VITAMIN D PROMOTES MYOGENIC DIFFERENTIATION AND INDUCES AN ANTIFIBROTIC PHENOTYPE IN PRIMARY CULTURES OF SKELETAL MUSCLE DERIVED SATELLITE CELLS AND FIBROBLASTS

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Background I

- Skeletal muscle wasting is a serious public health problem associated with aging, Chronic Kidney Disease (CKD), and AIDS1.
- Vitamin D (VD) is most widely recognized for its regulation of calcium and phosphate homeostasis in relation to bone development and maintenance, and for its synergistic effects on target organs such as PTH glands.
- Recently, it has been shown to improve muscle performance and reduce falls in VD deficient older adults3. However, little is known of the underlying molecular mechanism or the role it plays in association with myogenic differentiation and on muscle fibrosis.

Materials & Methods

- Primary cultures of skeletal muscle derived satellite cells and fibroblasts were isolated from the tibialis anterior, soleus and gastrocnemius muscles of 2-month-old C57/BL6 male mice and then treated with or without 1,25-D3 in a time course manner.
- Expression of Vitamin D receptor (VDR), collagen I, III, pro and anti-fibrotic factors, muscle lineage and angiogenic markers were assessed by Immunocytochemistry (ICC), PCR arrays and confirmed by Real time qPCR and western blots.

Results I

- Myogenesis Array Results after 7 days of continuous incubation of Satellite cells with 1,25-D3.
- Isolation of Satellite Cells from Skeletal Muscle Yields an 88% Efficiency Demonstrated by PAX-7 Expression by ICC.

Results II

- Conclusions
  - The efficiency of satellite cells isolation determined by PAX-7 was 88%.
  - It was confirmed that satellite cells expressed VDR.
  - Addition of 1,25-D3 (100nM) to satellite cells induces:
    a) Increase expression of Troponin-I and II.
    b) Increase expression of Bmp4.
    c) Increase expression of IGF-I and IGF-II.
    d) Increase expression of Follistatin (Myostatin inhibitor).
  - A decrease expression of Mstn (Myostatin - a key negative regulator of muscle mass).
- Fibroblast isolated with a 90% efficiency were characterized by Vimentin- and α-SMA- cells showed a decreased expression of collagen I and III after being challenged with TGF-β alone or in combination with 1,25-D3.

References