

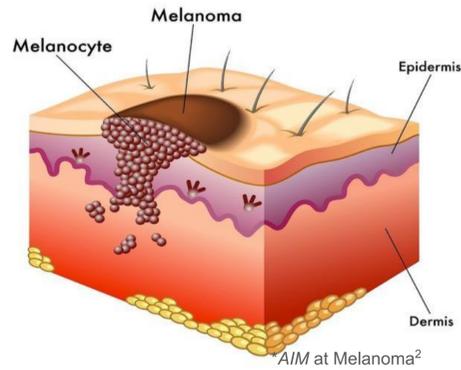
Mela-Know-More

Leveraging tissue mechanics to transform the melanoma screening pathway



JOHNS HOPKINS
BIOMEDICAL ENGINEERING

THE PROBLEM: SUBJECTIVITY IN MELANOMA SCREENING



Melanoma is a form of skin cancer caused by mutations in pigment-producing cells (melanocytes).¹ It presents as **pigmented lesions or moles on the skin**.¹ It is projected to affect **100,640 people in the U.S. in 2024**.¹

Dermatologists rely on **subjective visual cues** to screen for melanoma using a dermatoscope.

Asymmetry
Border
Color
Diameter
Evolving



The lesions highlighted in red are **melanomas**.



The **dermatoscope** is the current clinical gold standard.

This subjectivity results in many unnecessary biopsies.

For every **positive** melanoma biopsy, **26.8** unnecessary skin biopsies are taken.⁵

Effects of screening bias are amplified for patients with darker skin.

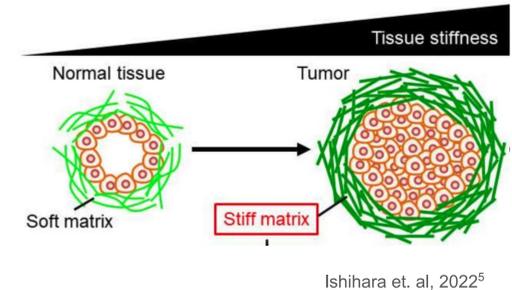


Rate of accuracy in examination and recommendation for biopsy are significantly lower for patients with skin of color.

⁶Medical News Today

OUR APPROACH: TISSUE MECHANICS

Literature shows that **melanoma lesions have greater tissue stiffness** than healthy moles.



To be **clinically applicable**, this property needs to be **quantitatively characterized in situ**.

THE NEED: OBJECTIVITY

Melanoma research specialists need to **quantitatively characterize the mechanical properties of melanoma tissue** to facilitate the development of a **more objective screening pathway**.

Our solution will be:

- ✓ **Noninvasive**
- ✓ **Output quantitative measurement to distinguish melanoma from healthy tissue**
- ✓ **Unbiased by skin tone/color**
- ✓ **Portable, Maneuverable**

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References

1. What is melanoma skin cancer?: What is melanoma? What Is Melanoma? | American Cancer Society. 2024.

2. Understanding melanoma. AIM at Melanoma Foundation. January 17, 2024.

3. Using dermoscopy in skin cancer screenings - asms. American Society for Mohs Surgery. February 23, 2022. 4. Ishihara S, Haga H. Matrix stiffness contributes to cancer progression by regulating transcription factors. MDPI. February 18, 2022.

5. Zhang Y, Moy AJ, Feng X, et al. Assessment of raman spectroscopy for reducing unnecessary biopsies for melanoma screening. Molecules (Basel, Switzerland). 2020;25(12):2852.

6. Skin cancer on Black skin: What it looks like, signs, and more. Medical News Today