

Modification of the endocrine signaling hormone IGF-1 to increase therapeutic value

(Functionalization of IGF-1 to increase cardiac ECM binding potential)

About Me: Sean Wickers



- Studying Biochemistry at the University of Denver
- Hobbies: reading, rock climbing, skiing, hiking and travel
- Hope to be a pediatric practitioner and researcher



My Goals with EuroScholars:

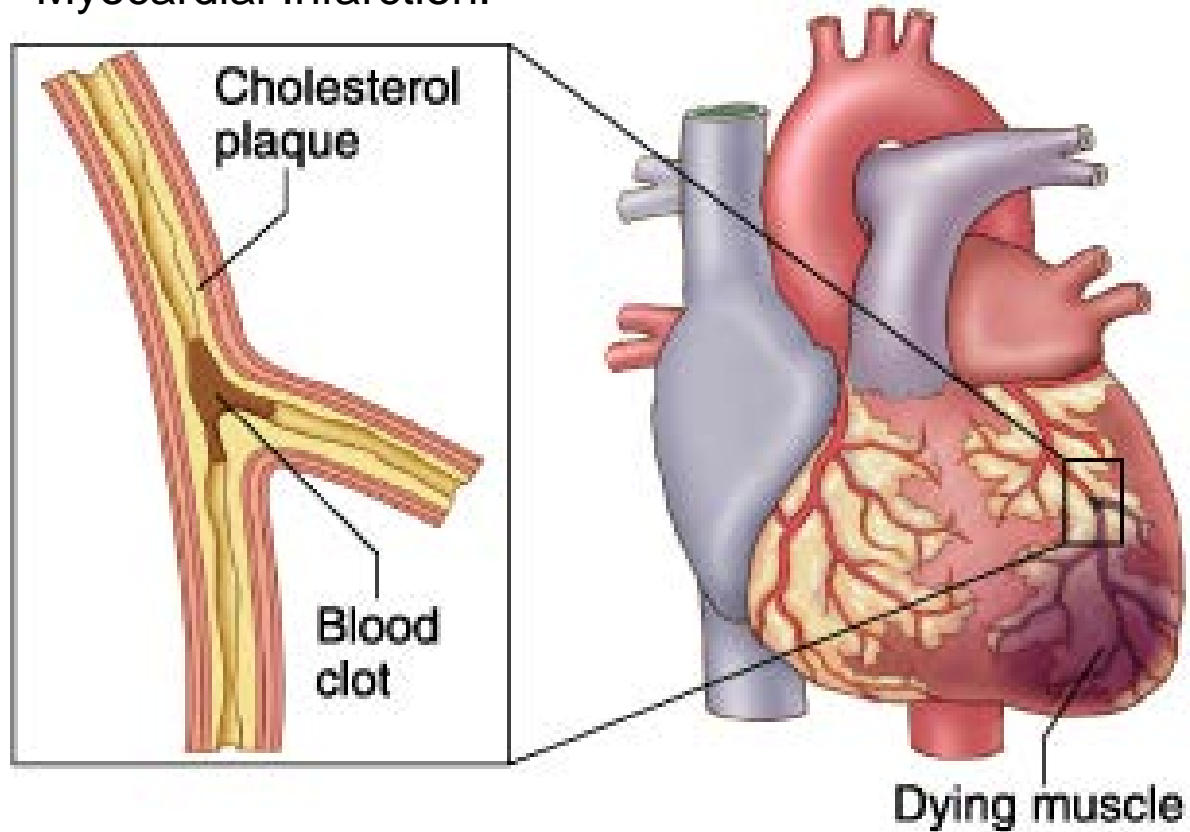
1. Get research experience that will provide a good foundation for my career
2. Make connections across the world, especially for considering medical programs
3. TRAVEL!!!
4. Expand my cultural and personal horizons

