

A SELECTION OF TEN READINGS ON TOPICS RELATED TO ACHIEVING MUSCLE AND METABOLIC HEALTH

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Selection of readings made by A/Prof Goh Lee Gan

READING 1 – CPG FOR SARCOPENIA: SCREENING, DIAGNOSIS, MANAGEMENT AND PREVENTION

Lim WS,¹ Cheong CY,¹ Lim JP,¹ Tan MMY,¹ Chia JQ,¹ Malik NA,¹ Tay L.¹ Singapore Clinical Practice Guidelines For Sarcopenia: Screening, Diagnosis, Management and Prevention. *J Frailty Aging*. 2022;11(4):348-369. PMID: 36346721.

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ABSTRACT

OBJECTIVES: To present the local evidence and final recommendations of the Clinical Practice Guidelines workgroup convened by the Chapter of Geriatricians and the Society for Geriatric Medicine Singapore. The aim is to develop contextualised evidence-based recommendations that facilitate adoption of the Asian Working Group for Sarcopenia (AWGS) 2019 consensus into current practice in Singapore.

METHODS: The workgroup drew upon the AWGS 2019 consensus, updated literature review of Singapore studies till 31 Dec 2020, and evidence from recent systematic reviews. From 40 local studies included for data extraction, we constructed an evidence tables organised as: definition and epidemiology; diagnosis and evaluation; and treatment and intervention. Twenty recommendations – case-finding, diagnosis, treatment, prevention, research – were developed, and graded for strength and quality using the GRADE approach. Consensus from an expert panel (N=23) was achieved after two rounds of the modified Delphi process.

RESULTS: The local prevalence of sarcopenia among community-dwelling older adults ranged from 13.6 percent to 25 percent. Most studies adopted the AWGS 2019 and AWGS 2014 criteria. Reported case-finding tools include SARC-F, calf circumference (CC), and SARC-CalF. Gender-specific AWGS cut-offs for appendicular skeletal mass were used to define low muscle mass. Different protocols and dynamometers were used to assess handgrip strength, whilst gait speed and 5-times chair stand were commonly used to assess physical performance.

RECOMMENDATIONS: We conditionally recommend a case-finding approach in at-risk older adults using validated case-finding tools. Screen-positive individuals should be assessed for “possible sarcopenia” and underlying causes. For diagnosis, we conditionally recommend using the AWGS 2019 algorithm, and dual-energy X-ray absorptiometry when necessary to determine low lean mass for a confirmatory diagnosis of sarcopenia. For treatment, we strongly recommend resistance-based exercises and conditionally recommend a quality protein-rich diet/protein supplementation, with Vitamin D supplementation for insufficiency (<30 micrograms/L). For prevention, we recommend regular resistance-based physical activity and adequate protein intake (≥ 1.0 g/kg bodyweight). We encourage more research to address local evidence gaps.

READING 2 – SCREENING, DIAGNOSIS AND MONITORING OF SARCOPENIA. WHEN TO USE WHICH TOOL?

Ackermans LLGC,¹ Rabou J,² Basrai M,³ Schweinlin A,⁴ Bischoff SC,⁵ Cussenot O,⁶ Cancel-Tassin G,⁷ Renken RJ,⁸ Gómez E,⁹ Sánchez-González P,¹⁰ Rainoldi A,¹¹ Boccia G,¹² Reisinger KW,¹³ Ten Bosch JA,¹⁴ Blokhuis TJ.¹⁵ Screening, diagnosis and monitoring of sarcopenia: When to use which tool? *Clin Nutr ESPEN*. 2022 Apr;48:36-44. PMID: 35331514.

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ABSTRACT

BACKGROUND & AIMS: Sarcopenia is a muscle disorder associated with loss of muscle mass, strength, and function. Early screening, diagnosis, and treatment may improve outcome in different disease conditions. A wide variety of tools for estimation of muscle mass is available and each tool has specific technical requirements. However, different investigational settings and lack of homogeneity of populations influence the definition of gold standards, proving difficult to systematically adopt these tools. Recently, the European Working Group on Sarcopenia in Older People (EWGSOP) published a revised recommendation (EWGSOP-2) and algorithm for using tools for screening and diagnosing sarcopenia. However, agreement of the EWGSOP2 criteria with other classifications is poor and although an overview of available tools is valuable, for the purpose of clinical decision-making, the reverse is useful; a given scenario asks for the most suitable tools.

RESULTS: Tools were identified for screening, diagnostics, and longitudinal monitoring of muscle mass. For each of these clinical scenarios, the most appropriate tools were listed and for each technique their usability was specified based on sensitivity and specificity. Based on this information, a specific recommendation was made for each clinical scenario.

CONCLUSION: This narrative review provides an overview of currently available tools and future developments for different clinical scenarios such as screening, diagnosis, and longitudinal monitoring of alterations in muscle status. It supports clinical decision-making in choosing the right tools for muscle mass quantification depending on the need within a given clinical scenario as well as the local availability and expertise.

READING 3 – SARCOPENIA RISK AMONG CHINESE COMMUNITY-DWELLING OLDER ADULTS LIVING ALONE

Cheng L,¹ Sit JWH,² Chan HYL,² Choi KC,² Wong MMH,² Cheung RKY,³ Li FYK,³ Lee TY,³ Fung ESM,³ Tai KM,³ So WKW.⁴ Sarcopenia risk and associated factors among Chinese community-dwelling older adults living alone. *Sci Rep.* 2021 Nov 15;11(1):22219. PMID: 34782685.

