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## NEURONUTRITION PROVIDES ADDITIONAL STRENGTH IN NEUROREHABILITATION

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Nutritional support has emerged as a critical component in neurorehabilitation, with extensive research demonstrating its fundamental role in optimizing patient outcomes and recovery processes across various neurological conditions. Malnutrition affects approximately 42% of patients with moderate to severe acquired brain injury upon admission to neurorehabilitation facilities, contributing to longer hospital stays, increased complications, and elevated morbidity and mortality rates. The metabolic changes following neurological injury, including hypermetabolism and hypercatabolism, create unique challenges that predispose patients to malnutrition if nutritional support is not initiated early. Research evidence strongly supports targeted nutritional interventions, with protein supplementation studies showing significant enhancements in neurological recovery - a randomized controlled trial of 42 ischemic stroke patients demonstrated that 21 days of hyperproteic nutritional formula (10% protein) resulted in greater improvement in NIH Stroke Scale scores compared to controls. Omega-3 polyunsaturated fatty acid supplementation has shown remarkable neuroprotective effects, with experimental research demonstrating that mice fed omega-3 PUFA-enriched diets for two months exhibited attenuated behavioral deficits following controlled cortical impact, protection against hippocampal neuronal loss, reduced pro-inflammatory responses, and maintained nerve fiber conductivity. The timing of nutritional intervention proves crucial, with very early feeding (within 6 hours) resulting in significantly shorter ICU stays compared to delayed feeding - analysis of 9,210 critically ill trauma patients showed 7.82 days versus 17.55 days for late feeding beyond 48 hours.

Comprehensive nutritional interventions have demonstrated multifaceted benefits, with individualized nutritional management in 454 stroke patients showing independent associations with improved skeletal muscle mass, motor function, dysphagia management, and shortened length of stay when implementing high-calorie, high-protein diets for malnourished patients and calorie-restricted appropriate protein diets for obese patients. Specialized dietary approaches including ketogenic diets have shown promise in neurological recovery through neuroprotective effects via improved mitochondrial function, while Mediterranean diet adherence has been associated with improved cognitive function and reduced risk of cognitive decline and dementia.

Micronutrient supplementation, particularly vitamin D for neuroprotective effects and B vitamins for myelin sheath production and neural function improvement, plays essential roles in supporting neurological recovery. The field is advancing toward personalized nutritional approaches through neuronutrition, considering individual responses to nutritional therapy based on factors like severity of deficiency, underlying medical conditions, and genetic variations. Effective implementation requires comprehensive nutritional assessment using validated tools like the Mini Nutritional Assessment-Short

Form (MNA-SF) and Global Leadership Initiative on Malnutrition (GLIM) criteria, combined with multidisciplinary team coordination involving dietitians, neurologists, physiotherapists, and speech therapists working collaboratively to ensure nutritional interventions align with overall rehabilitation goals and address the complex metabolic and recovery needs of neurological patients.

**Keywords:** Neuronutrition, Protein supplementation, Neurorehabilitation, Stroke, Dementia

## References

1. Aadal L, Holst M, Rasmussen HH, Nielsen JF, Odgaard L. Malnutrition in patients with moderate to severe acquired brain injury: prevalence during 4 weeks of subacute rehabilitation. *J Neurosci Nurs.* 2023;55(2):49-55.
2. Aquilani R, Maestri R, Andersson M, Boss A, Calza S, Micheletti G, et al. Protein supplementation may enhance the spontaneous recovery of neurological alterations in patients affected by ischaemic stroke. *Clin Rehabil.* 2008;22(12):1042-50.
3. Pu H, Guo Y, Zhang W, Huang L, Wang G, Liou AK, et al. Omega-3 polyunsaturated fatty acid supplementation improves neurologic recovery and attenuates white matter injury after experimental traumatic brain injury. *J Cereb Blood Flow Metab.* 2013;33(9):1474-84.
4. Kolanu ND, Ahmed S, Kerimkulova MK, Stańczak M, Vera GJ, Shaikh N, et al. Influence of nutritional interventions on functional outcomes in stroke rehabilitation: a systematic review. *Cureus.* 2024;16(2):e53685.
5. Vizzini A, Pinzon A, Bomfim A, Mendes M, Sampaio S, Ramos D, et al. Individualized nutritional treatment for acute stroke patients with malnutrition risk improves functional independence measurement: a randomized controlled trial. *Geriatr Gerontol Int.* 2020;20(3):176-182.
6. Valls-Pedret C, Sala-Vila A, Serra-Mir M, Corella D, de la Torre R, Martínez-González MÁ, et al. Mediterranean diet and age-related cognitive decline: a randomized clinical trial. *JAMA Intern Med.* 2015;175(7):1094-103.