



Leadership



Adeela Syed, PhD
OBC SUF Manager

Self Use Facility (SUF)

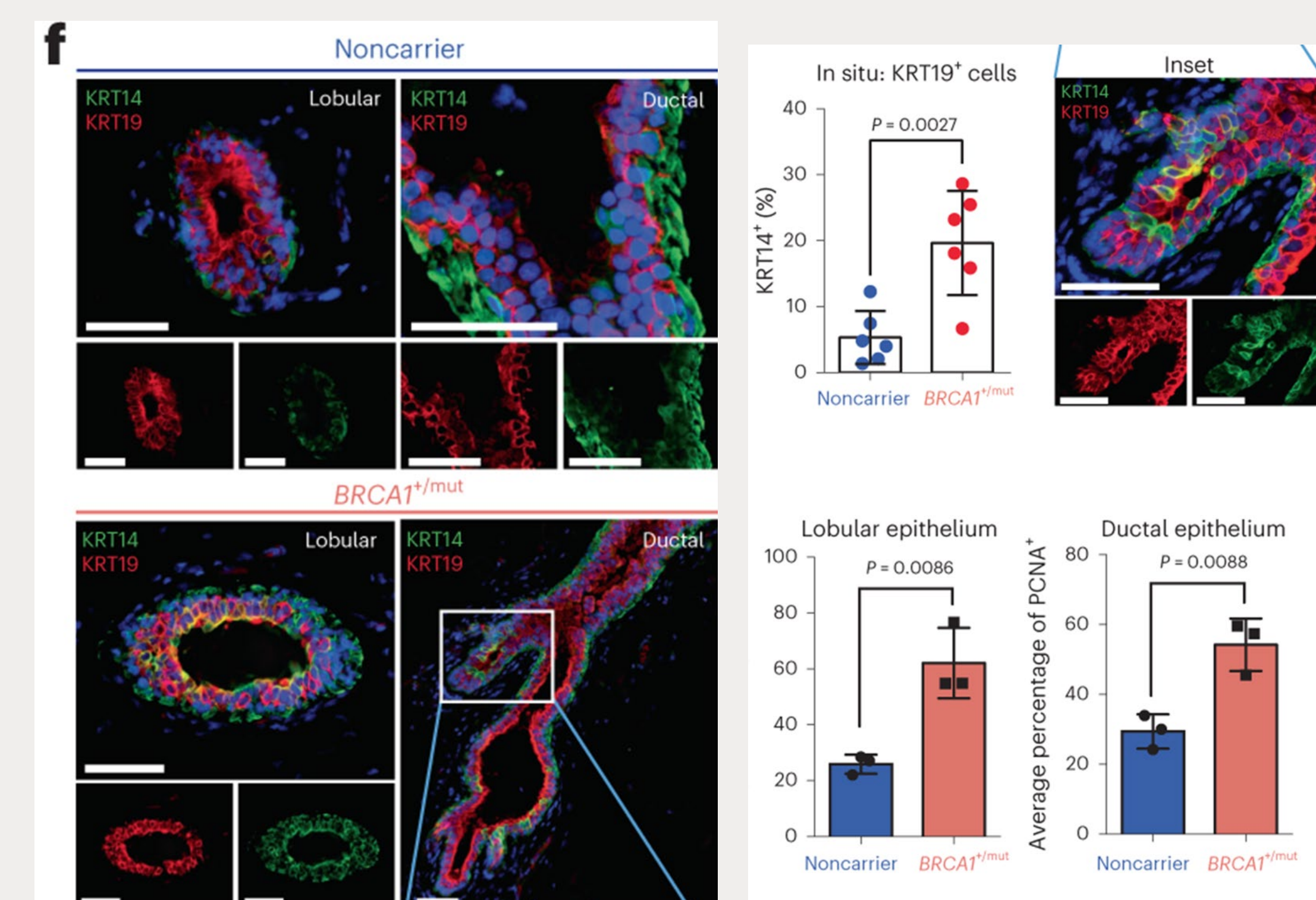
Offers suite of confocal, lightsheet and two photon microscopes that allow everything from deep tissue, whole tissue, confocal, Super Resolution imaging and image analysis

Instruments

- 24/7 access providing comprehensive support, including training, assistance with experimental setup, and data analysis
- 4 confocal microscopes (Zeiss LSM 980, 900, 780 and Leica Sp8) capable of 2 photon microscopy, live imaging,
- Zeiss Z1 Mesoscale Lightsheet for whole tissue imaging
- Zeiss Elyra 7 Super Resolution microscope: Lattice SIM & Single Molecule Localization Microscope
- Workstations for Image Analysis – Imaris, Arivis, ZEN etc

