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How Glutamine Expedites Wound Healing

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Abstract— Glutamine is one of the amino acids that the body produces. It has various important roles, including muscle repair, rebuilding, protein synthesis, immune function and metabolism. Glutamine supplements are also touted in general for speeding the rate of wound healing. This pertains to the effectiveness of the amino acid to promote tissue repair and modulate immune function. Moreover, Glutamine boosts immunity and reduces inflammation around the wound. This abstract aims to provide a general overview of the existing knowledge regarding the phenomenon of glutamine and its role in wound healing, possibly as a therapeutic agent in the near future. We hereby report the significant improvement of wound healing in a 26-year-old polytrauma patient.

***Index Terms*— amino acid, glutamine, trauma, wound healing.**

1. Introduction

Wound healing occurs in four key stages as stated by Ugur Kesici et al., 2013; Hemostasis, Inflammation, Proliferation and Remodelling.

1. *Hemostasis:* Immediately after injury, blood vessels constrict and platelets form a clot to stop bleeding.
2. *Inflammation:* White blood cells preventing infection and preparing for healing of the wound.
3. *Proliferation:* New tissue forms as blood vessels grow, collagen is produced and the wound starts to close with new skin cells.
4. *Remodelling:* Over weeks to months, the new tissue strengthens and reorganizes, though the wound site may remain weaker and scarred.

These stages work together to restore tissue integrity and function after injury. Role of glutamine is a crucial amino acid that plays a key role in various bodily functions, including immune support, muscle recovery and gut health and most importantly wound healing, by Elena et. al., 2021. As the most abundant amino acid in the body, it is classified as non-essential because the body can produce it. However, during stress, illness, or intense physical activity, the demand for glutamine increases, making it conditionally essential.

2. Case Report

A 26-year-old female with difficult healing surgical wound following an open laparotomy. She was involved in a motor-vehicle accident, restrained in front seat passenger with the seatbelt trapped her shoulder and right axilla.

She was retrieved from the scene to a general hospital via ambulance. She sustained multiple injuries including common bile duct injury, Grade II liver injury, pylorus of stomach injury, pancreatic injury, right renal haematoma, L4/L5 chance fracture and right 7th, 10th, and 11th ribs fracture.

She underwent multiple surgeries: Firstly, laparotomy due to pneumoperiutoneum. Post operatively, noted drain had bile content. Patient underwent second operation, noted near total transection distal common bile duct injury, proceeding with hepaticojejunostomy. Multiple laparostomy and progressive abdominal wall closure done in view of abdomen compartment syndrome. We had a great challenge managing her laparotomy wound despite daily dressing with antibacterial cleansing solution and hydrogel. The patient's wound had improved significantly after the initiation of Glutamine Supplementation. She made a good recovery and was discharged after a 7-week admission.

Fig. 1. 2nd October 2024

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Fig. 2. 6th October 2024

Fig. 3. 10th October 2024

Fig. 4. 15th October 2024

Fig. 5. 23rd October 2024

3. Discussion

Wound healing is a complex physiological process involving sequential yet overlapping stages (Strodtbeck, 2001). Hemostasis occurs immediately after injury, forming a provisional matrix to seal the site and initiate healing. Inflammation follows, driven by mediators from injured cells, platelets, and hemostatic by-products. The third stage restores vascular and structural integrity as granulation tissue fills the wound. Finally, remodelling matures granulation tissue into connective tissue or scar.

Glutamine, the most abundant amino acid in mammalian plasma, is actively transported and metabolized in most tissues (Labow & Souba, 2000). Although considered "nonessential" due to its de novo synthesis, catabolic states like surgery and trauma increase glutamine demand beyond the body's production capacity. Within cells, glutamine supports nitrogen transport, redox balance, metabolism, and energy supply. Kapadia et al. (1985) showed significant declines in plasma and muscle glutamine levels post-surgery, reflecting heightened organ demand during stress. Increased gut glutamine consumption during such periods may conserve glucose for wound healing and glucose-dependent tissues.

Nutrition plays a critical role in wound healing, especially under stress (Arribas-López et al., 2021). Glutamine enhances healing by increasing arginine and citrulline levels, supporting nitric oxide synthesis, reducing inflammation (e.g., CRP levels), and acting as an antioxidant via glutathione production. Clinical trials have demonstrated its benefits in reducing CRP levels, infection rates, hospital stays, and wound healing time. For example, Lu et al. reported significantly lower CRP levels and infection rates in patients supplemented with 0.3 g/kg/day glutamine, while Neri et al. found shorter hospital stays with 0.2 g/kg/day supplementation. Similarly, Zhou et al. observed faster wound healing in burn patients receiving 0.34 g/kg/day glutamine.

In a recent case, oral supplementation of 0.5 g/kg/day glutamine for 15 days significantly improved wound healing. Pre-treatment images (Figures 1–2) showed sloughy wounds,

while post-treatment images (Figures 3–5) revealed reduced slough and visible granulation tissue, indicating notable progress. Since the initiation of Glutamine, the wound is healed completely and achieved full closure in just two weeks. Closure of abdomen was done in serial suture tighting.

4. Conclusion

Glutamine plays a vital role in wound healing by supporting tissue repair, modulating immune response, and reducing inflammation. Its supplementation, especially in catabolic states such as trauma and surgery, has shown significant benefits, including improved healing rates, reduced infection risks, and shorter hospital stays. In this case of a 26-year-old polytrauma patient with a non-healing surgical wound, glutamine supplementation led to marked wound improvement and a successful recovery, underscoring its potential as a therapeutic adjunct in wound care.

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