ISCORE 2025: Investigation of HDAC11 and AKAP12 in Cardiac Fibroblasts

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March 2025 - May 2025

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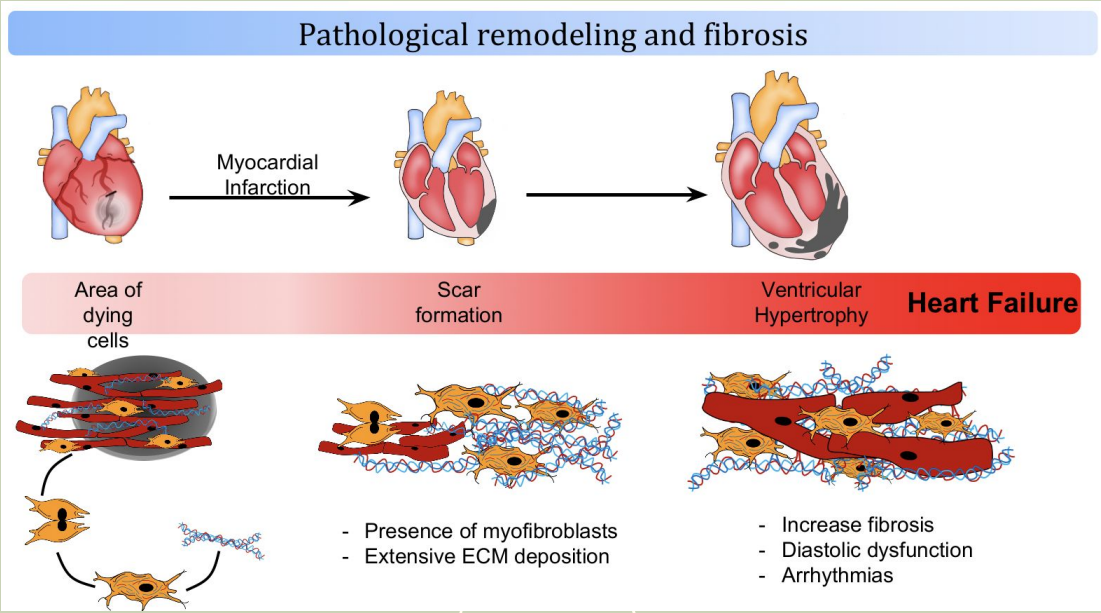
Introduction

Cardiac Fibrosis

Cardiac fibrosis is a condition that causes an excess amount of scar tissue to build up in the heart. Any condition that can cause heart damage can be the cause of cardiac fibrosis, the leading cause being heart attacks.



Why Study This?

Cardiovascular disease is the leading cause of death in Western countries, thus it is important to study cardiac fibrosis, as a means to find ways to identify and treat before there is a more severe impact.

Project 1: AKAP12 in Cardiac Fibroblasts

Scientific Question

AKAP12 (A-kinase anchor protein) is an anchoring protein and aids in organizing signaling molecules in a cell. How does this protein play a role in cardiac fibroblasts and fibrosis?

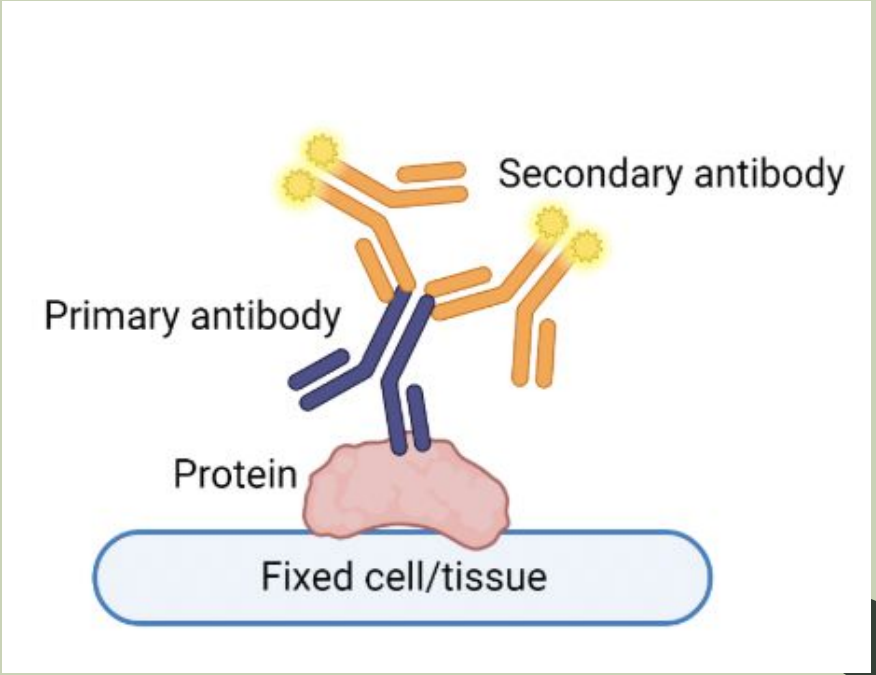
Goal

The goal was to investigate cellular localization and expression of AKAP12 in cardiac fibroblasts to understand its role in cardiac fibrosis. This would be the first time that AKAP12 has been studied in this cell population.