Scientific Highlights

Precancerous stroma in BRCA1+/mut may elevate breast cancer risk through the promotion of epithelial proliferation and an accumulation of luminal progenitor cells with altered differentiation. Nee, K., Ma, D., Nguyen, Q.H. *et al. Nat Genet* 2023 March 13. **55**, 595–606



- KRT14/KRT19-Positive Cells:** In situ immunofluorescence analysis shows a higher percentage of KRT14/KRT19-double positive cells in BRCA1+/mut tissues compared to noncarriers, indicating increased epithelial changes.
- PanCK and PCNA Expression:** Immunofluorescence analysis reveals higher expression of pan-cytokeratin and PCNA in ductal and lobular regions of BRCA1+/mut breast tissues, suggesting increased cellular proliferation.
- PCNA+ Cells:** Bar graphs indicate a significantly higher percentage of PCNA-positive cells in both lobular and ductal regions of BRCA1+/mut patients compared to noncarriers, highlighting elevated proliferative activity.

Leadership



Mihaela Balu, PhD
NLOM Manager

Non-Linear Optics Microscopy (NLOM)

Specializing in multiphoton microscopy-based imaging with large fields of view and rapid scanning, NLOM collaborates on equipment use, development, and protocol design for diagnosing and monitoring skin conditions and therapies.

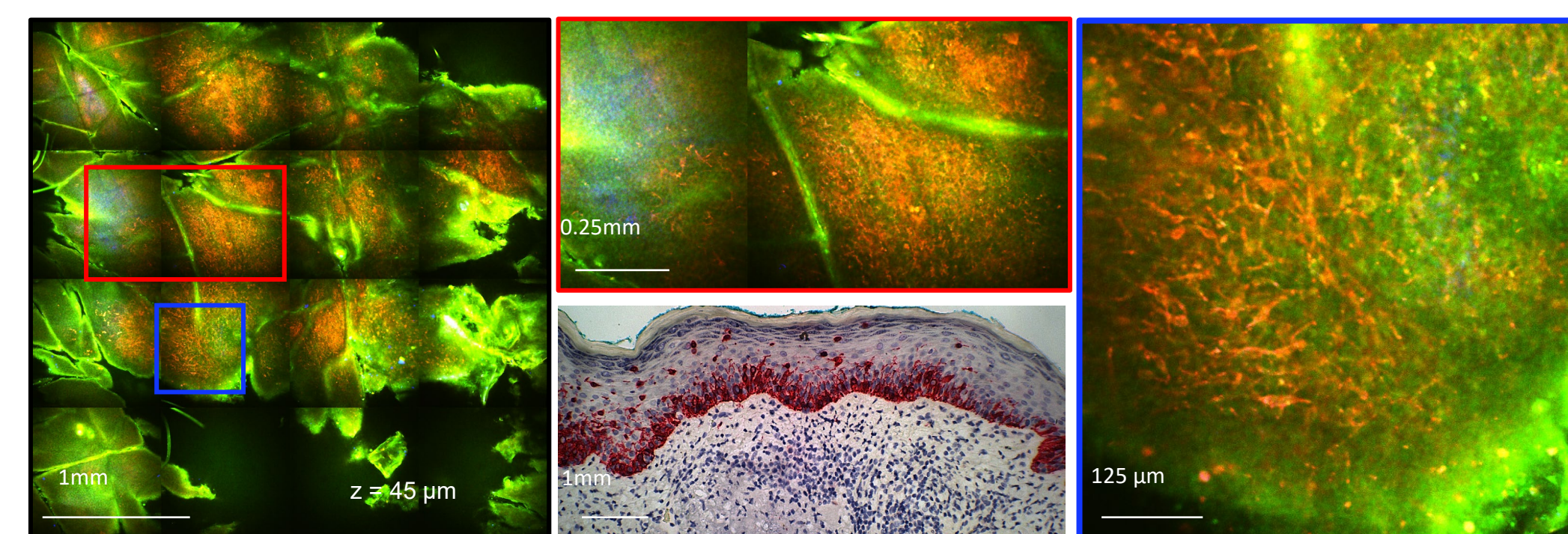
Instruments

Leica SP8 Falcon + coherent anti-Stokes Raman Scattering (CARS) Commercial imaging platform customized to feature the following modalities: confocal fluorescence and two-photon excited fluorescence (TPEF) microscopy, second harmonic generation (SHG), CARS and fluorescence lifetime microscopy.

Scientific Highlights

Label-free non-invasive imaging of melanoma using multiphoton microscopy (MPM): In this study, we investigate the feasibility of a clinical home-built multiphoton microscope (fast, large area multiphoton exoscope: FLAME) to detect non-invasively early melanoma (in situ) in human skin based on label-free molecular contrast provided through time-resolved fluorescence detection from NADH, FAD, melanin, keratin and elastin fibers and second harmonic generation of collagen.

