

## Temporal Understanding of the Conversion of Normal Synovial Fibroblasts into Osteoarthritic Fibroblasts

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### Introduction

The primary cellular components involved in osteoarthritis are synovial fibroblasts, synovial macrophages, and chondrocytes. Due to their role as mediators between synovial macrophages and chondrocytes, synovial fibroblasts serve as the subject for experimentation (Figure 1).

#### Main Objectives

- Study the cell's conversion from normal to osteoarthritic when subject to the pro-inflammatory cytokine, Interleukin 1 beta (IL1 $\beta$ ).
- Determine whether continuous, low-intensity ultrasound (cLIUS) can reduce osteoarthritic qualities presented by inflamed synovial fibroblasts.

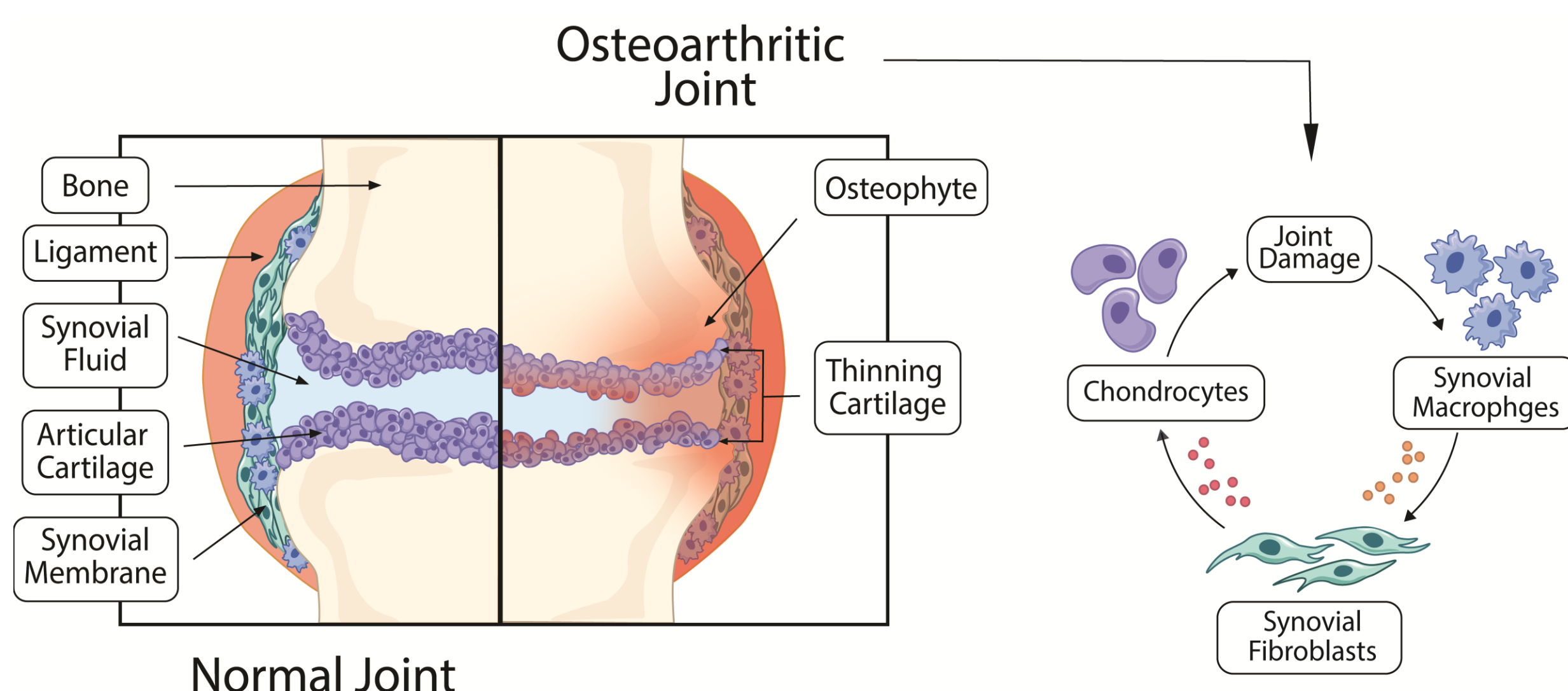


Fig. 1 Comparison of The Normal and Osteoarthritic Joint

### Materials & Methods

- Once confluent as a monolayer, cells were released and encapsulated in alginate hydrogels to mimic the environment of natural joint tissue.
- Hydrogels were then cultured for 22 days in the following groups: Group 1 – kept in DMEM Media; Group 2 – kept in DMEM Media + IL1 $\beta$  (10 ng/mL); and Group 3 – kept in DMEM Media + IL1 $\beta$  (10 ng/mL) + cLIUS treatments 4 times/day.
- Outcome analysis involved a cell viability assay, western blotting, and quantitative real-time polymerase chain reaction (qRT-PCR).