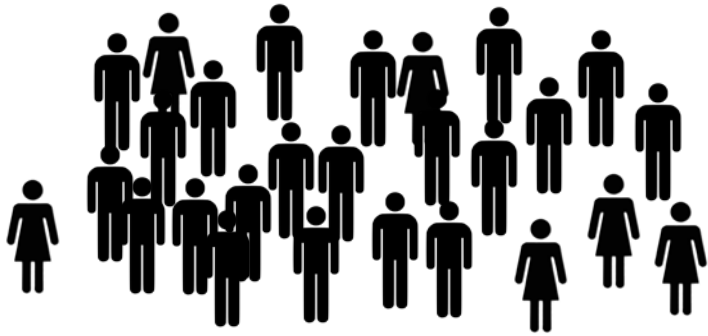


Heart Failure

Many types

Myocardial Infarction:





Over 5 million Americans live with congestive heart failure



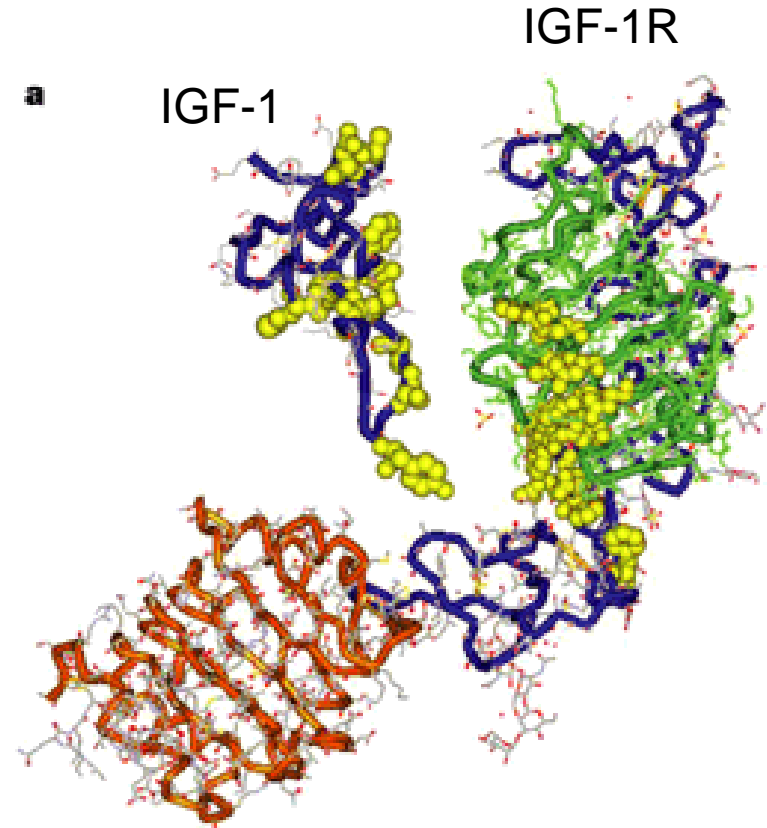
1 in 9 deaths in the US include heart failure as a contributing cause of death