Mihaela Balu, PhD – BIDD & Kristen Kelly, MD – BIDD



FLAME imaging of pagetoid spread in human melanoma. (a) The color coding of the cells is related to their temporal bin detection. Melanocytes and melanoma cells are selectively detected based on the short fluorescence lifetime of eumelanin compared to the fluorescence lifetime of the rest of the fluorophores in human skin. If our current clinical study is successful, this approach will provide a reliable tool for non-invasive, early detection of melanoma in human skin

More Information



Leadership



Michelle Digman, PhD
LFD Manager

Laboratory of Fluorescence Dynamics (LFD)

State-of-the-art research facility dedicated to the development and application of advanced fluorescence microscopy techniques for studying molecular dynamics and interactions in various biological systems.

Instruments

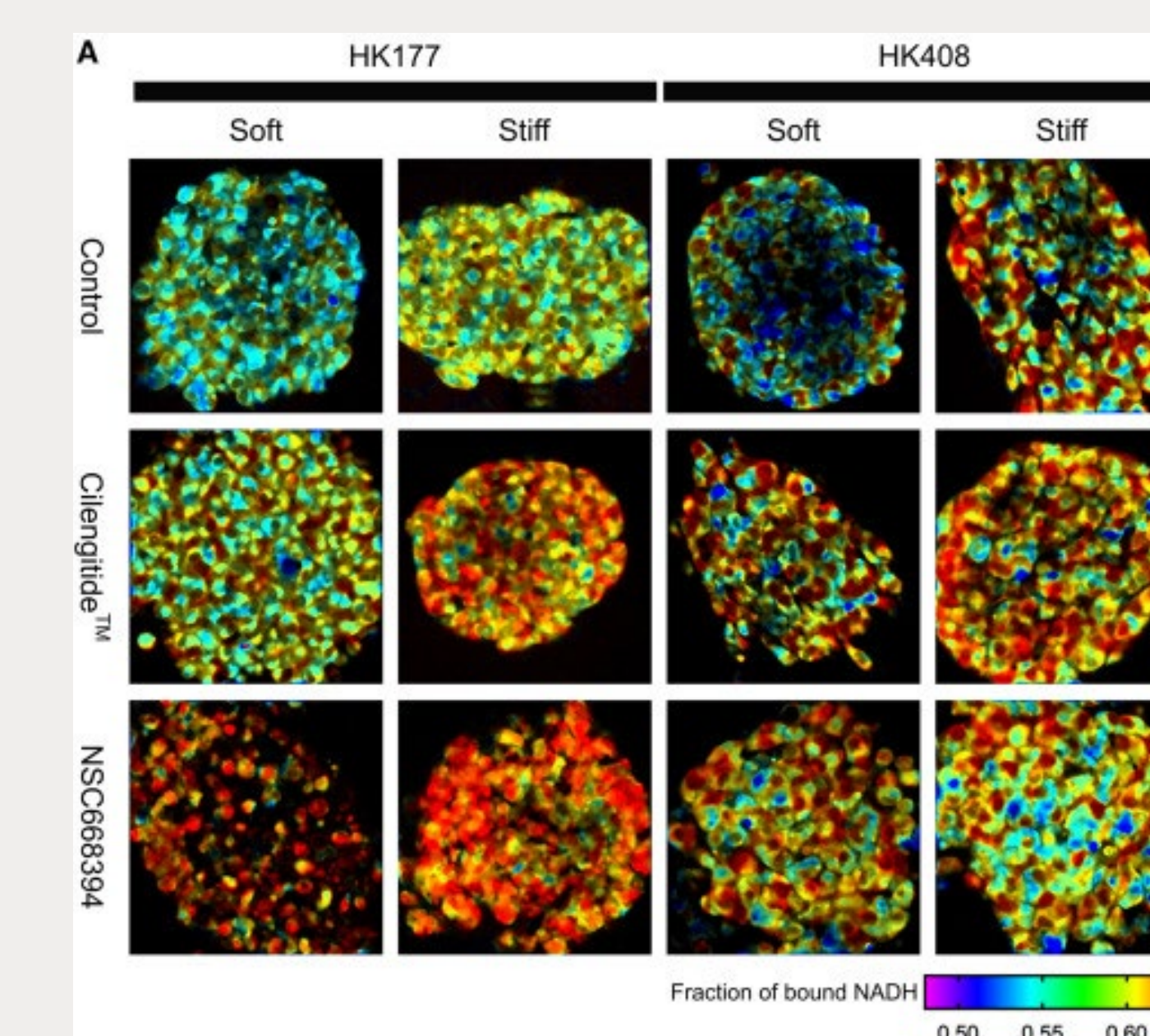
National research resource center for biomedical fluorescence spectroscopy with over 12 instruments for dynamic imaging

