

A grayscale micrograph of lung tissue, showing a complex network of cells and extracellular matrix (ECM) fibers. The image is dark with bright, fibrous structures that form a dense, interconnected web. The text is overlaid on this image.

# Imaging Cell-ECM Interactions in the Lung Tumor Microenvironment

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**Mentors:** Sylvia Plevritis, Ph.D.; Michael Longaker, M.D.

Stanford Cancer Imaging Training (SCIT) Seminar

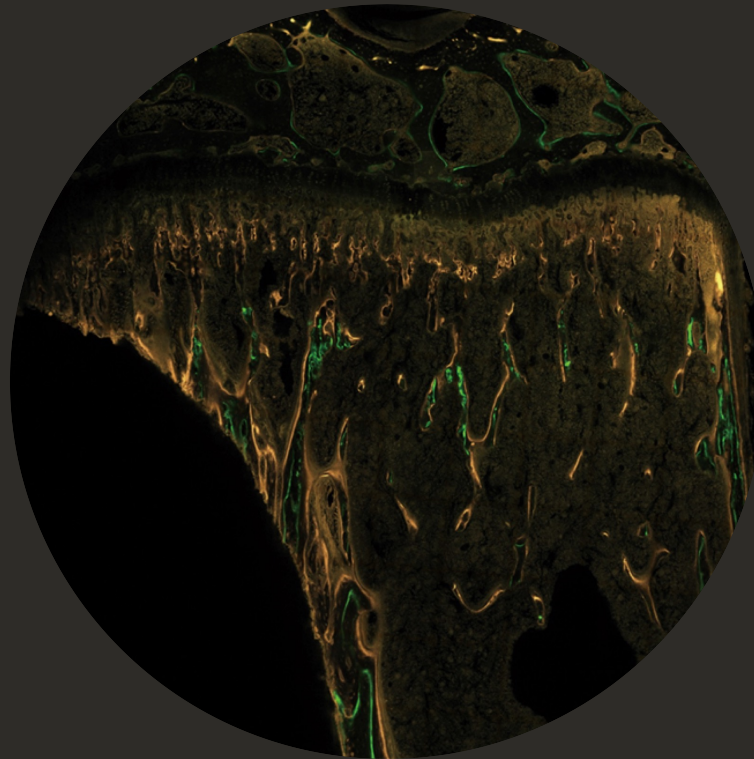
April 7, 2021

# About me: dissertation research

**Cornell  
Engineering**

Ph.D. in Biomedical Engineering  
Mentor: Claudia Fischbach, Ph.D.