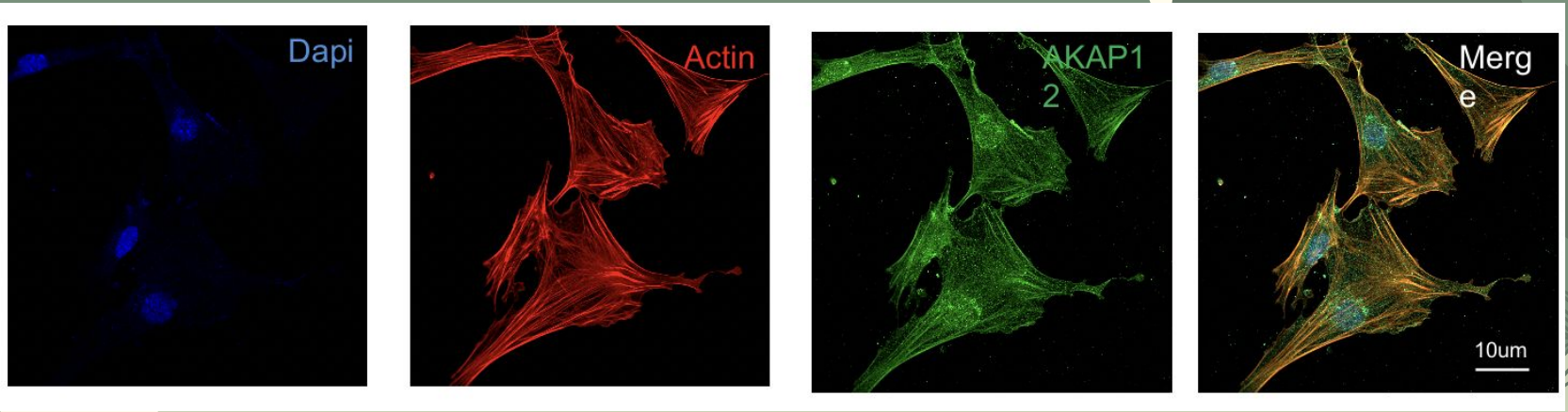
AKAP12 is Expressed in Cardiac Fibroblasts

Technique: Immunocytochemistry

We performed a in vitro cell culture of cardiac fibroblasts from mice. We performed immunostaining to highlight AKAP12 and image acquisition was done using confocal microscope LSM980 Zeiss.



AKAP12 is Expressed in Cardiac Fibroblasts



Conclusion

Localization seems to be perinuclear and around the membrane.

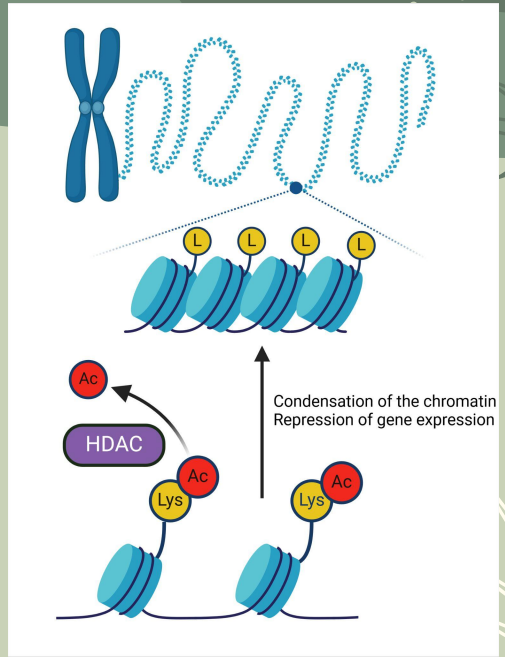
Future Direction

To confirm the localization of AKAP12, a staining with membrane and endoplasmic reticulum markers will be performed.

Project 2: HDAC11 in Cardiac Fibroblasts

HDAC11

HDAC11 is a histone deacetylase and aids in a multitude of processes, such as DNA replication, immune regulation, development of metabolic diseases and tumor growth.



Why Study This?

Gene expression can be altered and cell function can be impacted. Researching HDAC11 can aid in understanding and developing treatments for cardiovascular diseases.

Project 2: HDAC11 in Cardiac Fibroblasts

Scientific Question

To study the role of HDAC11, we want to use a global knockout transgenic mouse line.

