# Dystroglycan Gene Expression in Early Myoblast Differentiation

**Munerah Hamed**, Qiao Li

- Department of Cellular and Molecular Medicine, Department of Pathology and Laboratory Medicine, Faculty of Medicine, University of Ottawa, Ottawa, Ontario, Canada.
- Department of Pathology, Faculty of Medicine, Umm AL-Qura University, Saudi Arabia

## Abstract (300 word limit)

Dystroglycan, a component of the dystrophin-associated glycoprotein complex, connects the extracellular matrix and cytoskeleton to maintain muscle membrane integrity. As such, abnormalities of dystroglycan are linked to different types of muscular dystrophies. In an effort to develop therapeutic approaches to re-establish signal integration for muscle repair and homeostasis, we have previously determined that a clinically approved agonist of retinoid X receptor enhances myoblast differentiation through direct regulation of gene expression of the muscle master regulator MyoD. Using comprehensive omics and molecular analyses, we found that dystroglycan gene expression is responsive to retinoid X receptor-selective signaling in early myoblast differentiation. In addition, the dystroglycan gene is a MyoD target, and residue-specific histone acetylation coincides with the occupancy of histone acetyltransferase p300 at the MyoD binding sites. Consequently, the p300 function is important for rexinoid-augmented dystroglycan gene expression. Finally, dystroglycan plays a role in myoblast differentiation. Our study sheds new light on dystroglycan regulation and function in myoblast differentiation and presents a potential avenue for re-establishing signal integration of a specific chromatin state pharmacologically to overcome muscle pathology and identify additional myogenic interactions for therapeutic applications.

## Image

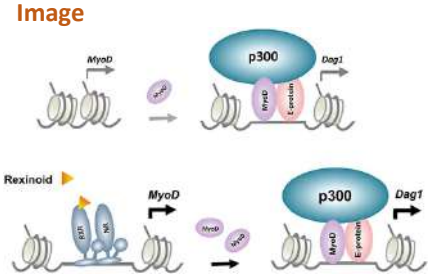



**Figure1. Model proposed for the regulatory events underlying p300 and MyoD-mediated rexinoid signaling in *Dag1* gene expression. RXR and its dimerization partner, nuclear receptor (NR), enhance *MyoD* expression, which in turn augments target gene expression such as *Dag1*.**

## Recent Publications (minimum 5)

1- Iqbal, Danish, Md Tabish Rehman, Mohamed F. Alajmi, Mohammed Alsaweed, Qazi Mohammad Sajid Jamal, Sharifa M. Alasiry, Awatif B. Albaker, **Munerah Hamed**, Mehnaz Kamal, and Hind Muteb Albadrani. 2023. "Multitargeted Virtual Screening and Molecular Simulation of Natural Product-like Compounds against GSK3β, NMDA-Receptor, and BACE-1 for the Management of Alzheimer's Disease" *Pharmaceuticals* 16, no. 4: 622. https://doi.org/10.3390/ph16040622

2- **Hamed M**, Chen J and Li Q (2022) Regulation of Dystroglycan Gene Expression in Early Myoblast Differentiation. Front. Cell Dev. Biol. 10:818701. doi: 10.3389/fcell.2022.818701

3- Al-Mijalli, S.H.; Mrabti, H.N.; Assaggaf, H.; Attar, A.A.; **Hamed, M**.; Baaboua, A.E.; Omari, N.E.; Menyiy, N.E.; Hazzoumi, Z.; Sheikh, R.A.; Zengin, G.; Sut, S.; Dall'Acqua, S.; Bouyahya, A. Chemical Profiling and Biological Activities of *Pelargonium graveolens* Essential Oils at Three Different Phenological Stages. *Plants* 2022, *11*, 2226. https://doi.org/10.3390/plants11172226

4- Khilji, S, **Hamed, M**, Chen, J and Li, Q. Dissecting myogenin-mediated retinoid X receptor signaling in myogenic differentiation. Nature, communications biology. 2020. DOI: 10.1038/s42003-020-1043

5- Khilji, S*, **Hamed, M***, Chen, J and Li, Q. Loci-specific histone acetylation profiles associated with transcriptional coactivator p300 during early myoblast differentiation. Epigenetics. 2018. DOI: 10.1080/15592294.2018.1489659 (*Co-1st author



**Munerah Hamed, PhD**

**Dr. Munerah Hamed** has her expertise in research and peer reviewing in the medical field. Her approach is open and contextual, and is built upon the principles of responsive constructivismp paves the way for new avenues to enhance the molecular genetic/Pathology field. She is currently an assistant professor at Umm Al-Qura University in Makkah, department of pathology. She also a senior specialist in the molecular genetic laboratory, part time, at King Abdulaziz Medical city in Jeddah. She is interested in gene transcriptional regulation in diseases, specifically muscle disease. 2023

Email: mhhamed@uqu.edu.sa