



The role of fibronectin in malnutrition and immunity in ICU patient: a mini-review

Wisam Abdallah Hassan^{1,*} 

¹ Department of Intensive Care Unit, Almoosa Specialist Hospital, Al-Ahsa, Saudi Arabia.

*Corresponding author: Wisam Abdallah Hassan.
Department of Intensive Care Unit, Almoosa Specialist Hospital, Al-Ahsa, Saudi Arabia.
E-mail: dr.wesamoo00@gmail.com
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Abstract

Plasma fibronectin is a sensitive marker for nutritional status, rapidly decreasing during starvation and protein-energy malnutrition, making it a useful indicator for monitoring short-term nutritional status. As a glycoprotein, it is reduced in malnourished patients, often before albumin decreases, due to decreased hepatic synthesis and potential increased clearance. Plasma fibronectin levels have been shown to correlate with reticuloendothelial function and are reduced in critically ill patients, such as those with burns, shock, trauma, and sepsis. Patients failing to show an increase in fibronectin levels after stress have been shown to do poorly. Starvation studies in human volunteers have demonstrated decreasing plasma fibronectin levels until feeding was resumed.

Keywords: Fibronectin. Nutritional status. Malnutrition. Immunity. Intensive care unit.

Impact of Malnutrition on Fibronectin Level

Reduced Immune Defense: Low levels of circulating fibronectin impair the reticuloendothelial system's ability to clear foreign particles and bacteria, increasing infection risk. Impaired Wound Healing: Reduced fibronectin, a vital glycoprotein for cellular adhesion and migration, hinders the body's repair mechanisms [1,2].

Disease Progression: Low fibronectin is associated with poor outcomes in severe illnesses and, paradoxically, its decline is used as an indicator of nutritional depletion. High Mortality in Malnourished Patients: Studies indicate that restoring fibronectin levels via nutritional interventions (like parenteral

nutrition) can improve survival in malnourished children, suggesting its critical role in stabilization [3,4].

Fibronectin in Nutritional Interventions

Nutritional Indicator: Plasma fibronectin is highly sensitive to nutritional changes, often decreasing rapidly during short-term starvation and rising quickly with refeeding. It is considered a functional index of nutritional status, sometimes more sensitive than albumin in detecting mild to moderate protein-energy malnutrition [1-3].

Response to Therapy: Studies show that plasma fibronectin concentrations significantly increase after 1 week of intensive nutritional therapy, making it a valuable marker for monitoring the effectiveness of nutritional interventions [3].

Clinical Significance: As a glycoprotein, it plays a role in immunity and, when monitored in malnourished children, improved with nutritional support. However, some studies indicate it may lack consistency in long-term, chronic malnutrition studies [2,3].

Trauma/Critically Ill: In patients with trauma, fibronectin levels help monitor the effectiveness of enteral nutrition, correlating with nitrogen balance [3].

The effects of malnutrition on serum fibronectin and reticuloendothelial function

Wound Healing and Tissue Repair: Topical application aids in closing chronic, recalcitrant, or surgical wounds by promoting re-epithelialization and forming a scaffold for granulation tissue [4,5].

Corneal Regeneration: Used in eye drops or gels to improve healing in corneal ulcers and injuries. Tissue Engineering and Biomaterials: Fibronectin acts as a key component in scaffolding for tissue reconstruction, improving cell adhesion to medical devices, and as a component in bioactive dressings [4,9].

Critical Care/Immunotherapy: Investigated for restoring, with potential use in improving host defenses against sepsis in neonates or in critically ill adults [6,7].

Cosmetics and Skincare: Utilized for skin hydration and to enhance elasticity in antiaging treatments [5].

Musculoskeletal and Neural Repair: Plays a role in repairing connective tissue and is being researched for overcoming scar tissue in nerve regeneration [4].

Future Directions in Research

While promising, the use of fibronectin requires precise control, as persistent or improperly cleared fibronectin can lead to pathological fibrosis in diseases like arthritis. Future research is focused on developing engineered materials for controlled, localized, and sustained delivery of fibronectin to maximize efficacy.

Conclusion

Fibronectin is a crucial glycoprotein and rapid-turnover nutritional marker (half-life 4–24 hours) that drops significantly during malnutrition and severe illness, acting as an indicator of protein-energy deficiency. As a vital cell-adhesion molecule, its therapeutic administration has potential in treating critically ill patients, wound healing, and supporting immune function. Influence of total parenteral nutrition on plasma fibronectin in malnourished subjects with or without inflammatory response.

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