Mesenchymal Stem Cell Response to Static Stretch on Electrospun Nanofibrous Scaffold

Ty’Quish Keyes
Background: MSCs

Mesenchymal Stem Cells (MSCs):

- multipotent stem cells
- considered for many therapeutic practices
  - differentiate
  - trophic and anti-inflammatory effects
- contribute to healing and tissue regeneration.
- Affected by the growth factors they encounter as well as the physical cues from their cellular microenvironment
Goal

- To investigate the role of contractility in MSCs mechanotransduction
- Seeding of polymer nanofibrous scaffolds.
- Contractility
  - Inhibitors or activators
- Investigate mechanical properties and microscale strains of crimped vs. uncrimped PLLA scaffolds
Results

Nuclear Deformation

Control LPA CytoD ML7 Y27

Normalized NAR

Control ML7 (25uM) Y27 (10uM)

McKay Orthopaedic Research Laboratory
Results
Conclusions

- Increasing contractility prevents nuclear deformation
  - LPA
- Inhibiting the contractility and the actin cytoskeleton further prevent nuclear deformation
  - Y27632 or Cytochalasin D (CytoD)
- Decreasing contractility without disrupting actin increases nuclear deformation
  - ML7
Thank You

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