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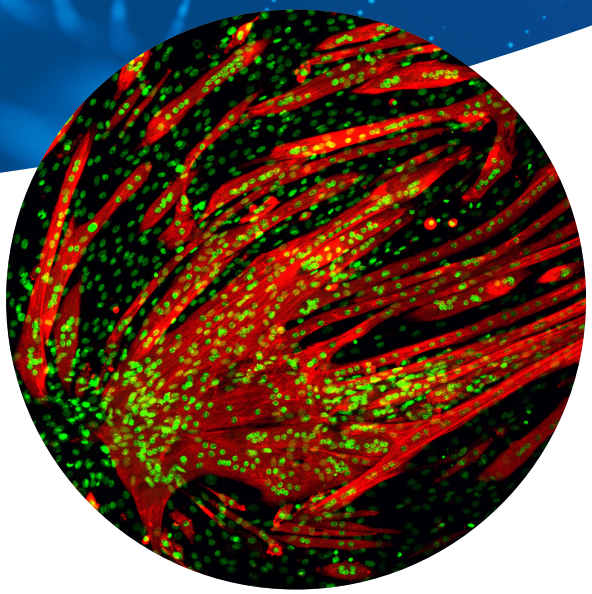

Studying how the Biochemical and Transcriptional regulation and Evolution of Myomaker and Myomixer drive muscle development

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Dr. Pengpeng Bi is an Assistant Professor in the Department of Genetics and Center for Molecular Medicine at the University of Georgia. His group started in 2018 and has since enjoyed a fulfilling journey of scientific discoveries.

The Bi Lab focuses on the molecular genetics mechanism of muscle development by studying two proteins: Myomaker and Myomixer. More specifically, they study the biochemical, transcription regulation, and evolution mechanisms of these genes that drive muscle development.

The lab's recent characterizations of human myoblast fusion[1] identified the key mechanism of membrane mixing. They have also devised an efficient workflow to generate mouse mutants without relying on a core facility,[2] which has allowed them to also identify a key transcriptional mechanism of myogenesis[3] and the evolutionary course of myoblast fusion in chordates.[4]

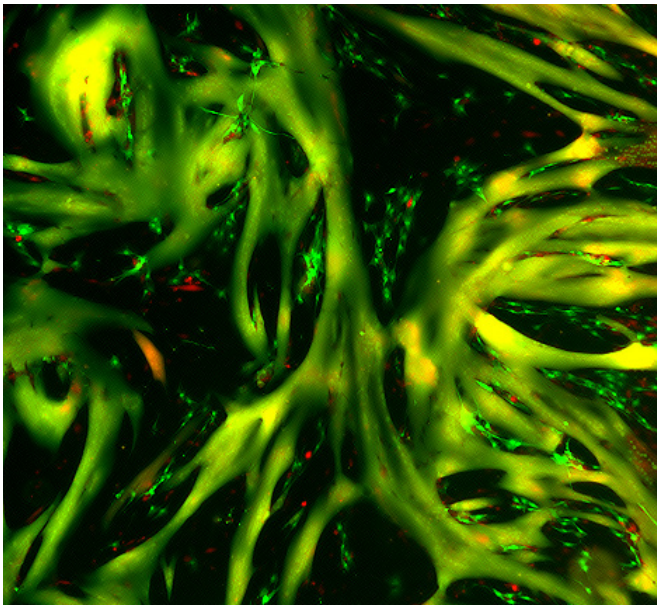

Figure 1. Fibroblast (tagged with GFP) shown fused with Myoblast (tagged with Cherry) by Myomaker and Myomixer.

When asked what the anticipated benefits are from his research, Dr. Bi explains, "Our long-term goal is to understand the genetic and cellular basis of tissue development and regeneration and explore the translational value of the basic science toward better therapeutic treatments of muscle diseases."

The study of muscle development is of particular interest to the lab. In this line of study, he is most excited about decoding the genetic roadmap of muscle development and regeneration.

"The skeletal muscle is most abundant tissue which accounts for around 40% of human body weight and (is) indispensable in everyday life," he says. "While the majority of the population is born with healthy muscles, a large group of genetic defects affect the development of muscle and cause devastating outcomes. We are motivated to take unique angles of scientific approach to help understand the diseases."

Dr. Bi hopes that their work can eventually facilitate development of therapeutics for muscle diseases.

