Revolutionizing Molecular Research: The e-Biopsy Platform

Accessing high-fidelity molecular data non-destructively from in-vivo models and sensitive tissues.

The Challenge: The Limits of Traditional Biopsy in Research

For decades, research has relied on excisional biopsies (punch, core, or surgical) to analyze tissue. While a gold standard for histopathology, this method presents significant limitations for advanced molecular research:

- **Destructive & Terminal:** The sampling process is inherently destructive, causing significant tissue damage, inflammation, and scarring. This makes it unsuitable for delicate tissues or repeat analysis.
- **Inhibits Longitudinal Studies:** It is impossible to re-sample the exact same tissue site to track disease progression or therapeutic response. A new site must be used, introducing significant variability.
- **Limited Molecular Fidelity:** The process of tissue excision and processing can degrade sensitive molecules like RNA and proteins, compromising downstream analysis.

The Solution: e-Biopsy (Electroporation Puncture Biopsy)

Elsy Medical is a pioneer of the e-Biopsy platform, a transformative technology that extracts pure intracellular material (RNA, proteins, lipids metabolites) without excising tissue or destroying cells.

Using a minimally-invasive fine-gauge needle, the e-Biopsy system delivers a series of precise, high-voltage short pulses. This process, known as non-thermal electroporation, creates temporary, nanoscale pores in the cell membranes, allowing cytosolic contents to be gently aspirated for analysis. The tissue remains intact, and the cells remain viable, enabling repeat sampling and longitudinal studies for the first time.

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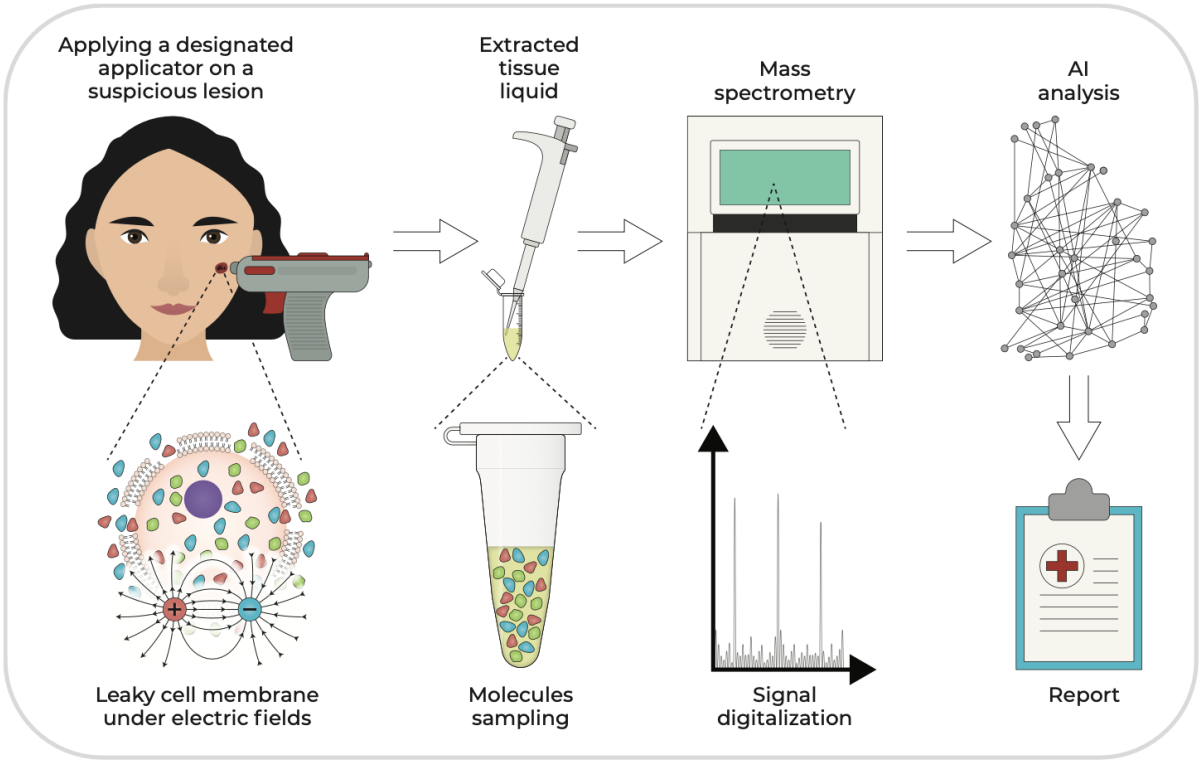