Half of patients diagnosed die within 5 years

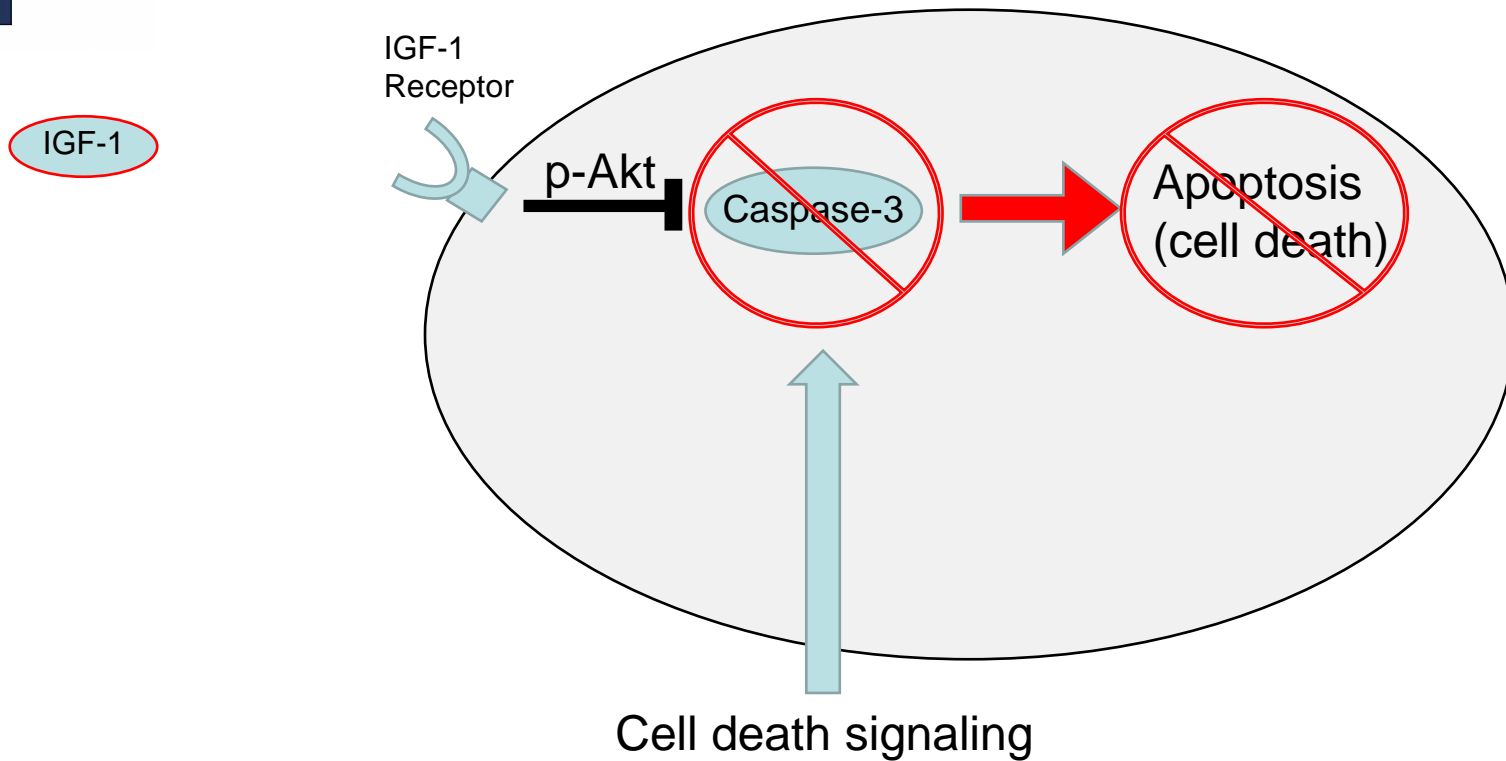
What is IGF-1?

- **IGF-1 (somatomedin c):**
 - Endocrine signaling hormone binds IGF-1 receptor (IGF-1R)
 - Has a role in cardiomyocyte proliferation, differentiation and cell survival^(1,2)



