Karl Chiari Lab for ORTHOPAEDIC BIOLOGY
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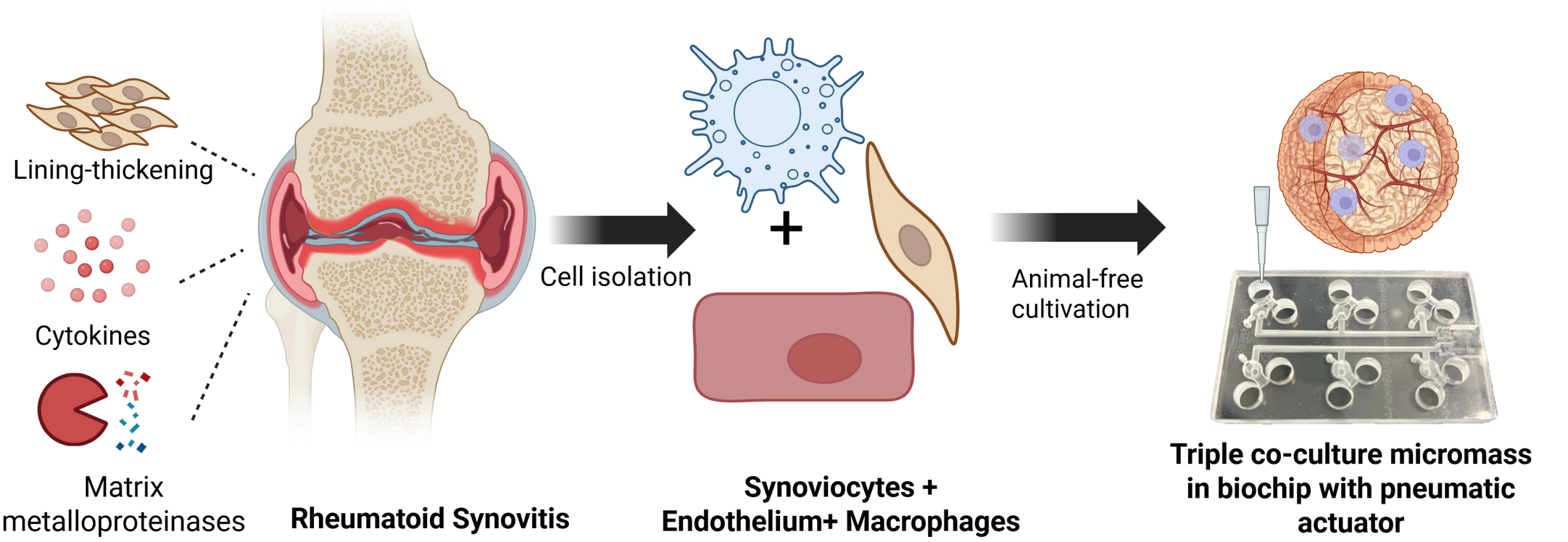
Advancing Rheumatoid Arthritis Research with a Biomechanical Synovium-on-a-Chip Model

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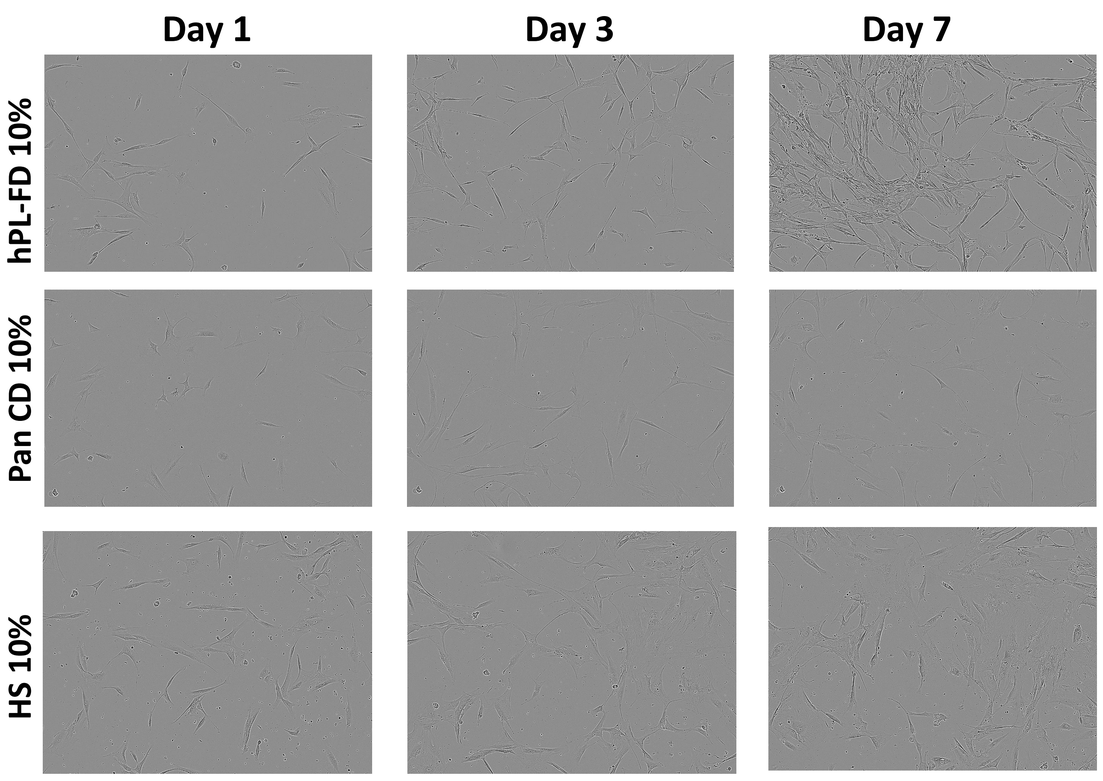
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Recreating of animal-free model of Rheumatoid Arthritis