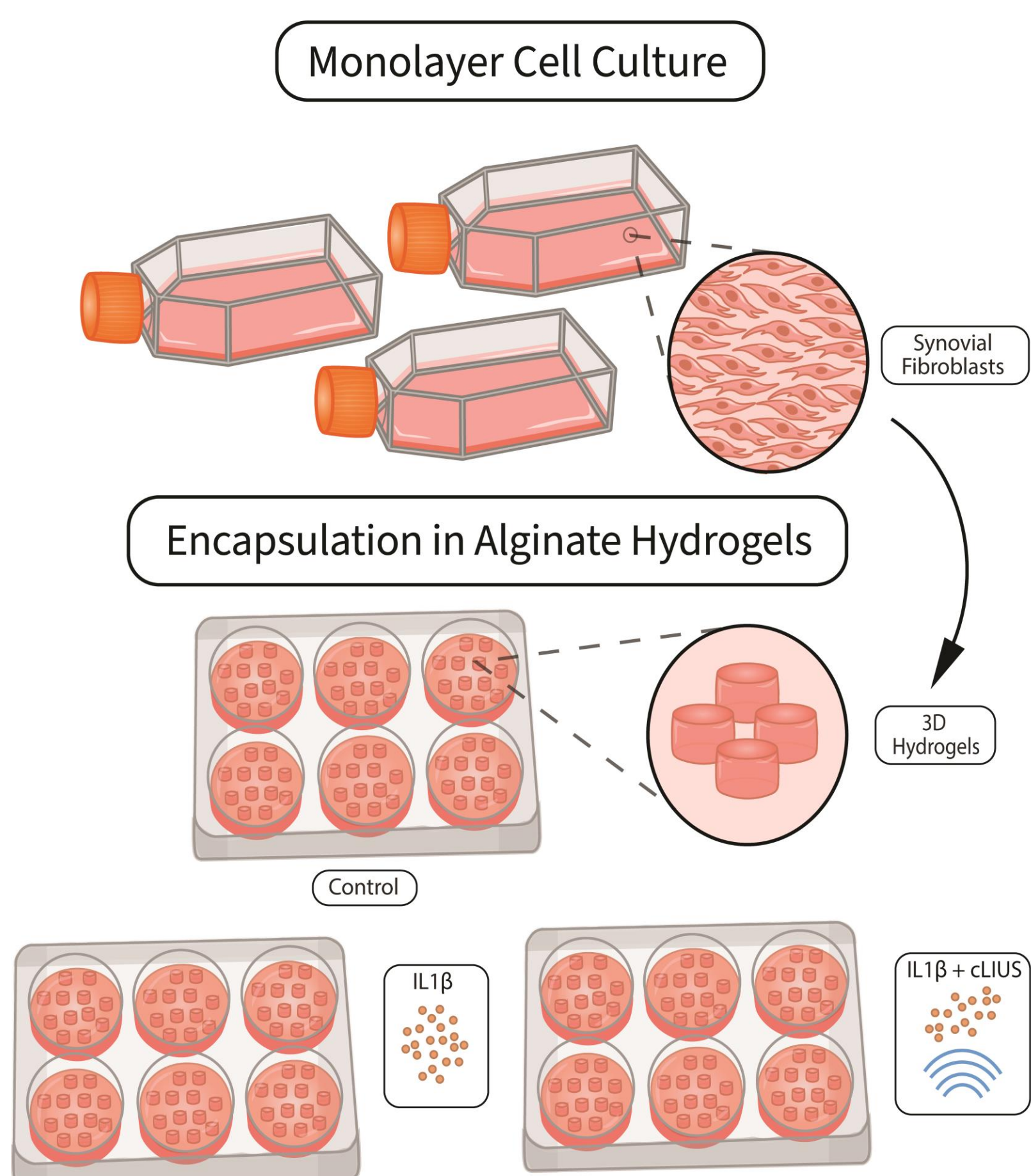
