

Novel Methods for 3D Imaging and Quenching Tissue Autofluorescence

Lead Inventors:

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Background & Unmet Need

- Visualizing cellular structures in the global context of intact organs is critical for deciphering organ function
- However, imaging intact organs is impacted by the following challenges:
 - Biological tissues are not transparent and scatter light
 - Biological tissues are naturally autofluorescent
- These challenges limit the depth of imaging accessible by light microscopy techniques, and make it hard to resolve signal from noise during fluorescent imaging
- **Unmet Need:** Methods to enable improved light penetration and reduced autofluorescence of biological tissues

Technology Overview

- **The Technology:** Two complementary techniques to address current imaging limitations of 3D tissue
 - **Atacama Clear:** Makes tissue optically transparent, enabling 3D imaging of whole organs
 - **Atacama Quench:** Eliminates tissue autofluorescence to improve signal-to-noise ratio
- **PoC Data:**
 - **Atacama Clear:** 50% greater signal-to-noise ratio than CUBIC during imaging of 1mm murine heart sections
 - **Atacama Quench:** 10x more blood vessel signal compared to TrueBlack during immunostaining of a murine brain section
- Tissue preparation protocols are easy to follow and do not require the use of toxic solvents

Inventors:

Romulo Hurtado

Patents:

[US Application Filed](#)

[EP Application Filed](#)

[PCT Application Filed](#)

Publications:

N/A

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Technology Applications

- Optical clearing of tissues for superior 3D imaging of intact biological tissues
- Elimination of autofluorescence to enable visualization of biological markers in basic science and clinical imaging studies

Technology Advantages

- Atacama Clear does not require use of toxic solvents or dehydration with common alcohols
- Atacama Clear clears tough fibrous tissue and preserves fluorescent reporter protein signals
- Atacama Quench eliminates autofluorescence throughout the fluorescent light spectrum
- Atacama Quench preserves tissue integrity and is compatible with follow-up IF studies

Supporting Data / Figures

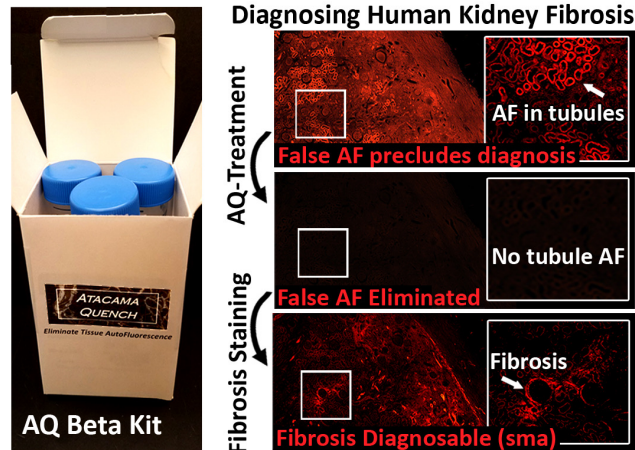


Figure 1: A) Atacama Quench kit consists of 3 chemical solutions. B) Use of Atacama Quench to diagnose fibrosis in a human kidney biopsy. Top panel, natural autofluorescence of biopsy. Middle panel, autofluorescence after treatment with Atacama Quench. Bottom panel, staining of biopsy for fibrosis (smooth muscle actin, red).

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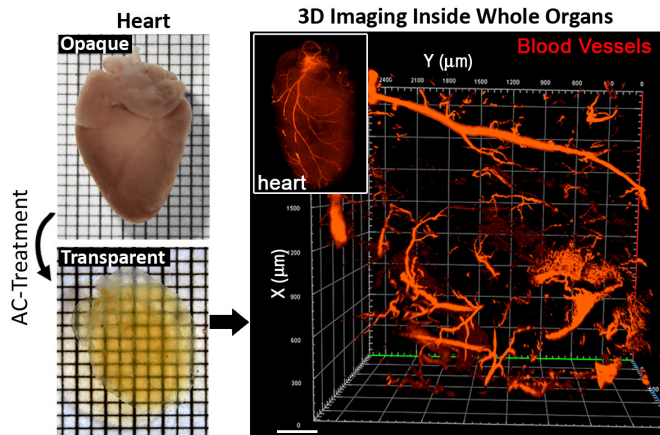


Figure 2: Use of Atacama Clear to optically clear whole organs. Top left panel shows the heart, untreated. Bottom left panel shows the heart after treatment with Atacama Clear. Right panel shows imaging deep inside the heart for cardiac blood vessels.

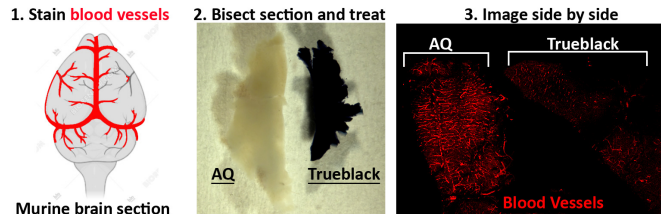


Figure 3: Atacama Quench preserves 10-fold more blood vessel signal than TrueBlack (Biotium), which abrogated the blood vessel staining.

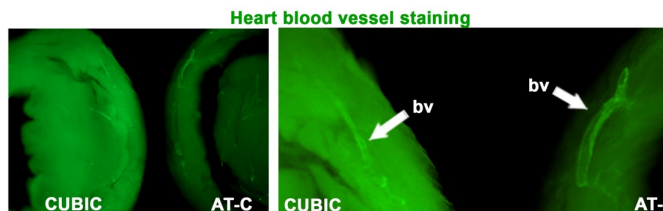


Figure 4: Atacama Clear sections exhibit approximately 50% greater signal-to-noise ratio than CUBIC.

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