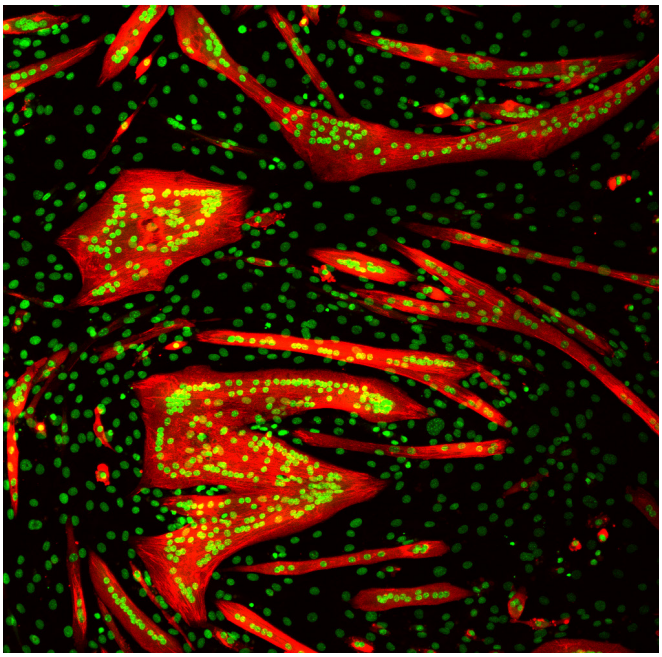

Figure 2. Myoblast fusion.

The lab currently uses CRISPR genome editing technology in human and mouse cells to alter the genetic codes. This includes CRISPR-mediated insertion, deletion, and alteration of genomic DNA sequences. They also employ CRISPR activation technology to induce gene expression from their endogenous loci for gene functional studies. In particular, they are performing genome-wide screens to identify key factors that promote the function of Myomixer and Myomaker. At the readout stage of the screens, they will generate the gRNA amplicon-libraries for next-generation sequencing (NGS).

They are also taking a complementary approach to utilize another NGS workflow that surveys the transcriptome of human myoblasts at the time of cell fusion.

When asked what challenges to their research they currently face, Dr. Bi said that extramural funding was at the top of the list. Many would agree. Though NGS is an excellent analytical tool, it's not cheap, and the cost for reagents and consumables can be an additional barrier.

To support their remarkable research, Beckman Coulter Life Sciences collaborated with the Bi lab. This collaboration gave Dr. Bi and his team the opportunity to evaluate the newly developed EMnetik 24 microparticle processor system, which Dr. Bi says, "has greatly facilitated our molecular cloning work."

Dr. Bi was nominated for a Beckman Coulter Life Sciences SPRI grant and was awarded the SPRIselect NGS cleanup and size selection reagent that was applied to the lab's NGS library preparation workflows, as well as other molecular cloning steps to clean up reactions and purify DNA.

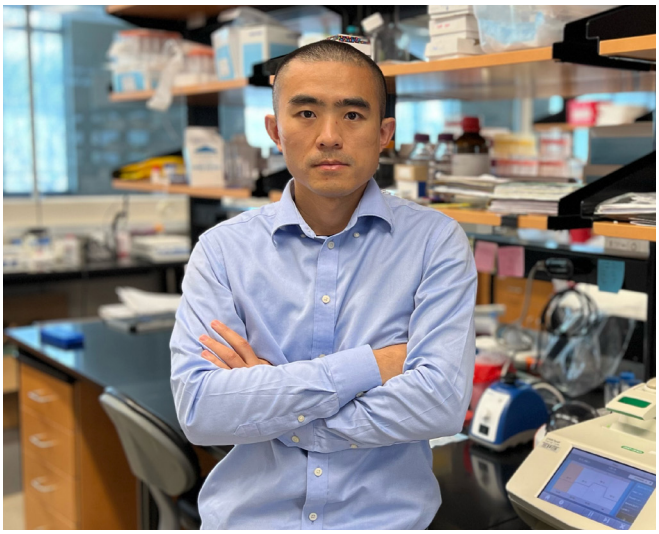

Figure 3. Dr. Bi in his lab at UGA.

The lab aspires to perform curiosity-driven research and advance the fundamental knowledge paramount for understanding the biological basis of both health and disease. In the field of fast-moving biomedical research, Dr. Bi believes that collaboration is the key to the success of both individuals and excellence as a team.

Beckman Coulter Life Sciences, with its grant and collaboration programs, provides a step toward collaborations that empower those like Dr. Bi who seek answers to life's important scientific and healthcare questions.

Learn more about the Bi Lab at **https://bilab.uga.edu/**

Learn more about Beckman Coulter Life Sciences Genomic Reagents at **https://www.beckman.com/reagents/genomic**

References:

1. Zhang H, Wen J, Bigot A, Chen J, Shang R, Mouly V, Bi P. Human myotube formation is determined by MyoD–Myomixer/Myomaker axis. ***Science Advances***. 2020; 18;6(51): eabc4062 [PMCID: 33355126]
2. Shang R, Zhang H, Bi P. Generation of mouse conditional knockout alleles in one step using the i-GONAD method. ***Genome Research***. 2021;31(1):121-13017 [PMCID: 33328166]
3. Zhang H, Shang R, Bi P. Feedback regulations of Notch signaling and myogenesis connected by MyoD–Dll1 axis. ***PLoS Genetics***. 2021 Aug 9;17(8):e1009729.
4. Zhang H, Shang R, Kwantae K, Zhou J, Liu L, Pei J, Wen J, Fissette S, Zhang J, Sun L, Green S, Bronner M. Grishin N, Li W, Ye K, Stolfi A, Bi P. Stepwise evolution of chordate-specific control system of myoblast fusion. ***bioRxiv***. 2021.

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