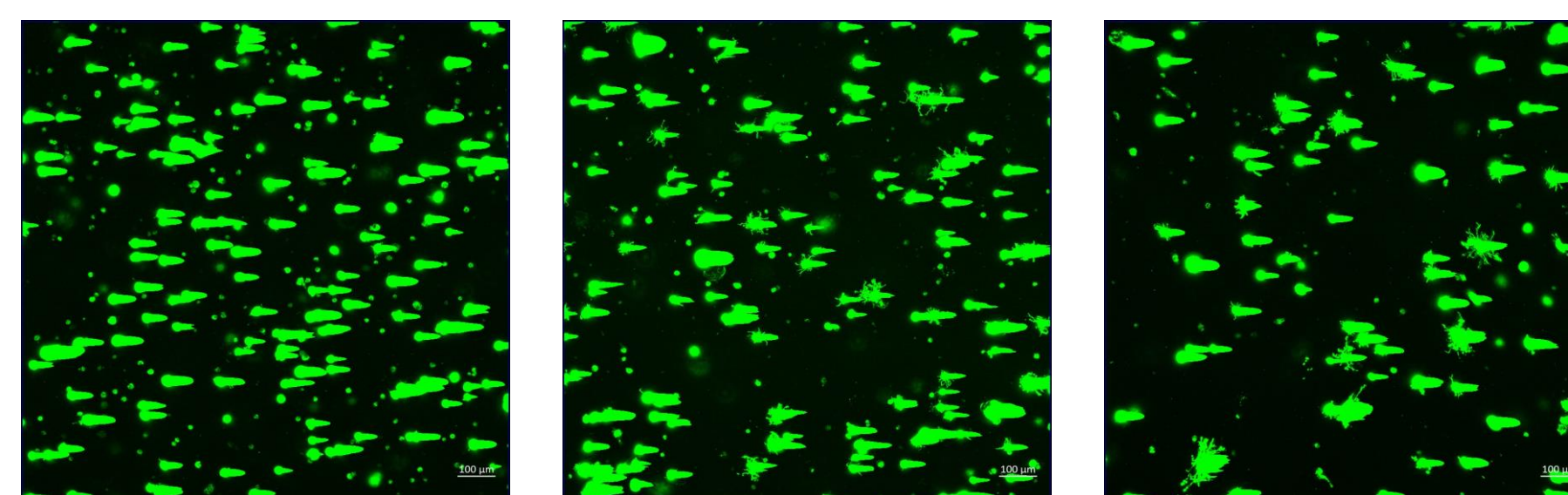