## Pre-metastatic bone characterization



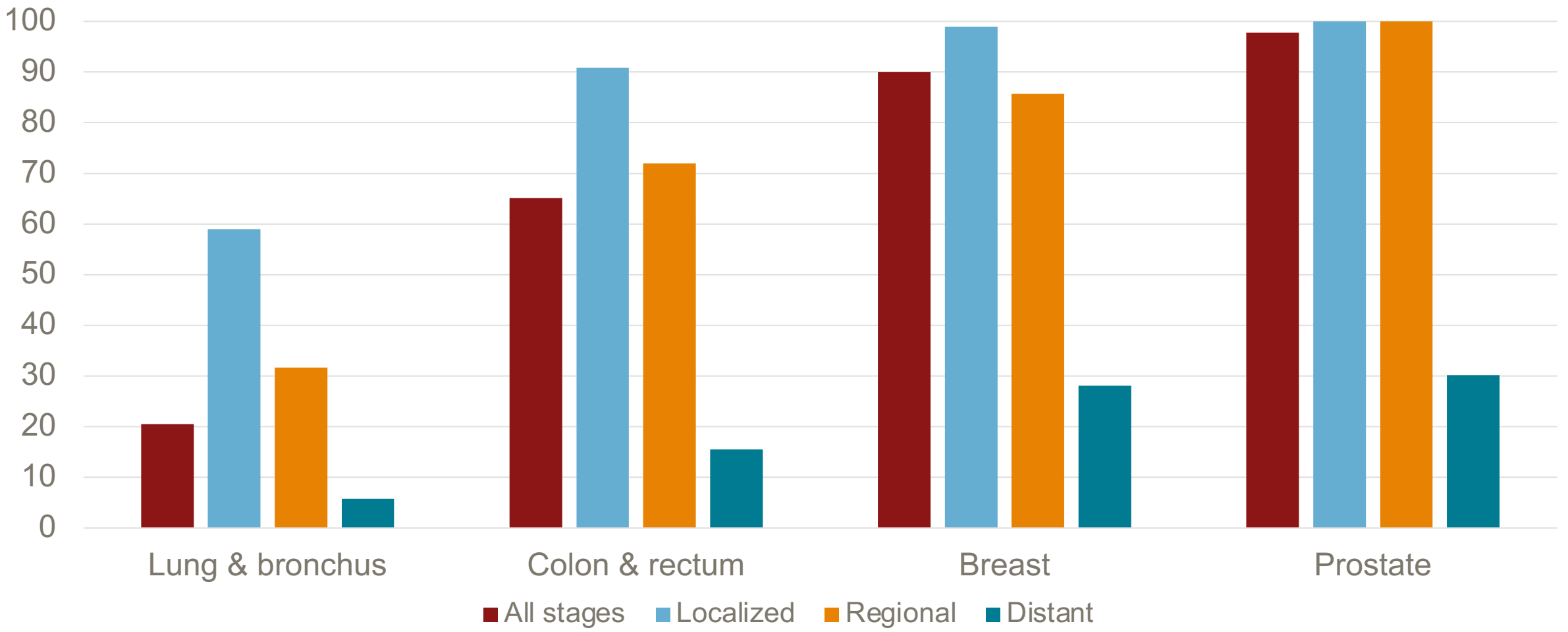
Early-stage breast  
cancer metastasis  
to bone:

