

ACHIEVING MUSCLE AND METABOLIC HEALTH

Dr Chiang Shu Hui Grace

SFP2023; 49(3)

The process of ageing is a deterioration and decline of functional properties at the cellular, tissue, and organ level, which results in homeostatic dysregulation and increased vulnerability to stressors.¹ The global failure in hemodynamics resultant from ageing contributes to frailty, which has been postulated to be induced by reaching a threshold resultant from multisystem dysregulation.^{2,3}

Inadequate nutrition is an important determinant in the development of frailty and cognitive decline^{4,5} both through a direct and indirect casual pathway through its association with other risk factors of frailty such as increased risk of chronic diseases,⁶ decreased bone density,⁷ decreased immunity,⁸ sarcopenia, and functional decline.^{9,10} Sarcopenia, which can result from malnutrition, is an integral factor in the development of both frailty and cognitive impairment through an oxidative stress mechanism.^{11,12}

Cognitive decline and fatigue, which are both components and risk factors of frailty, interact within a cycle of decline associated with ageing and inadequate nutrition, which further hasten the development of frailty.^{13,14} Inadequate homocysteine-related vitamins and antioxidant nutrients increase the risk of cognitive decline and fatigue, and this results in a bidirectional relationship wherein fatigue and cognitive decline further worsen malnutrition, leading to increased frailty.^{15,16} Studies have found that an adherence to a Mediterranean diet, which is high in antioxidants, is linked to both a decreased incidence of frailty and improved cognition.¹⁷⁻¹⁹

Positive associations have been reported between frailty, cognitive impairment, and lack of physical activity.^{20,21} There is a strong correlation between physical activity and sarcopenia, a component of frailty and cognitive impairment; increased levels of physical activity have been shown to reverse sarcopenia and cognitive impairment.¹⁸

Interventions to improve muscle and metabolic health to prevent frailty include promoting healthy lifestyle behaviours such as increased physical activity, a Mediterranean diet, cognitive stimulation, smoking cessation, having a healthy mental state, being socially engaged, and prevention of cardiovascular risk factors and diseases.^{22,23}

This issue will provide an update on the latest evidence-based treatment options to achieving muscle and metabolic health.

In Unit 1, A/Prof Lim Wee Shiong gives an update on the current clinical practice guidelines for the screening, diagnosis, management, and prevention of sarcopenia in Singapore.

In Unit 2, Dr Chan Soo Ling writes about the challenges associated with Type 2 diabetes mellitus (T2DM) and the role of weight loss in controlling T2DM through multidisciplinary strategies comprising of lifestyle interventions, a patient-centred approach, and pharmacotherapy.

In Unit 3, Ms Sheetal Somaiya provides a review of the literature on increasing adherence to medical nutritional treatment with behaviour modification.

In this issue, A/Prof Goh Lee Gan has selected ten current readings on topics related to frailty, sarcopenia, and the role of nutritional intervention in T2DM and weight loss.

This issue also features an original paper by Dr Raymond Ng. This paper discusses the relevance of the Advance Care Planning (ACP) and the integral role that family physicians can play in its advocacy.

REFERENCES

1. Holliday R. Understanding ageing: Cambridge University Press; 1995.
2. Walston J, Hadley EC, Ferrucci L, et al. Research agenda for frailty in older adults: toward a better understanding of physiology and etiology: summary from the American Geriatrics Society/National Institute on Aging Research Conference on Frailty in Older Adults. *J Am Geriatr Soc* 2006;54:991-1001.
3. Gruenewald TL, Seeman TE, Karlamangla AS, Sarkisian CA. Allostatic load and frailty in older adults. *Journal of the American Geriatrics Society* 2009;57:1525-31.
4. Bonnefoy M, Berrut G, Lesourd B, et al. Frailty and nutrition: searching for evidence. *J Nutr Health Aging* 2015;19:250-7.
5. Cruz-Jentoft AJ, Kiesswetter E, Drey M, Sieber CC. Nutrition, frailty, and sarcopenia. *Aging Clin Exp Res* 2017;29:43-8.
6. Fairfield KM, Fletcher RH. Vitamins for chronic disease prevention in adults: scientific review. *Jama* 2002;287:3116-26.
7. Rizzoli R. Management of the oldest old with osteoporosis. *European Geriatric Medicine* 2010;1:15-21.
8. High KP. Micronutrient supplementation and immune function in the elderly. *Clinical infectious diseases* 1999;28:717-22.
9. Robinson S, Cooper C, Aihie Sayer A. Nutrition and sarcopenia: a review of the evidence and implications for preventive strategies. *Journal of aging research* 2012;2012.
10. Milaneschi Y, Tanaka T, Ferrucci L. Nutritional determinants of mobility. Current opinion in clinical nutrition and metabolic care 2010;13:625.
11. Nourhashemi F, Andrieu S, Gillette-Guyonnet S, et al. Is There a Relationship Between Fat-Free Soft Tissue Mass and Low Cognitive Function? Results From a Study of 7,105 Women. *Journal of the American Geriatrics Society* 2002;50:1796-801.
12. Mulero J, Zafrailla P, Martinez-Cacha A. Oxidative stress, frailty and cognitive decline. *J Nutr Health Aging* 2011;15:756-60.
13. Robertson DA, Savva GM, Kenny RA. Frailty and cognitive impairment--a review of the evidence and causal mechanisms. *Ageing Res Rev* 2013;12:840-51.
14. Theou O, Jones GR, Overend TJ, Klooseck M, Vandervoort AA. An exploration of the association between frailty and muscle fatigue. *Applied Physiology, Nutrition, and Metabolism* 2008;33:651-65.
15. Topinková E. Aging, disability and frailty. *Annals of Nutrition and*

- Metabolism 2008;52:6-11.
16. Gillette-Guyonnet S, Van Kan GA, Andrieu S, Barberger-Gateau P. IANA task force on nutrition and cognitive decline with aging. *The journal of nutrition, health & aging* 2007;11:132.
 17. Leon-Munoz LM, Guallar-Castillon P, Lopez-Garcia E, Rodriguez-Artalejo F. Mediterranean diet and risk of frailty in community-dwelling older adults. *J Am Med Dir Assoc* 2014;15:899-903.
 18. Ngandu T, Lehtisalo J, Solomon A, et al. A 2 year multidomain intervention of diet, exercise, cognitive training, and vascular risk monitoring versus control to prevent cognitive decline in at-risk elderly people (FINGER): a randomised controlled trial. *The Lancet* 2015;385:2255-63.
 19. Singh B, Parsaik AK, Mielke MM, et al. Association of mediterranean diet with mild cognitive impairment and Alzheimer's disease: a systematic review and meta-analysis. *Journal of Alzheimer's disease* 2014;39:271-82.
 20. Woo J, Goggins W, Sham A, Ho S. Social determinants of frailty. *Gerontology* 2005;51:402-8.
 21. Ottenbacher KJ, Graham JE, Al Snih S, et al. Mexican Americans and frailty: findings from the Hispanic established populations epidemiologic studies of the elderly. *American Journal of Public Health* 2009;99:673-9.
 22. Sternberg SA, Wershof Schwartz A, Karunanathan S, Bergman H, Mark Clarfield A. The identification of frailty: a systematic literature review. *J Am Geriatr Soc* 2011;59:2129-38.
 23. Desai AK, Grossberg GT, Chibnall JT. Healthy brain aging: a road map. *Clinics in geriatric medicine* 2010;26:1-16.