides an easy-to-use and robust workflow that allows a deep insight into the tissue proteome in a few steps and with minimal hands-on time. For sample-specific protocols and optimization, visit www.preomics.com/resources or contact info@preomics.com.

Protocol

This protocol outlines the complete workflow for proteomic sample preparation, including BeatBox®-based tissue homogenization and protein extraction, followed by protein reduction, alkylation, digestion, and subsequent peptide purification. It describes FFPE sample preparation using the BeatBox Tissue Kit 24x (P.O.00128), iST 8x kit (P.O.00001), and additional washing buffer WASH 0 (P.O.00095). For additional labware needed, please see the “Pre-Requisites” section below.

Material

Component	Cap	Quantity	Buffer Properties	Description	Storage	
iST Kit 8x (P.O. 00001)			Organic	Acidic	Basic	Neutral
DIGEST	●	2x				Trypsin/LysC mix to digest proteins. -20°C
RESUSPEND	●	1x 2 mL			●	For reconstituting lyophilized proteolytic enzymes. RT
LYSE	●	1x 1 mL		●		For denaturing, reducing, and alkylating proteins. RT
STOP	●	1x 1 mL	●	●		For stopping enzymatic activity. RT
WASH 1	●	1x 2 mL	●	●		For removing hydrophobic contaminants. RT
WASH 2	●	1x 2 mL		●		For removing hydrophilic contaminants. RT
ELUTE	●	1x 2 mL	●		●	For eluting peptides from the cartridge. RT
LC-LOAD	○	1x 1 mL		●		For loading peptides on reversed-phase LC-MS column. RT
CARTRIDGE		8x				Cartridges with SPE sorbent for cleaning up peptides from 1–100 µg protein starting material. RT
WASTE TUBE		8x				2 mL tube for collecting waste after washing steps. RT
COLLECTION TUBE		8x				1.5 mL tube for collecting peptides after elution. RT
ADAPTER		8x				Enables a cartridge to be placed into a tube. RT

Additional reagents, kits and instruments from PreOmics:

WASH 0 (P.O.00095)	10 mL	● ●	For removal of remaining paraffin. Please order 1x WASH 0 buffer 10 mL (P.O.00095) from PreOmics, or ask for the buffer recipe at info@preomics.com .	RT
LYSE (P.O.00032)	20 mL	●	Additional LYSE buffer needed for homogenization. Please order the buffer in addition to the iST and BeatBox kits from PreOmics.	RT
BeatBox instrument (P.O.00144)			Tissue homogenizer with accessory kit.	
BeatBox Tissue Kit 24x (P.O.00128)			Consumables for protein extraction on the BeatBox in 24-tube format.	

Pre-Requisites

Common lab equipment is required for the sample preparation.

Consumables	Quantity and Description
REACTION TUBE	1.5 mL microcentrifuge low protein binding tubes are recommended (e.g., Eppendorf Protein LoBind® Tubes, catalogue number EU: 0030108116, US: 022431081).

Equipment	Quantity and Description
PIPETTE	Standard single-channel pipettes can be used.
PLASTIC TWEEZERS	For tissue transfer into BeatBox tubes.
HEATING SHAKER	Two separate devices are recommended to support the different temperatures of the LYSE and DIGEST steps.
CENTRIFUGE	Benchtop centrifuge for 1.5 or 2 mL tubes is required for peptide loading, washing, and elution.
VACUUM EVAPORATOR	To evaporate volatile buffers from the eluate before LC-MS.
ULTRASONIC BATH	Optional: can be used to resuspend peptides.
MAGNETIC RACK	Optional: can be used to hold tubes with Gyuto Beads for transferring supernatant.

Sample	Quantity and Description
FFPE tissue	Full formalin-fixed, paraffin-embedded (FFPE) punches, non-deparaffinized. One punch with 0.5–1.0 mm diameter, ~1 mm thickness. For FFPE tissue punches >1 mm in diameter and other FFPE sample types, contact PreOmics.

Procedure



Method

1. HOMOGENIZATION *NOTE1*

For a detailed description and graphical representation on how to use the BeatBox, please refer to the BeatBox Quick Start Manual 24x.

- 1.1. Place FFPE TISSUE in a 2 mL **BEATBOX TUBE** using PLASTIC TWEEZERS (using metallic tweezers can cause loss of **GYUTO BEADS**). Close the **BEATBOX TUBE**.
- 1.2. Place the **BEATBOX TUBE** on the **TUBE ADAPTER** of the BeatBox accessory kit.
CRITICAL To ensure proper movement of all **GYUTO BEADS**, all 24 positions of the rack must be filled with **BEATBOX TUBES** containing **GYUTO BEADS**. Tip: **BEATBOX TUBES** that have already been used can be kept and re-used to fill empty positions in subsequent runs.
- 1.3. Insert the **TUBES** and **ADAPTER** assembly into the **GARAGE** and start the BeatBox run with HIGH power settings for 10 min.
- 1.4. After the BeatBox run is completed, remove the **GARAGE** from the instrument, and the **BEATBOX TUBES** from the **TUBE ADAPTER**. Spin down the **BEATBOX TUBES** (RT; max. 300 rcf; 30 sec).
- 1.5. Add 100 μ L **LYSE**  and close the **BEATBOX TUBE**.  *NOTE2*
- 1.6. Place the **BEATBOX TUBE** on a pre-heated HEATING SHAKER (80–95°C; 1,000 rpm; 10 min). Spin down the **BEATBOX TUBES** (RT; max. 300 rcf; 30 sec) and let them cool to room temperature.
- 1.7. Repeat BeatBox run, steps 1.2–1.4.