## Imaging DTCs in bone

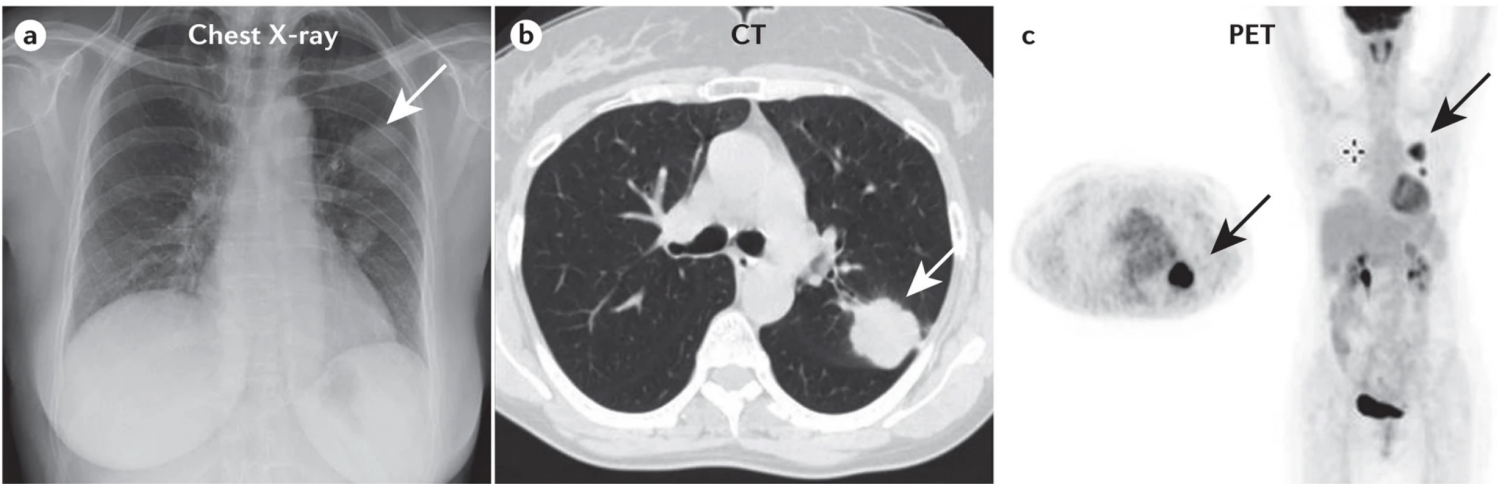


# Lung cancer survival lags behind other common cancers

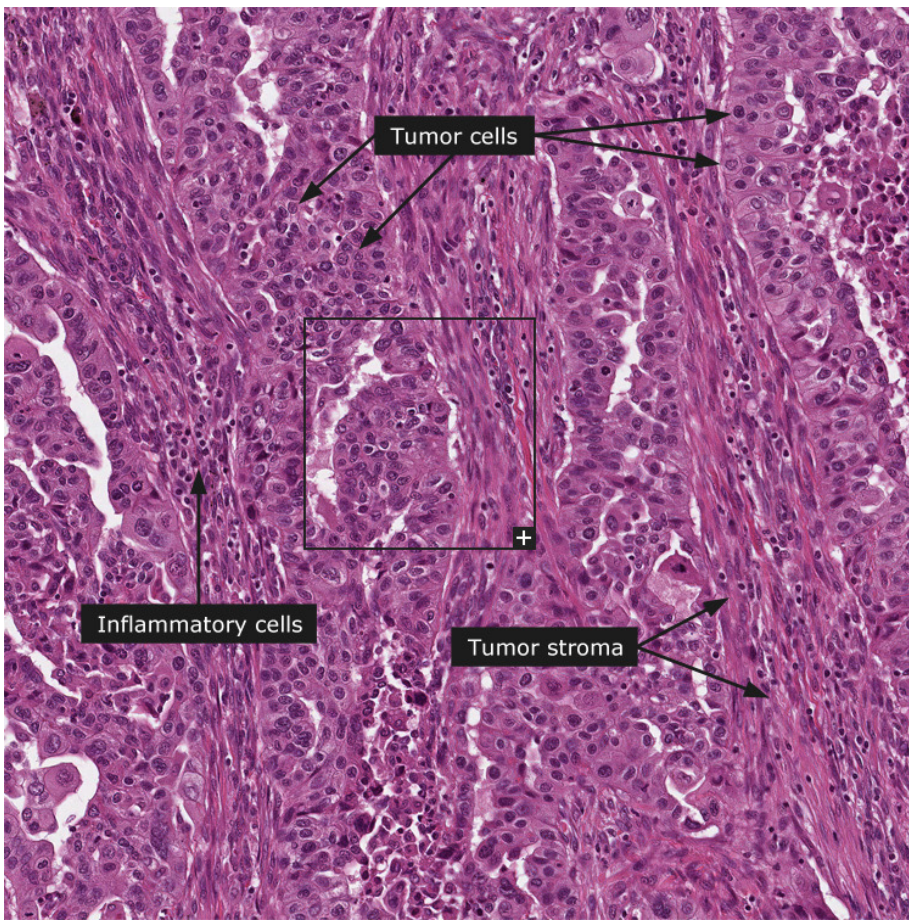
5-year survival rates (%) by cancer site and stage at diagnosis



