

# Streamline biospecimen preservation & extraction

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## Introduction

Presently there is a significant amount of heterogeneity in the methods used to collect, process, store, and extract biospecimens for molecular analyses. Improper handling of biospecimens may artificially introduce molecular changes in the biospecimens, often times without the knowledge of the researchers, which in turn can lead to false research findings or wrong diagnoses.

To simplify biospecimen processing, reduce processing heterogeneity, and eliminate artificial molecular changes arising from biospecimen handling, we have developed a one-of-the-kind aqueous preservative, AquaPreserve, which can preserve biospecimens and extract DNA, RNA, and proteins from the preserved biospecimens.

Therefore, it may be used to streamline the entire biospecimen pre-analytical workflow, from collection, stabilization, transport, storage, to extraction.

### Comparison of biospecimen preservation methods

	Aqua Preserve	Formalin	RNAlater	Trizol
<b>Mech'sm</b>	Inactivate enzymes	Inactivate enzymes	De-hydration	Phenol Chl'form
<b>Extract</b>	Yes	No	No	Proteins?
<b>X-link</b>	No	Yes	No	No
<b>Odor</b>	No	Yes	No	Toxic
<b>Store at</b>	22 to -80	22	22	-80
<b>Kill pathogen</b>	Yes	Yes	No	Yes
<b>Preserve structure</b>	Yes?	Yes	Yes?	Not

## Methods

Four mice (CD1, male, 5 weeks old) were sacrificed by cervical dislocation to harvest the liver tissues. Each liver was weighed and dissected into 10 pieces (~100 mg each) with a pair of scissors in a beaker on ice. The liver tissues were stored at different temperatures (-80, 4, and 22 °C) with and without AquaPreserve for 7 days. Subsequently, DNA/RNA/proteins were extracted by homogenizing the tissues with a Precellys bead beater, recovered from the cleared lysate by isopropanol and acetone precipitation, and then analyzed by agarose gel electrophoresis and UV spectrophotometry. The preservation and extraction protocol is outlined in the table below.

### Protocol for Biospecimen Preservation and Extraction

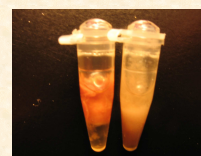
- (1) Collect the specimen
- (2) Place the specimen in AquaPreserve
- (3) Store the specimen at room temperature
- (4) Homogenize the specimen
- (5) Recover the clear lysate
- (6) Precipitate the DNA and RNA
- (7) Precipitate the proteins



## Results

### Can AquaPreserve preserve biospecimen?

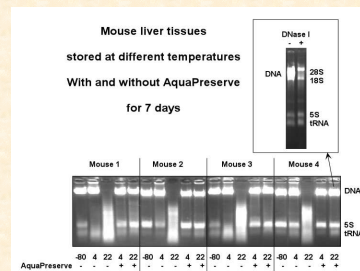
Mouse liver tissues stored in AquaPreserve at 22 °C for 7 days remained intact, while liver tissues stored in PBS under the same condition became completely degraded.



**Gross anatomy of liver tissues preserved in AquaPreserve and PBS.** Fresh mouse liver tissues (~100 mg) were submerged in 0.2 ml AquaPreserve (left) or PBS (right) and stored at 22 °C for 7 days.

### Can AquaPreserve preserve biomolecules?

DNA and RNA extracted from mouse liver tissues preserved in AquaPreserve remained intact, while those extracted from tissues without AquaPreserve were highly degraded.



**DNA/RNA integrity of mouse liver tissues.** Mouse liver tissues were stored at -80, 4, and 22 °C with and without AquaPreserve for 7 days and then their DNA/RNA were extracted and analyzed by gel electrophoresis.

## Conclusion

**1. AquaPreserve not only can preserve biospecimen but also extract biomolecules.** Therefore, a single AquaPreserve may be used to standardize and streamline the entire biospecimen workflow, from biospecimen collection, stabilization, transport, storage, to extraction without needing additional extraction kits.

**2. AquaPreserve stabilizes biospecimen without damaging the biomolecules.** AquaPreserve stabilizes biospecimen by inactivating degradative enzymes without causing biomolecule crosslinking. And unlike formalin it is odorless.

**3. AquaPreserve allows biospecimen storage at ambient temperatures.** The inconvenient snap freezing, dry ice shipment, and liquid nitrogen or -80 °C frozen storage may all be eliminated by the use of AquaPreserve.

Once fully validated, AquaPreserve could become a mainstay reagent for biospecimen research and it may have a significant impact on researches and applications that are dependent on high quality biospecimens.

## Contact information

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Would you like a free sample of AquaPreserve?