2. LYSE

- 2.1. Place the **BEATBOX TUBES** on a pre-heated HEATING SHAKER (80–95°C; 1,000 rpm; 1 h).  *NOTE3*
- 2.2. Spin down the **BEATBOX TUBES** (RT; max. 300 rcf; 30 sec).
- 2.3. Optional: Place the **BEATBOX TUBES** on a MAGNETIC RACK.
- 2.4. Let samples cool down to room temperature.
If intact tissue is still visible, repeat BeatBox run (steps 1.2–1.4) and optional, the boiling step (steps 2.1–2.2).
Make sure that lids are tightly sealed.
- 2.5. Transfer the full homogenate into a clean REACTION TUBE for subsequent processing or analysis workflows.
CRITICAL The hardened paraffin might form a film on the supernatant or tube wall and should be left in the **BEATBOX TUBE** when transferring the homogenate.

3. DIGEST

- 3.1. Optional: Measure protein concentration. BCA-RAC assay can be used. Visit our FAQ for recommendations on protein quantitation assays. ***CRITICAL*** The samples should be vortexed prior to protein quantitation. Do not centrifuge or allow particles to settle. Use no more than 100 μ g of protein for digestion.
- 3.2. Add the well mixed homogenate with up to 100 μ g of extracted protein in a final volume of 50 μ L into a REACTION TUBE.
If the volume is <50 μ L, fill up to 50 μ L with **LYSE** .
CRITICAL The samples should be vortexed prior to digestion. Do not centrifuge or allow particles to settle.
- 3.3. Add 210 μ L **RESUSPEND**  to **DIGEST**  (1 tube for 4 reactions) and shake (RT; 500 rpm; 10 min).
- 3.4. Add 50 μ L **DIGEST**  to each TUBE and place it in a pre-heated HEATING SHAKER (37°C; 500 rpm; 3 h).  *NOTE4*
- 3.5. Spin down droplets (RT; 300 rcf; 30 sec).
- 3.6. Add 100 μ L **STOP**  to each sample, shake (RT; 1000 rpm; 1 min), and pipette up/down.  *SP*
- 3.7. Assemble **ADAPTER** and **CARTRIDGE** onto the top of **WASTE TUBE**. Label all tubes and transfer sample to the **CARTRIDGE**.

4. PURIFY

- 4.1. Centrifuge the **CARTRIDGE** at 3,800 rcf for 1–3 min. If needed, adjust time to ensure complete flow-through.
- 4.2. Add 200 μ L **WASH 0** (pink circle) to **CARTRIDGES**, repeat step 4.1.
- 4.3. Add again 200 μ L **WASH 0** (pink circle) to **CARTRIDGES**, repeat step 4.1.
- 4.4. Add 200 μ L **WASH 1** (blue circle) to **CARTRIDGES**, repeat step 4.1.
- 4.5. Add 200 μ L **WASH 2** (green circle) to **CARTRIDGES**, repeat step 4.1.
- 4.6. Transfer assembled **ADAPTER** and **CARTRIDGE** onto clean **COLLECTION TUBE**. Discard **WASTE TUBE**. Label all tubes.
- 4.7. Add 100 μ L **ELUTE** (pink circle) to **CARTRIDGE**, repeat step 4.1, keep flow-through in **COLLECTION TUBE**.
- 4.8. Repeat step 4.7, keep flow-through in the same **COLLECTION TUBE**.
- 4.9. Discard **CARTRIDGES** and place **COLLECTION TUBE** in a VACUUM EVAPORATOR (45°C; until completely dry). *SP*
- 4.10. Reconstitute peptides by adding **LC-LOAD** (white circle) to **COLLECTION TUBE**. Adjust the volume according to specific requirements.
For example, add 50 μ L **LC-LOAD** to 100 μ g protein starting material.
- 4.11. Sonicate **COLLECTION TUBE** in an ULTRASONIC BATH (5 min) or shake (RT; 500 rpm; 5 min).
- 4.12. Spin **COLLECTION TUBE** in a CENTRIFUGE (RT; 16,000 rcf; 5 min), transfer the supernatant to a clean vial and avoid touching the bottom of the collection tube during transfer. *NOTE5*

NOTE1

SINGLE USE ONLY: Each BEATBOX TUBE and GYUTO BEAD can be used only once. Total runtime per TUBE is recommended not to exceed 40 minutes, regardless of the settings used.

NOTE2

For sample homogenization, your own buffer (see FAQs for composition compatibility and limitations) can be used. If your lysis buffer contains >0.1% SDS, SDS removal with the SP3-iST add-on is required before continuing with the iST protocol. For a modified protocol using the SP3-iST kit, contact info@preomics.com.

NOTE3

The sample temperature reached inside the tubes may vary between different heating shaker models. At very high temperatures, the tube lid may burst open due to high vapor pressure. To avoid sample loss, perform a test run with lysis buffer to identify the highest possible temperature for your heating shaker setup. Please do not use a heated lid.

NOTE4

Resuspended DIGEST can be stored for up to two weeks at 4°C. For longer storage periods, visit our FAQ.

NOTE5

At this point, peptide concentration can be measured or the sample directly injected for LC-MS analysis. Visit our FAQ for recommendations on peptide quantitation assays.

***SP* - Storage Point:**

Peptides can be frozen at -20°C for two weeks. Dried peptides before reconstitution in LC-LOAD can also be stored long-term at -80°C.

Data analysis

Consider the following as fixed modifications in your database search:

MODIFICATION	DESCRIPTION	COMPOSITION	SPECIFICITY	MASS	UNIMOD #
ALKYLATION	Carbamidomethyl on cysteine	C_2H_3NO	[C]	+57Da	4

For answers to frequently asked questions, please visit our FAQ page at www.preomics.com/faq.

For our General Terms and Conditions, refer to www.preomics.com.

For trademark information, visit www.preomics.com/legal/trademarks.