# Diagnostic imaging and pathology



Gridelli et al., *Nature Rev Dis Primers* 2015

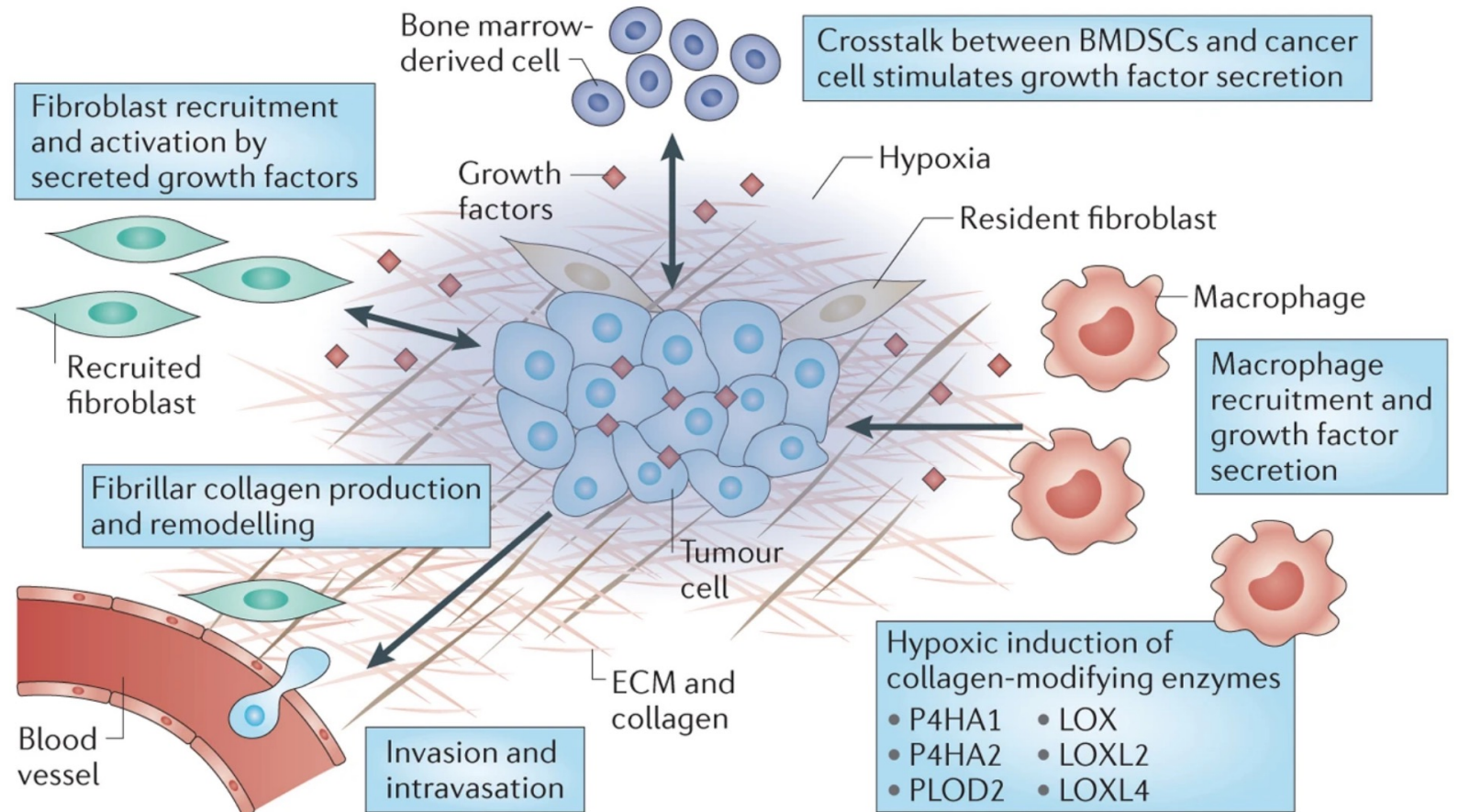


*The Human Protein Atlas*

# The tumor microenvironment as a biomarker

- Tumor cells
- Stroma
  - Immune cells
  - Fibroblasts
  - Other stromal cells
  - Extracellular matrix (ECM)

Which (interactions) are associated with progression?