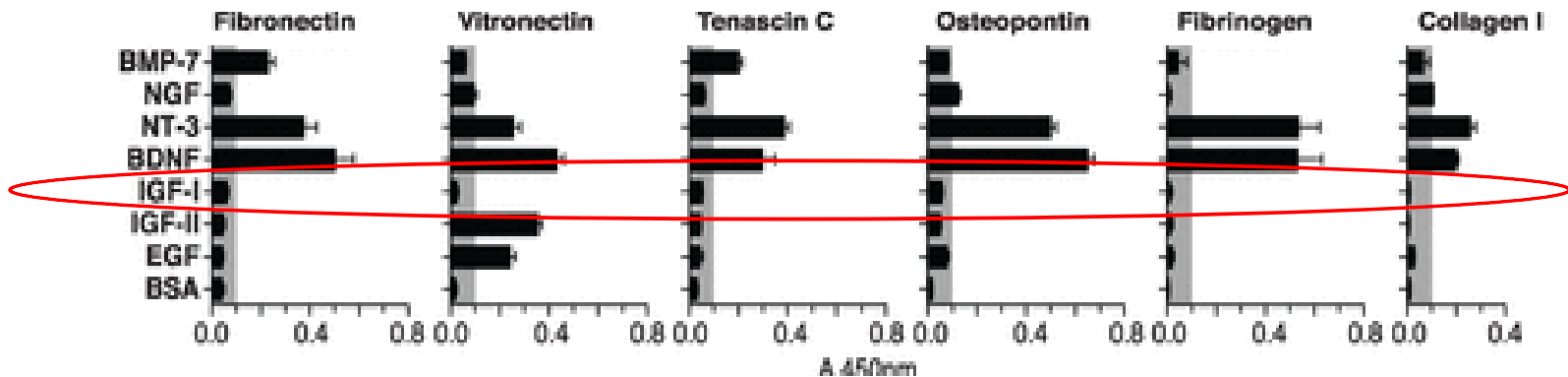
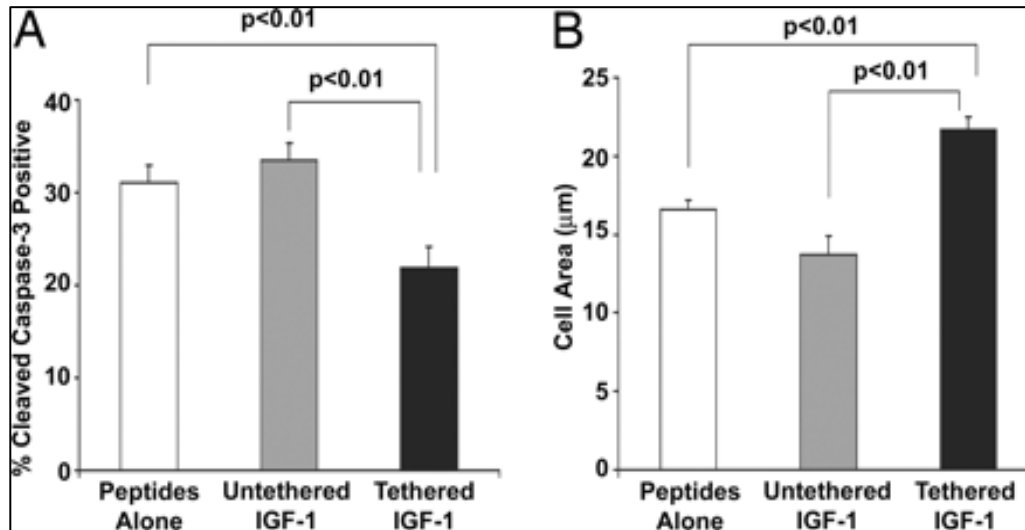
Structure determined by x-ray crystallography
Image courtesy of Nature Reviews Drug Discovery:
De Meyts P, Whittaker J. Structural biology of insulin and IGF1 receptors: implications for drug design. *Nat Rev Drug Discov.* 2002;1(10):769-783. doi:10.1038/nrd917.

How does it work in the heart?



IGF-1 has the ability to prevent apoptosis in normal and disease state cardiac myoblasts

Therapeutic Uses and Issues



Images courtesy of: Local myocardial insulin-like growth factor 1 (IGF-1) delivery with biotinylated peptide nanofibers improves cell therapy for myocardial infarction. M. Davis, P. Hsieh, et al. (Top)

Growth Factors Engineered for Super-Affinity to the Extracellular Matrix Enhance Tissue Healing. M. Martino, P. Briquez, et al (Bottom)