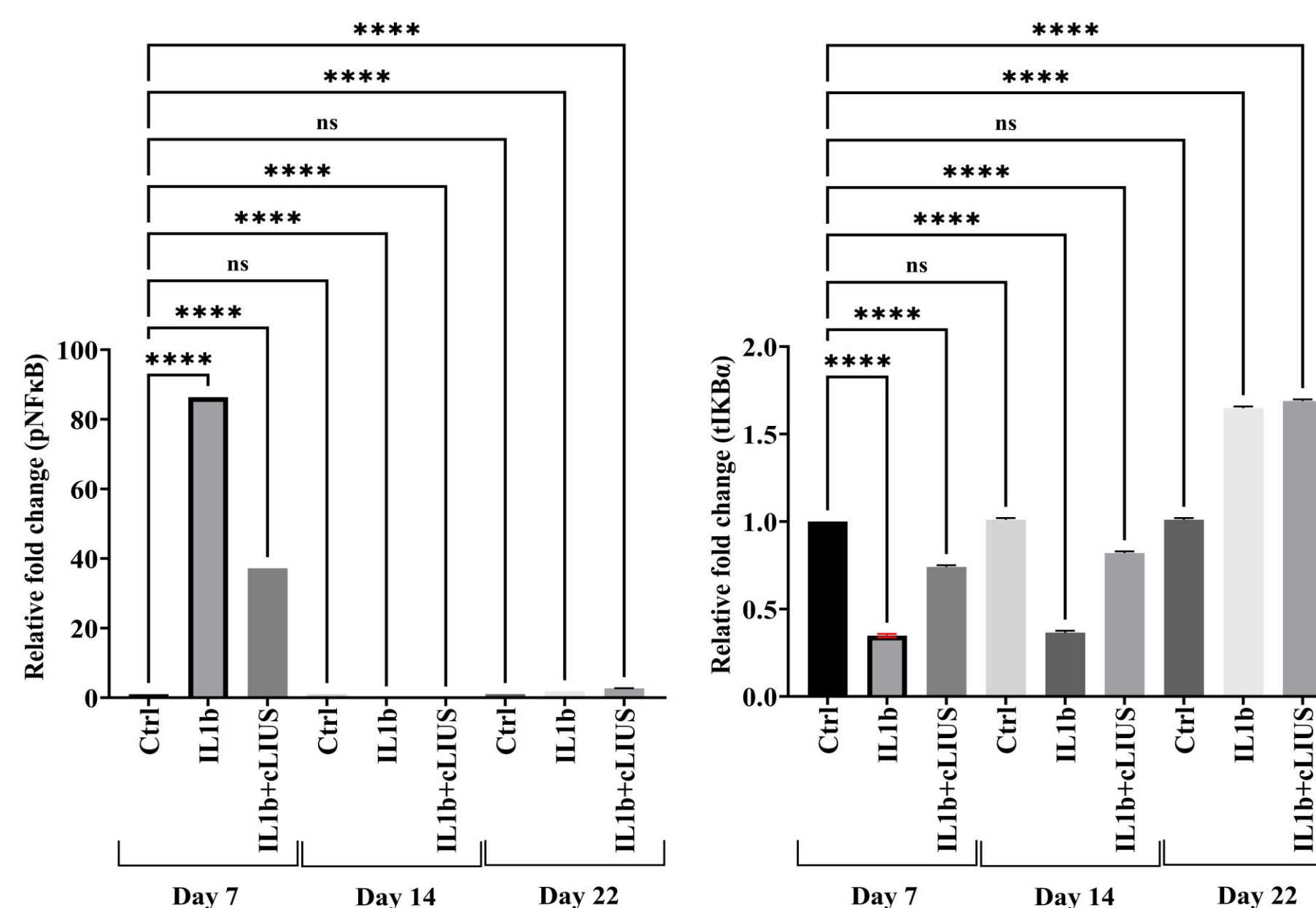
Fig. 2 Culture Methods

### Key Findings

#### Day 22 Viability of Group 1, Group 2, and Group 3



#### Western Blot Results



- Cytokine exposure led to increased inflammatory response, while cLIUS exposure brought this down.
- qRT-PCR results were inconclusive.

### Conclusion & Future Research

- Issues associated with hydrogel stability impeded reliable data collection.
- With future iterations of these experiments, such complications will be taken into consideration and improved upon.

### Acknowledgements

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