The e-Biopsy Process: (1) A fine-gauge needle is inserted into the target tissue. (2) Precisely controlled high-voltage pulses (electroporation) are delivered, temporarily opening cell membranes. (3) Pure intracellular contents are aspirated for downstream molecular analysis.

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Key Advantages for Research Applications

- **Non-Damaging & Non-Destructive:** Preserves tissue architecture and cell viability. Ideal for sensitive *in-vivo* models and irreplaceable samples.
- **Enable Longitudinal Studies:** Allows for repeat, sequential sampling from the *exact same location* to track molecular changes over time (e.s., therapeutic response, disease progression).
- **High-Fidelity Molecular Samples:** Aspirates a "liquid biopsy" of pure intracellular content, free from tissue-processing artifacts, for highly sensitive NGS, proteomics, and metabolomics.
- **Minimally Invasive:** Uses a fine-gauge needle (e.g., 30G) for a procedure comparable to a simple injection, minimizing trauma and animal welfare concerns.
- **Rapid Workflow:** Moves from *in-vivo* sampling to molecular data in as little as 24-48 hours, versus the weeks required for traditional histopathology.

The e-Biopsy research system, including the High-Voltage Pulse Generator (BHVPG) and the specialized aspiration handheld probe

Core System Specifications

- **Technology:** Electroporation Puncture Biopsy (EPB)
- **Generator:** High-Voltage Pulse Generator (HVPG)
- **Voltage Output:** Up to 1 kV, square shape pulses
- **Pulse Control:** Fully adjustable pulse duration, frequency, and energy delivery
- **Applicator:** Fine-gauge (e.g., 30G) needle-electrode assembly
- **Sample Output:** 2-5 µL of intracellular molecular fluid
- **Downstream Analysis:** Compatible with NGS, rt-PCR, Proteomics, Metabolomics, and AI-driven diagnostic platforms.

Potential Research Applications

The e-Biopsy system unlocks new avenues of investigation that are impossible with traditional destructive methods.

- **Pharmacodynamics (PD) Studies:** Track molecular-level target engagement and therapeutic response *over time in the same tumor* or organ within a single *in-vivo* model.
- **Biomarker Discovery:** Perform deep molecular profiling of hard-to-access tissues (e.g., pancreas, deep-tissue lesions) to discover and validate novel diagnostic or prognostic biomarkers.
- **Oncology Research:** Differentiate benign and malignant lesions at a molecular level (e.g., skin cancer, liver cancer) without the need for excisional biopsy and lengthy histological workups.
- **Regenerative Medicine:** Monitor the molecular profile and health of engineered tissues or graft sites *in-situ* and non-destructively.

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At-a-Glance Comparison

Feature	**Traditional Tissue Biopsy**	**e-Biopsy Platform**
Sample	Tissue Chunk (Excisional)	Intracellular Fluid (Aspirational)
Tissue Damage	High (Destructive, Scarring)	Minimal (Needle Puncture, Viable)
Repeat Sampling	No (Requires new site)	**Yes (Enables longitudinal studies)**
Primary Analysis	Histopathology (Morphology)	Molecular (NGS, Proteomics)
Time-to-Result	4-5 Weeks	**24-48 Hours**

Collaborate With Us

The E-biopsy research platform is available for collaboration and experimental use. We are seeking research partners to explore new applications in oncology, pharmacology, and regenerative medicine.

Contact us to design your next study:

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