Obtain DNA for IGF-1 with binding domain



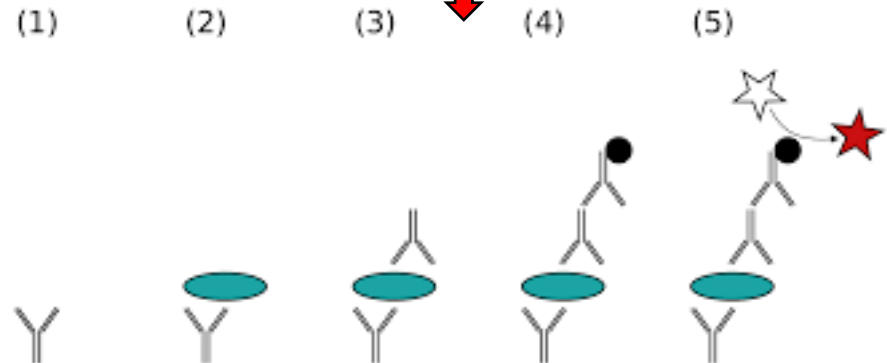
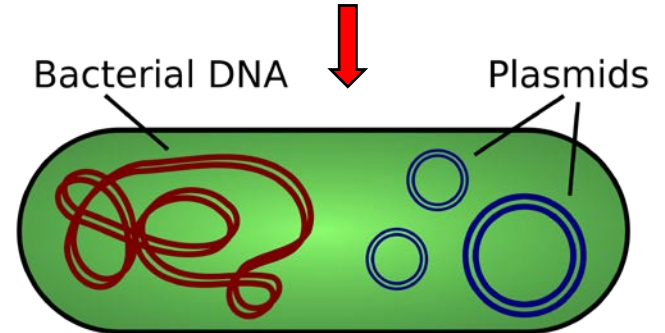
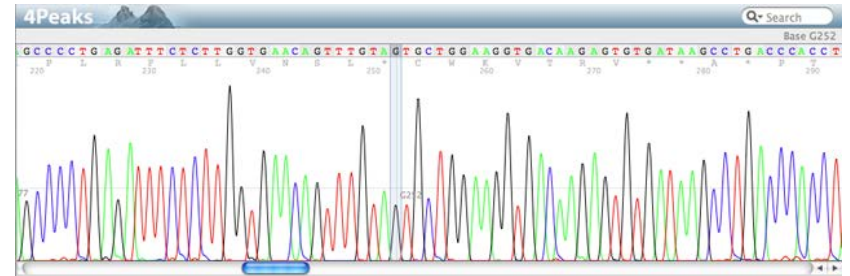
Purify a plasmid with the protein sequence