Goal: Development of a fully human RA model with additional biomechanical loading, to replace traditional rodent models, supporting the principles of the 3Rs in scientific research



Results



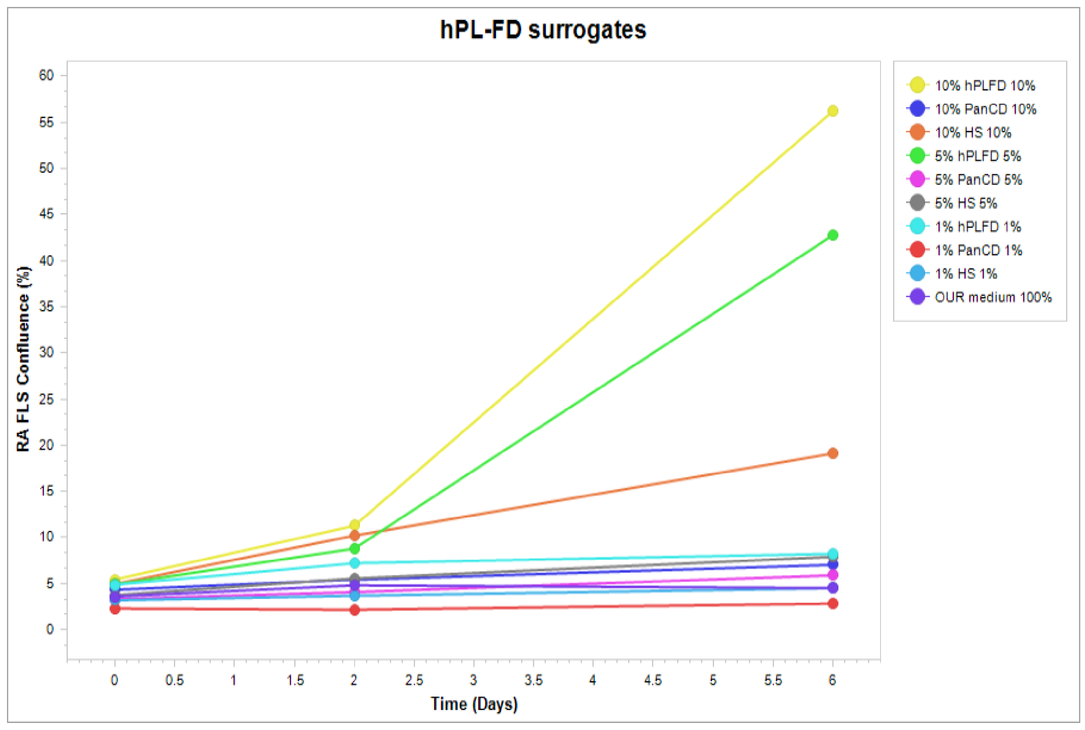


Fig. Establishment of animal-free culture conditions for primary rheumatoid arthritis fibroblast-like synoviocytes (RA FLS)
Primary RA FLS were seeded in a two-dimensional (2D) format and cultured in DMEM supplemented with different animal-free media formulations, including human platelet lysate (hPL-FD), Panexin CD, human serum AB (HS) (1%, 5% and 10%) and Oredsson replacement medium (OUR medium) without medium exchange for 7 days. Cell proliferation was monitored every 6 hours using the Incucyte live-cell imaging system. Confluency was quantified by automated image analysis employing AI-based confluency metrics within the Incucyte software.

Conclusion

Animal-free culture conditions did not support full confluence, with all tested formulations reaching a maximum below 60%. Currently, selected candidates are being further evaluated across multiple passages and in parallel, combined with animal-free hydrogel systems to assess their performance in three-dimensional environments under mechanical stimulation.