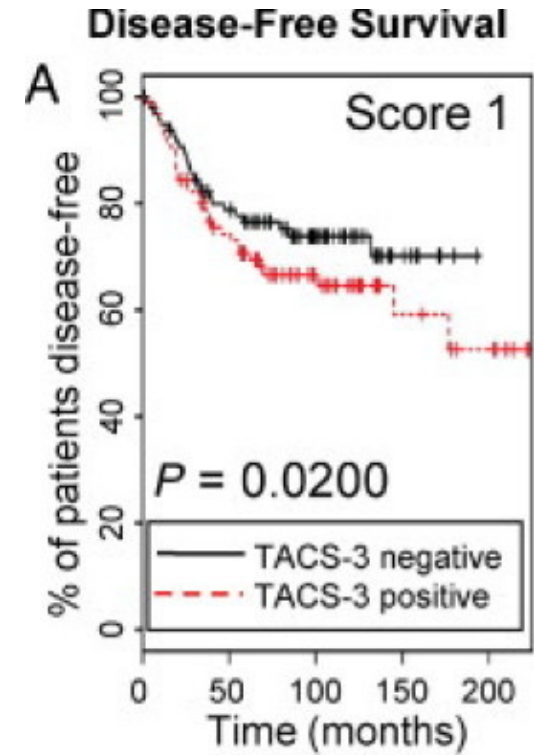
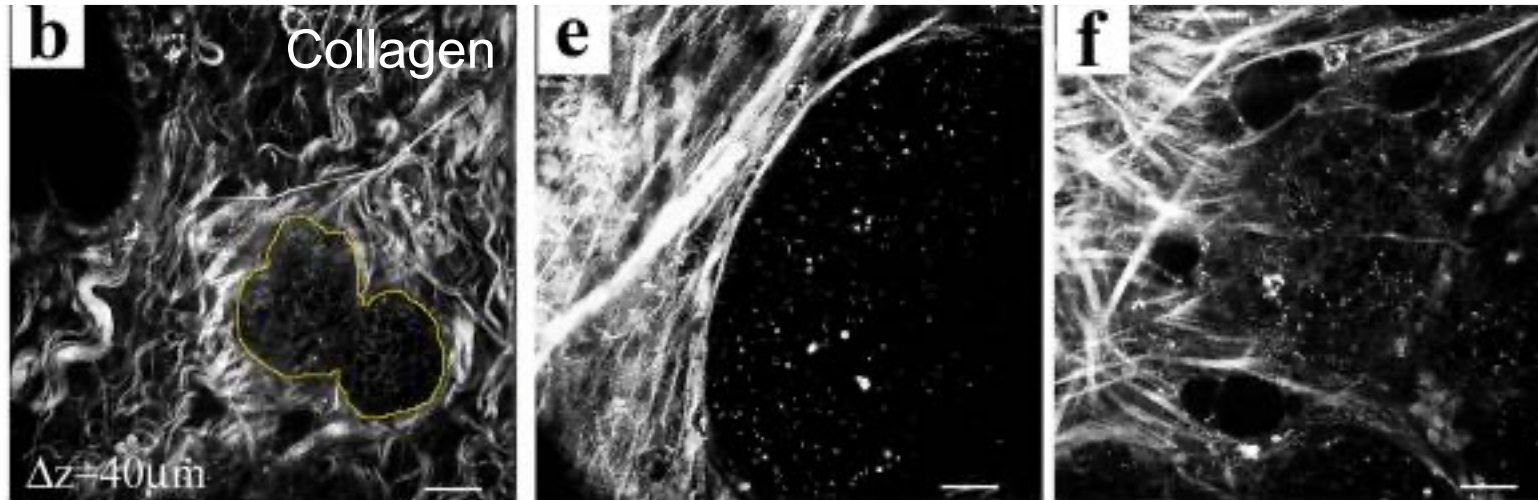
# Aligned collagen is prognostic for breast cancer