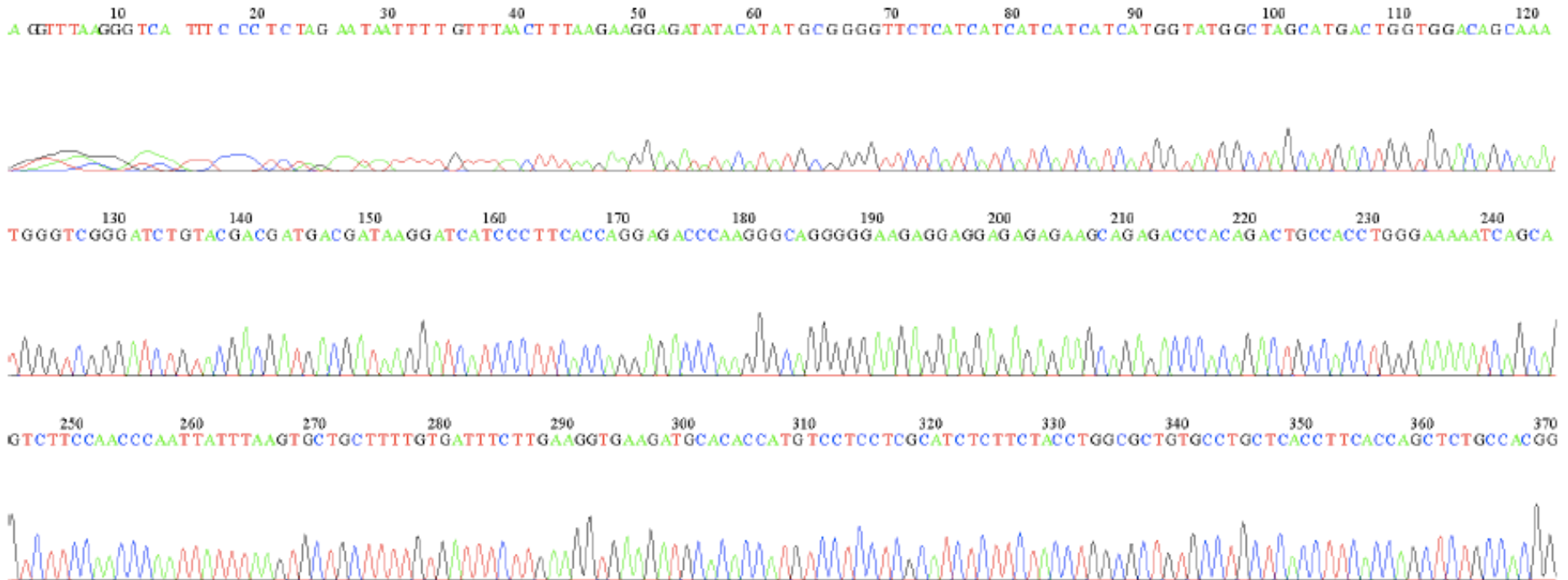
Get Expression of the modified protein



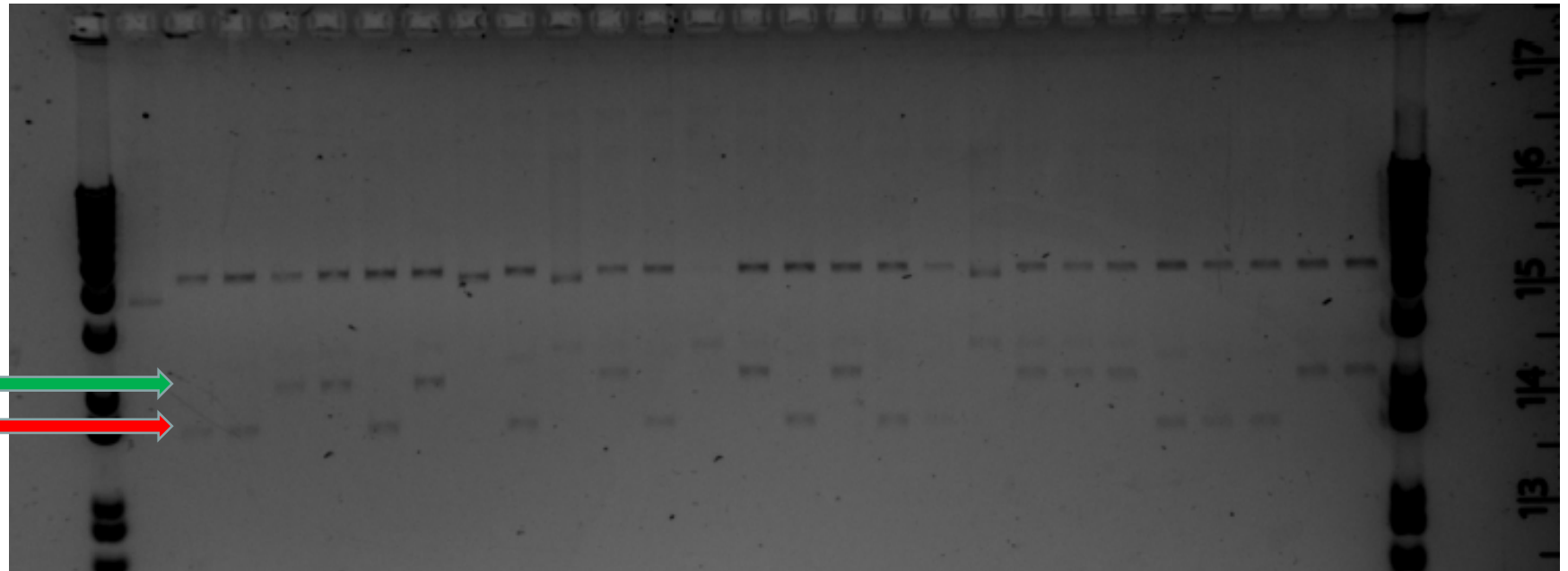
Test using ELISA for binding to cardiac ECM