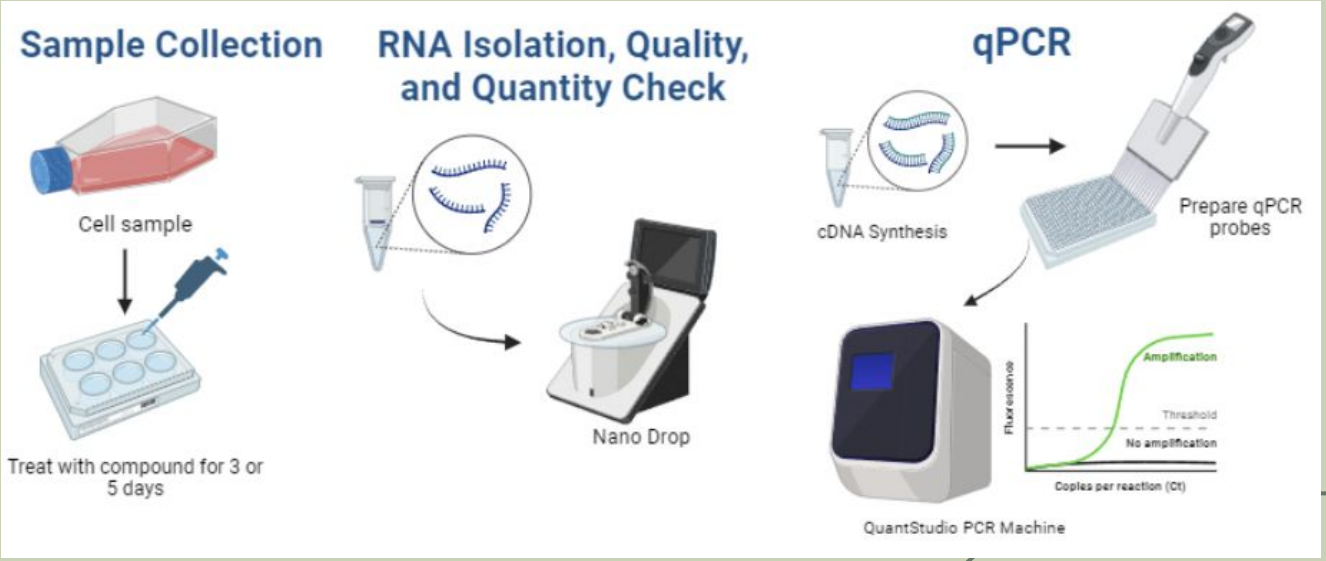
Goal

Two mouse lines (Wild type mouse and global knockout) were received and the purpose was to compare the expression of HDAC11 in various tissues. To confirm an absence of HDAC11 in the global knockout mouse line.

HDAC11 in Cardiac Fibroblasts

Technique: mRNA Extraction and Quantitative PCR

We performed an mRNA extraction from several tissues and then we performed a qPCR to investigate HDAC11 expression.

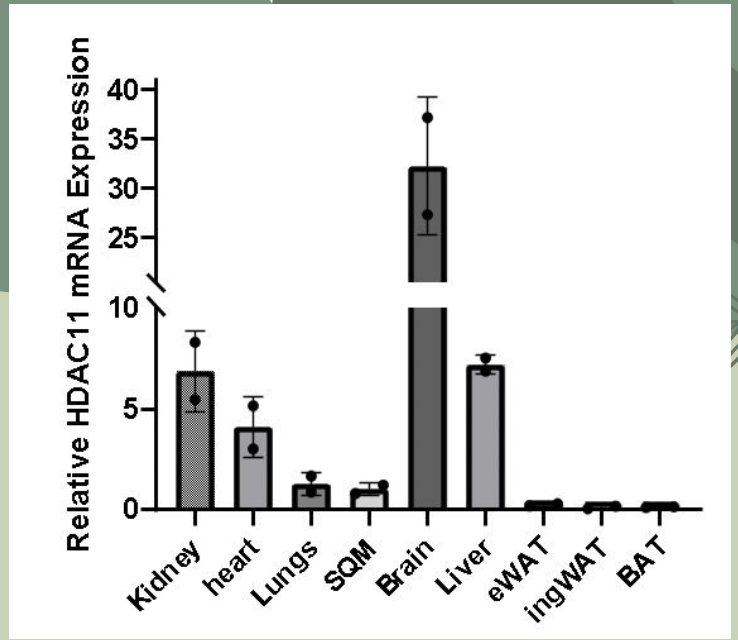


HDAC11 in Cardiac Fibroblasts

Conclusion

HDAC11 was confirmed not expressed in the global knockout transgenic mousline.

We could visualize HDAC11 differential expression is various tissue in wild type mice.



Future Direction

This global knockout transgenic mousline could be used to study the impact of HDAC11 absence in cardiac fibrosis.

Cultural Exchange

Working with someone from a different background is an exciting and educational experience!

We were able to bond over shared interests and differences from our backgrounds, goals and lifestyles.

I gained a lot of knowledge about research and working in a laboratory setting outside of a classroom. Marion taught me so much and let me engage in such a cool experience!

Thank You!

Thank you Marion for allowing me to learn and work alongside your interesting projects!

Thank you Dr. Cenicarelli and Elizabeth Evans for giving the opportunity to learn, gain experience and work with someone who can give so much insight to the field and share their background!