

FOLLISTATIN: A COMPREHENSIVE RESEARCH-BASED OVERVIEW

Amonova Gulafzal Uzbekboyevna – PhD,

Senior Lecturer of the Department of Pathological Anatomy with sectional-biopsy course of Samarkand State Medical University.

Remo Pal – 3rd year student of International Education Faculty of Samarkand State Medical University.

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Follistatin is a glycoprotein that plays a pivotal role in various physiological processes by binding and neutralizing members of the transforming growth factor-beta (TGF- β) superfamily, notably activins and myostatin. This interaction influences muscle growth, inflammation, fertility, and cellular signaling pathways.

The purpose of the study. Follistatin, also known as activin-binding protein, is a protein that in humans is encoded by the FST gene. Follistatin is an autocrine glycoprotein that is expressed in nearly all tissues of higher animals.

Research material and methods. Structure and Isoforms: Follistatin is primarily produced in the liver and is present in nearly all body tissues. It exists in multiple isoforms resulting from alternative splicing:

1. Follistatin 344 (FS-344): The most basic form, primarily used in gene therapy research. It can be converted into other forms to target different tissues.
2. Follistatin 315: The main form found in the bloodstream, predominantly targeting muscle tissue.
3. Follistatin 288: Involved mainly in reproductive health and has implications in tumor development.

Discussion of the results. Follistatin is a modulator of gonadal tumor progression and the activin-induced wasting syndrome in inhibin-deficient mice. Immunohistochemistry indicated that epithelial cells are the main source of activins and follistatin in the epididymis and vas deferens. Follistatin-like 1 (Fstl1) is a bone morphogenetic protein (BMP) 4 signaling antagonist in controlling mouse lung development. Follistatin (Fst) is a hyperplasia factor that plays a crucial role in muscle development. Activin and follistatin interactions in the male reproductive tract: activin expression and morphological abnormalities in mice lacking follistatin 288. Mechanism Follistatin is an autocrine glycoprotein that is found in the tissues of all mammals, including humans. Plasmid delivery of follistatin gene therapy safely improves body composition and lowers extrinsic epigenetic age in sex- and age-diverse adult human subjects. Follistatin increases in muscle tissue in response to muscle damage and plays a role in promoting cell growth throughout the body.

Biological Functions:

1. Muscle Growth: Follistatin promotes muscle hypertrophy by inhibiting myostatin, a protein that restricts muscle development. Studies in animals have demonstrated that increased follistatin levels lead to significant muscle growth.
2. Inflammation and Tissue Repair: Follistatin is involved in modulating

inflammatory responses and enhancing tissue repair. Research indicates its potential in improving skeletal muscle healing after injury.

3. **Reproductive Health:** By binding to activins, follistatin influences reproductive processes, including the regulation of follicle-stimulating hormone (FSH), impacting gamete development.

4. **Cellular Signaling:** Follistatin-like proteins interact with various receptors, such as DIP2A and TLR4, affecting signaling pathways related to cell growth, differentiation, and apoptosis. **Therapeutic Potential:** Due to its role in muscle growth and repair, follistatin has garnered interest in treating muscle-wasting conditions like muscular dystrophy. Gene therapy approaches delivering the follistatin gene have shown promise in enhancing muscle mass and strength in animal models. **Considerations and Future Directions:** While follistatin presents significant therapeutic potential, especially in muscle regeneration and reproductive health, further research is essential to fully understand its mechanisms and to develop safe and effective clinical applications. Ongoing studies continue to explore its broader implications in various physiological and pathological processes.

Conclusion. In summary, follistatin is a multifaceted protein integral to numerous bodily functions, with promising avenues for therapeutic interventions in muscle-related diseases and beyond. Follistatin naturally occurs in human bodies and is understood to play a role in both the inflammation processes as well as reproduction. The level of follistatin and activin is measured and their levels are compared with the oocyte grade in IVF patients. Follistatin, a glycosylated monomeric protein, is a modulator of transforming growth factor beta (TGF- β) superfamily signaling. Downregulated expression of the secreted glycoprotein follistatin-like 1 (Fstl1) is a robust hallmark of preadipocyte to adipocyte conversion. Reduced myogenin and follistatin expression seems to participate in muscle atrophy while increased MRF4 protein levels can modulate myosin.

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