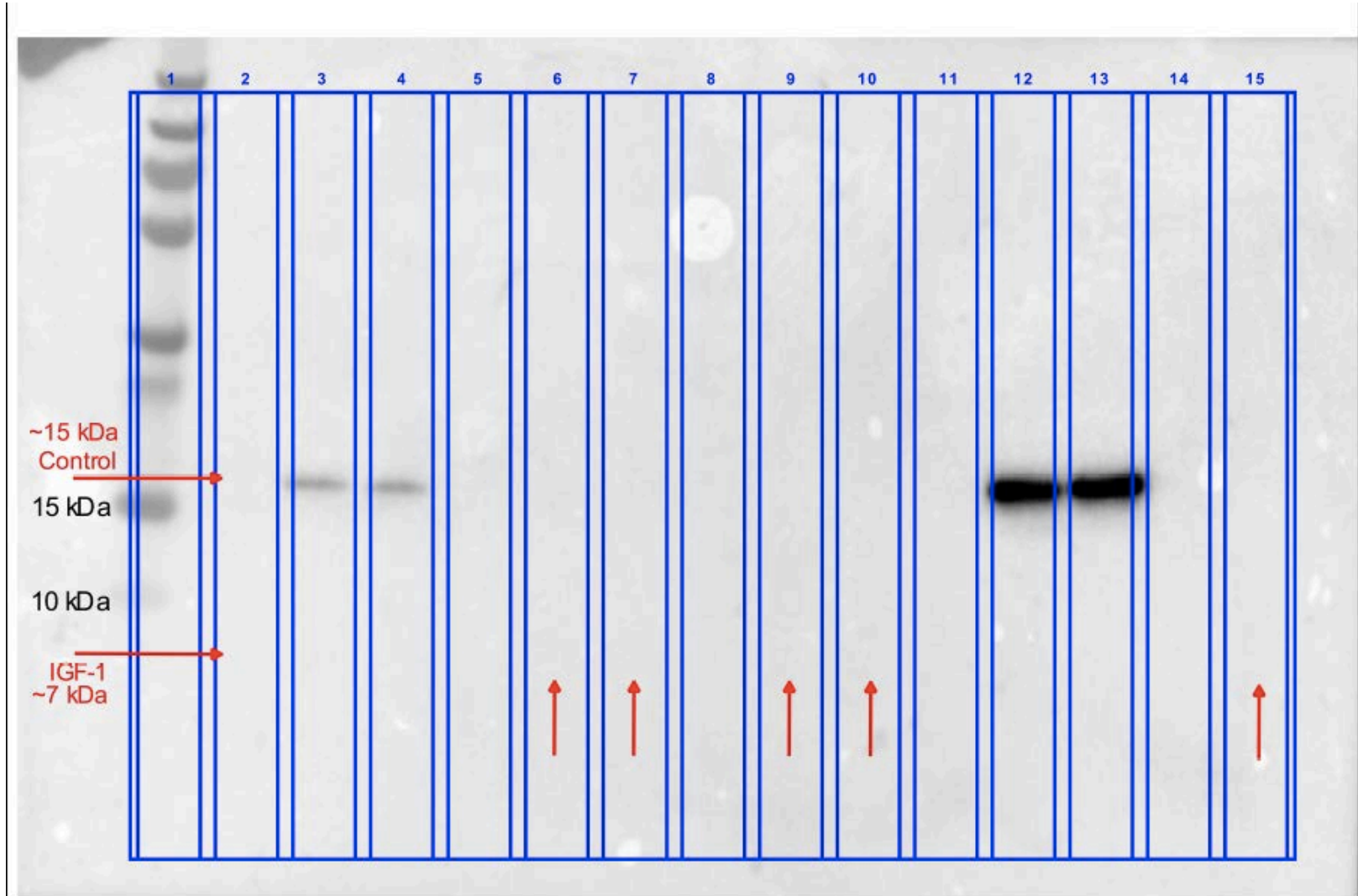
Obtain DNA for IGF-1 with binding domain



Purify a plasmid with the protein sequence



Get Expression of the modified protein



Whats Next?

- Troubleshoot protein purification
- ELISA (**E**nzyme **L**inked **I**mmuno**S**orbent **A**ssay)