- The LFD designs, tests, and implements advances in the technology of hardware, software, and biomedical applications
- Dynamic imaging modalities include: metabolic imaging, NADH metabolism, OXPHOS/Glycolysis, Bioluminescent immune reporters and fluorescence metabolic reporters

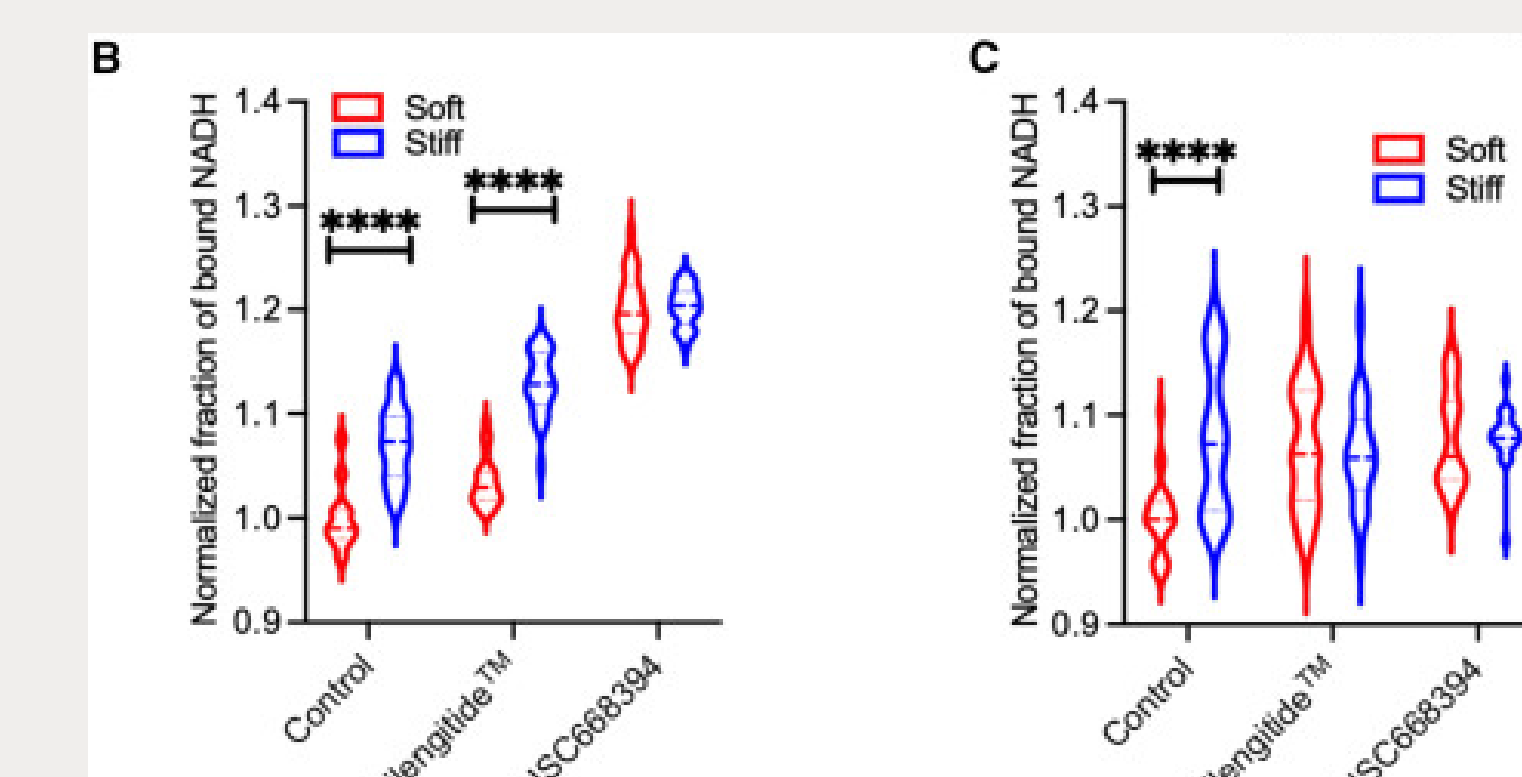
Scientific Highlights

This study highlights the critical role of tumor mechanics in influencing glioblastoma (GBM) cell behavior and metabolism.

Digman *et al.*, Cell Report. 2023 October 31, Volume 42, Issue 10, 10113175



In HK177 glioblastoma cells, the inhibitor NSC668394 increased oxidative phosphorylation (OXPHOS) activity and eliminated metabolic differences between soft and stiff hydrogels, indicating that CD44-ezrin interactions mediate the shift toward glycolysis in softer environments.



For HK408 glioblastoma cells, both cilengitide (CRGD) and NSC668394 increased OXPHOS activity, suggesting that both integrin engagement and ezrin phosphorylation play roles in the metabolic changes induced by mechanical cues.