



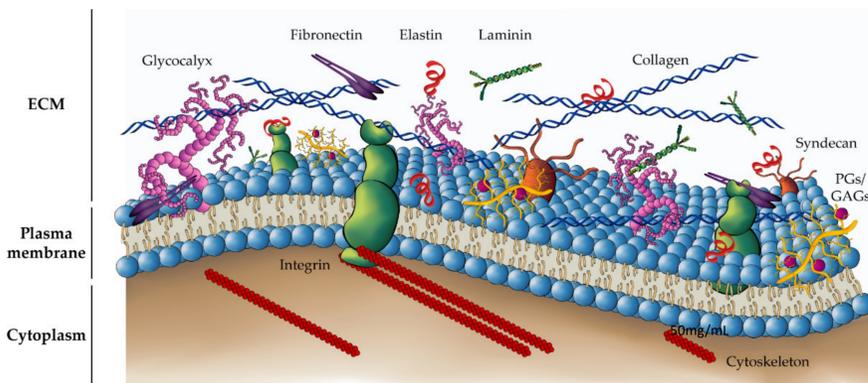
# Matrix Composition and Stiffness Regulate Ovarian Cancer Behavior

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## Introduction

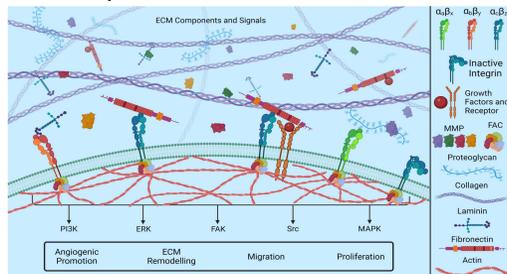
- Matrix stiffness regulates ovarian cancer behavior.
- Cells interact with different extracellular matrix (ECM) components such as fibronectin and laminin.
- Fibronectin communicates between the intra and extracellular environment.
- Laminin regulates cellular activities and signaling pathways in the basement membranes of cells.



Cell membranes have many receptor-type proteins responsible for ECM interaction to transduce various signals. Both mechanical and biophysical components of the ECM contribute to the variety of intracellular signals.

## Objective

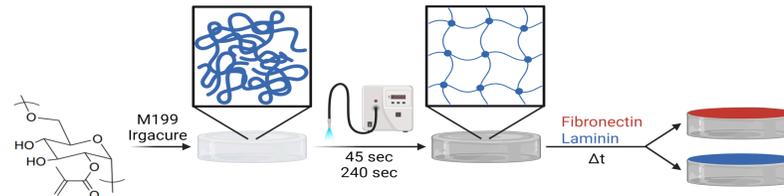
- To observe how the stiffness of Dextran gels affects the matrix absorption of different proteins, fibronectin and laminin.
- To explore ensuing migration of ovarian cancer with respect to protein presence and stiffness.
- Identify key ECM components that regulate pathways in cancer that could be targeted for drug treatment.



## Methods/Materials

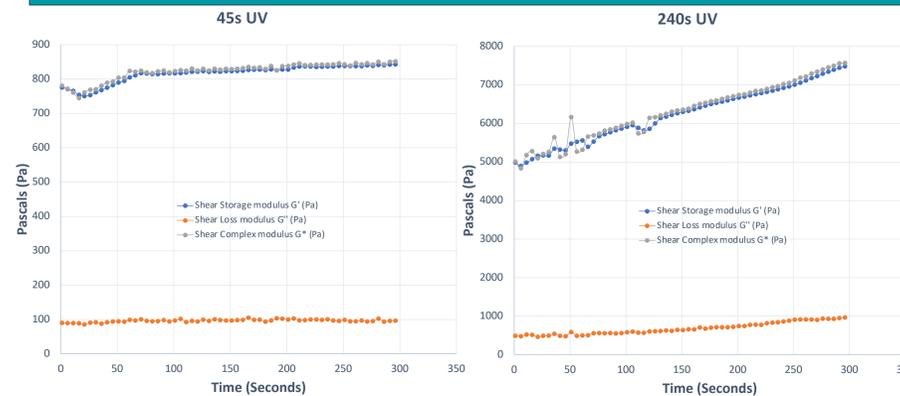
- 2D UV Dextran Gels were crosslinked using irgacure photo initiator.
- Dextran gels were coated with fibronectin and laminin.
- Cells were seeded after ECM coating and stained using Phalloidin in a 1:1000 ratio with PBS++

## Material Synthesis and Hydrogel Formation



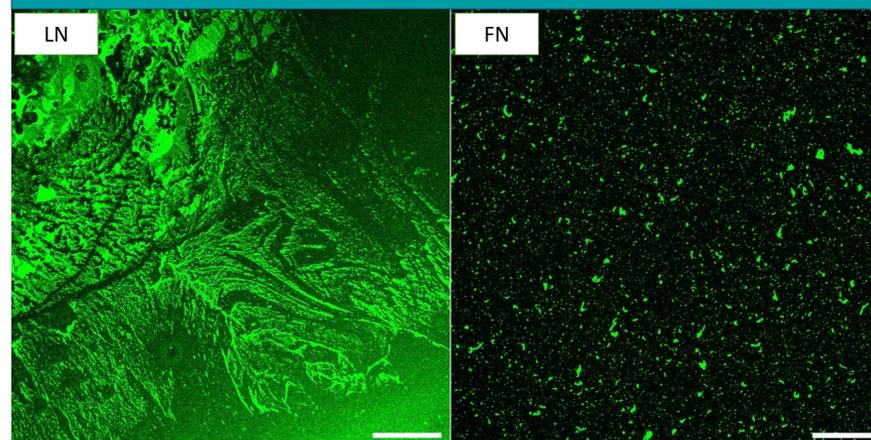
- 50mg/mL Dextran Methacrylate is mixed with irgacure and crosslinked under a UV light for either 45 seconds or 240 seconds.
- ECM proteins are independently incubated for one hour on the gels for absorption.

