Effect of a specialized amino acid mixture on human collagen deposition


Study purpose:
To examine the effect of arginine, β-hydroxy-β-methylbutyrate (HMB), and glutamine supplementation on wound collagen accumulation.

Arginine has been shown to enhance wound healing in animal and human studies. HMB has been shown to increase lean body mass, improve skeletal muscle strength, and exert anticatabolic activity. Glutamine is essential for the metabolism of lymphocytes, enterocytes and other cells that turn over rapidly, though previous studies have not shown a specific benefit in wound healing. Cell and animal studies have shown that glutamine may have a role in regulation of collagen DNA synthesis.

Study design:
• Double-blind, randomized, controlled trial
• N=35 healthy, nonsmoking adults 70+ years (men and women); each fitted with two PTFE tubes placed subcutaneously in the deltoid region
• 18 participants randomized to receive 14 g arginine, 3 g HMB and 14 g glutamine in two divided doses; control group (N=17) received an isonitrogenous, isocaloric supplement of nonessential amino acids
• Catheters were removed at 7 and 14 days postimplantation and analyzed for hydroxyproline (OHP, an index of collagen accumulation), and α-amino nitrogen (an index of total protein deposition)

Collagen synthesis and scar formation are necessary for successful resolution after most surgeries. Infections and delayed wound healing can result in postsurgical complications.
Study results:
- Supplementation with the arginine, HMB, and glutamine resulted in a significant increase in plasma arginine and ornithine levels.
- Collagen content (OHP levels)
  - At 1 week: no difference
  - At 2 weeks: significantly ($P < .03$) more collagen in the arginine/HMB/glutamine group (72.2 nmol/cm implant) vs the control group (43.2 nmol/cm implant).
- Increase in collagen was not accompanied by increases in total protein deposition; accumulation of wound total protein was not different between groups.
- The combination was well tolerated, with no reported side effects.

Study conclusions:
- Collagen synthesis is significantly enhanced in healthy elderly subjects with the oral administration of arginine, HMB, and glutamine in combination; further evaluation is warranted to determine the effect of the supplement on other age groups or others with impaired healing.
- At the tested dosage, the combination provides a safe nutritional agent for increasing wound repair.

PTFE = polytetrafluoroethylene