**TACS:** tumor-associated collagen signature

**TACS-1**

**TACS-2**

**TACS-3**

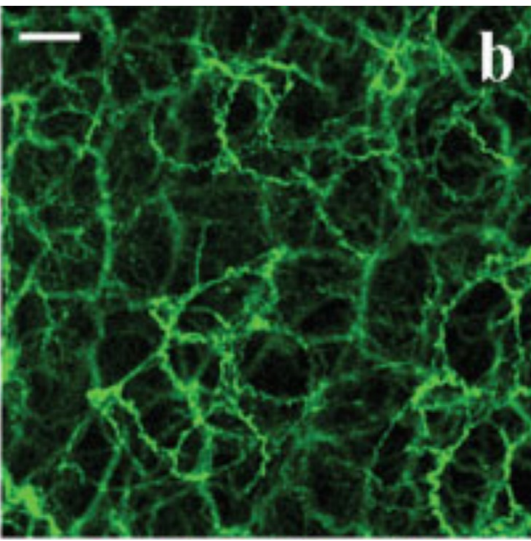


Keikhosravi et al. *Methods in Cell Biology* Vol. 123 2014

Provenzano et al. *BMC Med* 2006; Provenzano et al. *BMC Med* 2008; Conklin et al. *Am J Path* 2011

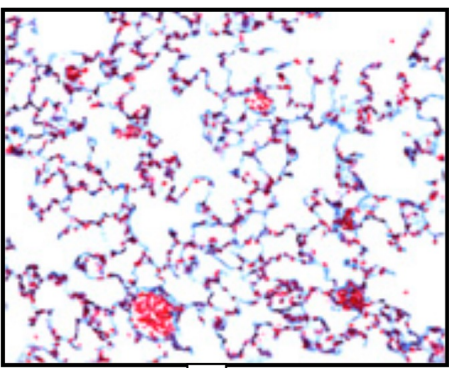
# ECM imaging: up to a few molecules at a time