## Mechanical Properties



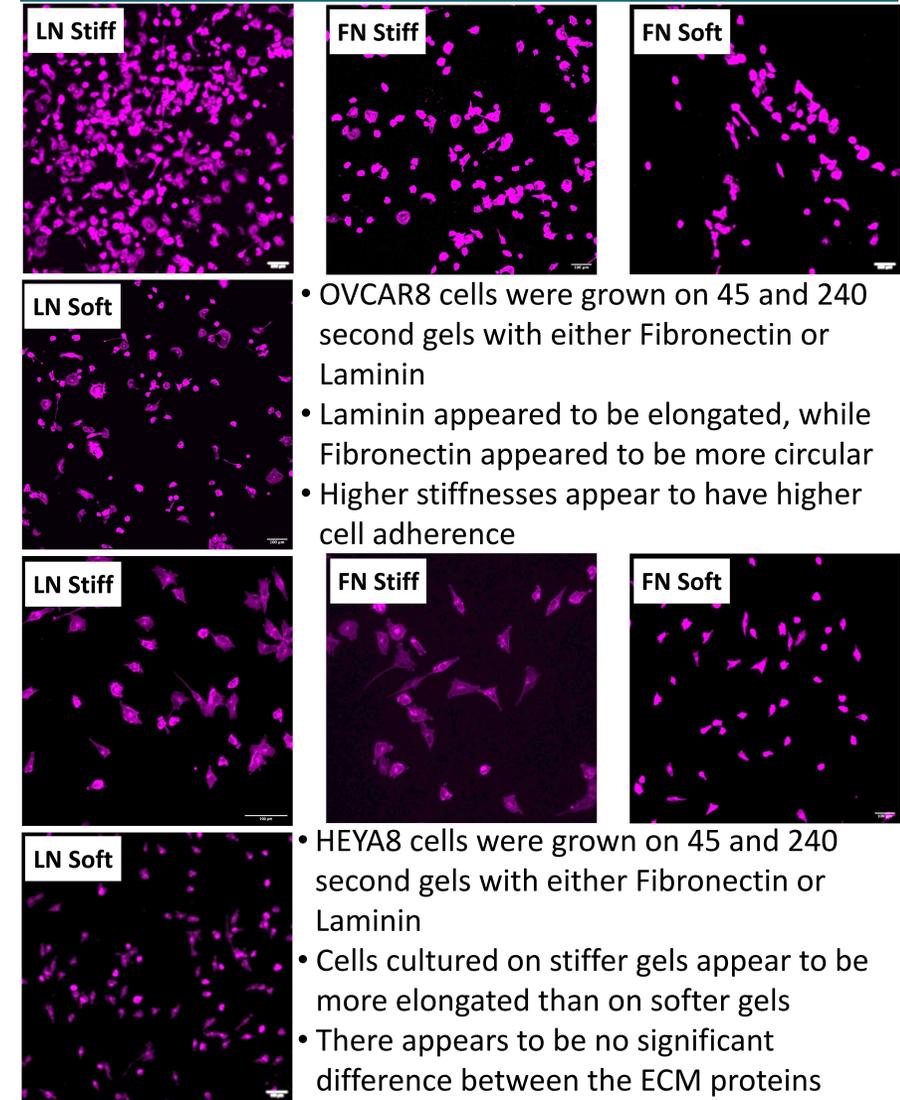
- 45 and 240 seconds showed significantly different storage moduli at ~850 Pa and ~8000 Pa
- Tunable material moduli can capture different stiffnesses of the tissue within the body.

## Antibody-Stained ECM Proteins on Hydrogel



- Antibody staining shows the difference in absorption of ECM proteins
- Laminin formed sheet-like structures, while fibronectin was scattered, as that is how they arrange in natural conditions.

## OVCAR8 and HEYA8 Cell Morphology



- OVCAR8 cells were grown on 45 and 240 second gels with either Fibronectin or Laminin
- Laminin appeared to be elongated, while Fibronectin appeared to be more circular
- Higher stiffnesses appear to have higher cell adherence
- HEYA8 cells were grown on 45 and 240 second gels with either Fibronectin or Laminin
- Cells cultured on stiffer gels appear to be more elongated than on softer gels
- There appears to be no significant difference between the ECM proteins

## Discussion

- The cell morphology images show that both the absorption of different ECM proteins and gel stiffness affect Ovarian Cancer.
- The differing ECM proteins more significantly influenced OVCAR8's cell morphology, while the gel stiffness affected HEYA8's morphology.
- Future work could be done using aspect ratios to quantify morphological differences and ECM absorption, which determines stiffness-dependent coating.

## Acknowledgements

Dr. Linqing Li; Jaxson Libby; UNH Biochemical Engineering Department; UNH Instrumentation Center; UNH Chemistry Ins; The Innovation Scholars Program

## References

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