**Second harmonic generation (SHG)**

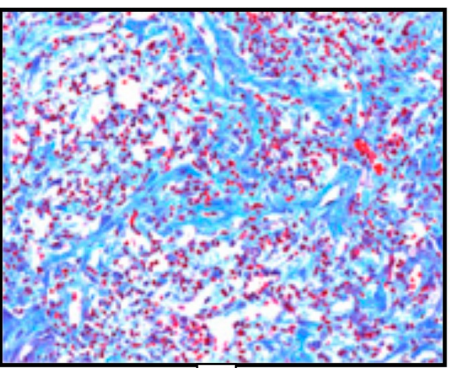


**Masson's Trichrome**

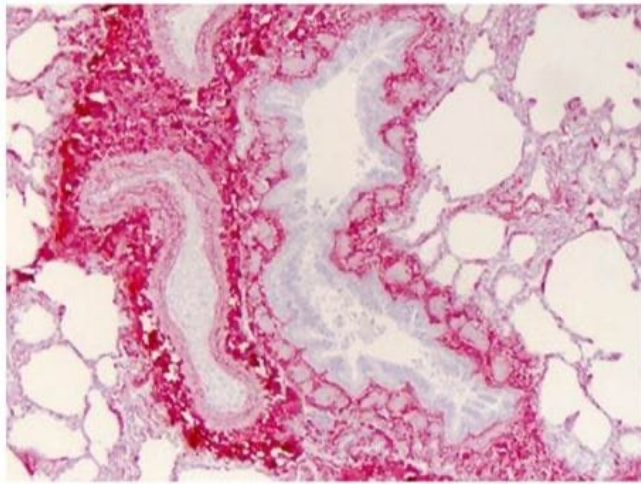
**Normal lung**



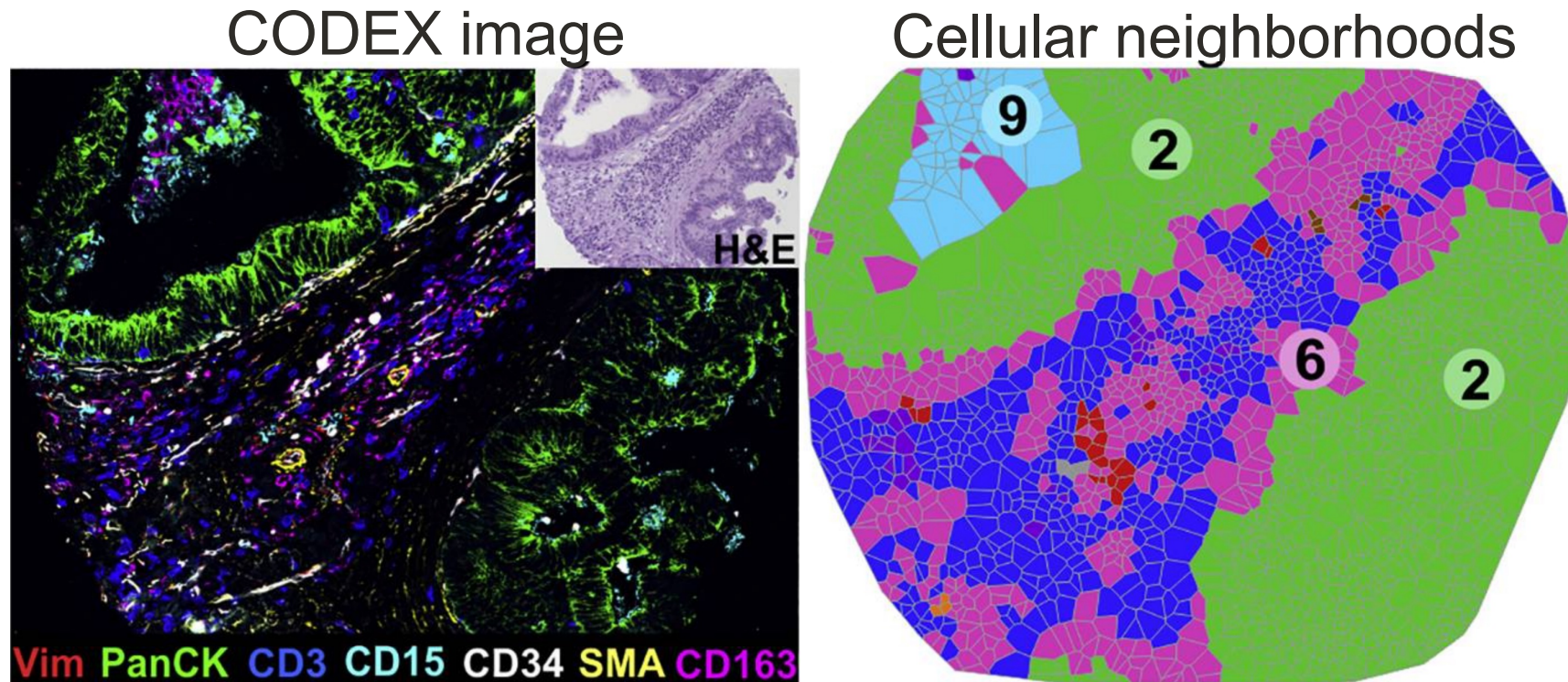
**Fibrotic lung**



**Antibody-based (IHC/IF)**

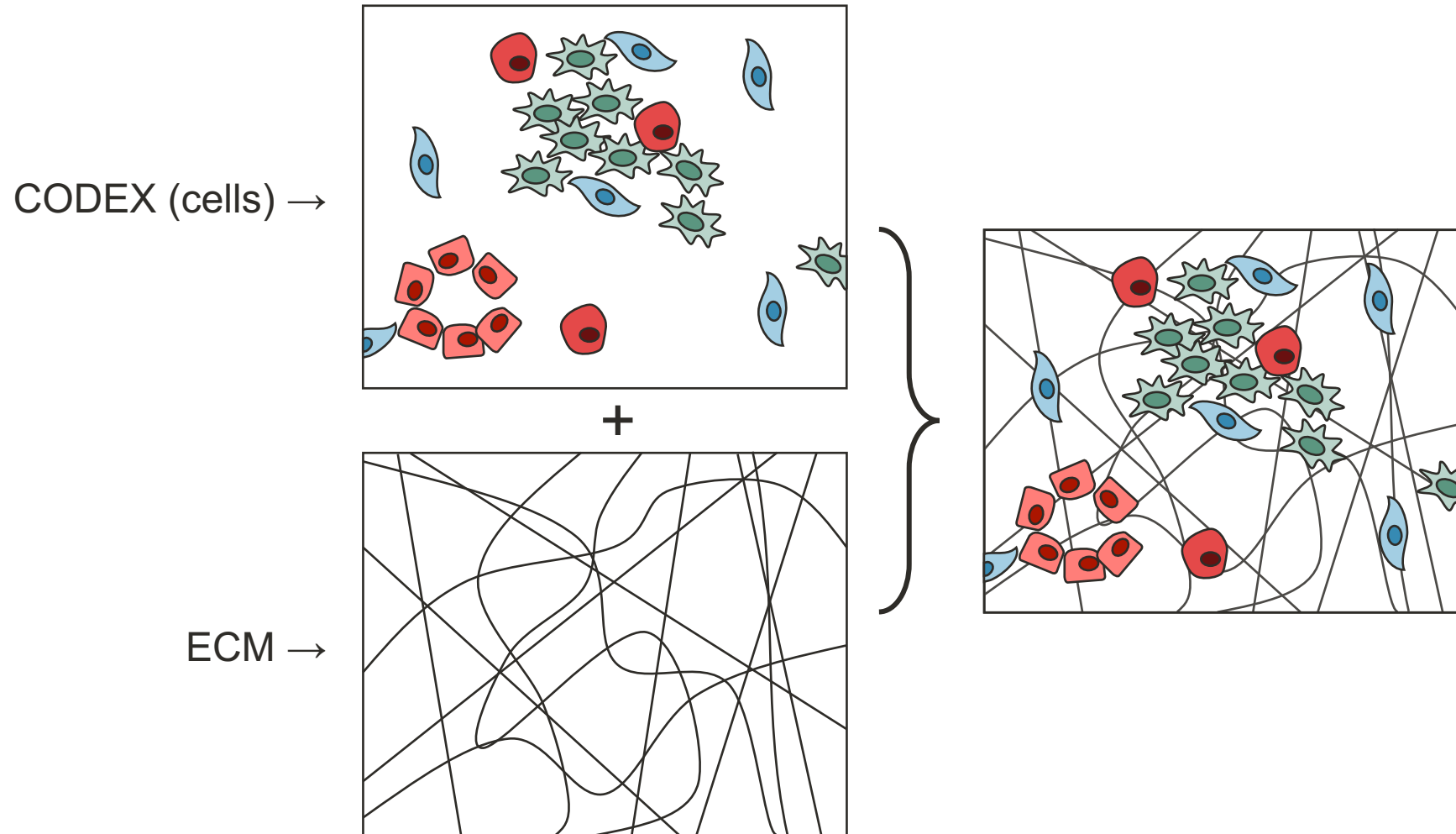


# CODEX enables multiplexed detection of cell types





# Methods goal: integrate ECM imaging with CODEX



# Thank you!

## Mentors

Sylvia Plevritis, Ph.D.  
Michael Longaker, M.D.



## Plevritis Lab

Irene Li  
Yuanyuan Li, Ph.D.



## Longaker Lab

## Thoracic Surgery

Joseph Shrager, M.D.



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