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ABSTRACT

Sarcopenia, defined as a progressive loss of muscle mass and reduced muscle strength and functional capacity, is common among older adults. This study aimed to assess the proportion of people at risk of sarcopenia and probable sarcopenia among Chinese community-dwelling older adults living alone and to identify the associated factors. A total of 390 older adults were included in this study. Sarcopenia and probable sarcopenia were defined according to the criteria of the Asian Working Group for Sarcopenia 2019. Data on socio-demographic characteristics, health status, health behaviours and lifestyle characteristics, nutritional status, physical activity level, and depressive symptoms were collected. The association between these characteristics and sarcopenia risk was analysed using a multivariate ordinal logistic regression.

The proportion of subjects at risk of sarcopenia and probable sarcopenia was found to be 57.7 percent and 30 percent, respectively. Older age, being malnourished, and being at risk of malnutrition were significantly associated with sarcopenia risk. Being educated to secondary level or above, being overweight or obese, and higher physical activity level were associated with decreased sarcopenia risk.

Our results showed that older adults living alone were at high risk of developing sarcopenia and probable sarcopenia. These results emphasise the urgent need to initiate aggressive screening and holistic lifestyle therapeutic intervention strategies for this high-risk population.

READING 4 – SIMPLER SCREENING TOOL FOR SARCOPENIA IN SURGICAL PATIENTS

Wongyingsinn M,¹ Chaiwat O,^{1,2} Siriussawakul A,^{1,2} Thanakiattiwibun C,² Muangpaisan W,^{2,3} Chalermmsri C,³ Pramyothin P,⁴ Thitisakulchai P,⁵ Limpawattana P.⁶ A simpler screening tool for sarcopenia in surgical patients. *PLoS One.* 2021 Sep 23;16(9):e0257672. PMID: 34555077.

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ABSTRACT

BACKGROUND: Sarcopenia is defined as decreased skeletal muscle mass and muscle functions (strength and physical performance). Muscle mass is measured by specific methods, such as bioelectrical impedance analysis and dual-energy X-ray absorptiometry. However, the devices used for these methods are costly and usually not portable. A simple tool to screen for sarcopenia without measuring muscle mass might be practical, especially in developing countries. The aim of this study was to design a simple screening tool and to validate its performance in screening for sarcopenia in older adult cancer patients scheduled for elective surgery.

METHODS: Cancer surgical patients aged >60 years were enrolled. Their nutritional statuses were evaluated using the Mini Nutrition Assessment-Short Form. Sarcopenia was assessed using Asian Working Group for Sarcopenia (AWGS) criteria. Appendicular skeletal muscle mass was measured by bioelectrical impedance analysis. Four screening formulas with differing combinations of factors (muscle strength, physical performance, and nutritional status) were assessed. The validities of the formulas, compared with the AWGS definition, are presented as sensitivity, specificity, accuracy, and area under a receiver operating characteristic curve.

RESULTS: Of 251 enrolled surgical patients, 84 (34 percent) were diagnosed with sarcopenia. Malnutrition (odds ratio [OR]: 2.89, 95 percent CI: 1.40-5.93); underweight status (OR: 2.80, 95 percent CI: 1.06-7.43); and age increments of five years (OR: 1.78, 95 percent CI: 1.41-2.24) were independent predictors of preoperative sarcopenia. The combination of low muscle strength and/or abnormal physical performance, plus malnutrition/risk of malnutrition, had the highest sensitivity, specificity, and accuracy (81.0 percent, 78.4 percent, and 79.3 percent, respectively). This screening formula estimated the probability of sarcopenia with a positive predictive value of 65.4 percent and a negative predictive value of 89.1 percent.

CONCLUSION: Sarcopenia screening can be performed using a simple tool. The combination of low muscle strength and/or abnormal physical performance, plus malnutrition/risk of malnutrition, has the highest screening performance.

READING 5 – MANAGEMENT OF T2DM IN ELDERLY PATIENTS WITH FRAILTY AND/OR SARCOPENIA

Sanz-Cánovas J,^{1,2} López-Sampalo A,^{1,2} Cobos-Palacios L,^{1,2} Ricci M,^{1,2} Hernández-Negrín H,^{1,2} Mancebo-Sevilla JJ,^{1,2} Álvarez-Recio E,^{1,2} López-Carmona MD,^{1,2} Pérez-Belmonte LM,^{1,2} Gómez-Huelgas R,^{1,2,3} Bernal-López MR.^{1,2,3} Management of Type 2 Diabetes Mellitus in Elderly Patients with Frailty and/or Sarcopenia. *Int J Environ Res Public Health*. 2022 Jul 16;19(14):8677. PMID: 35886528.

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ABSTRACT

The life expectancy of the population is increasing worldwide due to improvements in the prevention, diagnosis, and treatment of diseases. This favours a higher prevalence of type 2 diabetes mellitus (T2DM) in the elderly. Sarcopenia and frailty are also frequently present in ageing. These three entities share common mechanisms such as insulin resistance, chronic inflammation, and mitochondrial dysfunction. The coexistence of these situations worsens the prognosis of elderly patients. In this paper, we review the main measures for the prevention and management of sarcopenia and/or frailty in elderly patients with T2DM.

READING 6 – DIETARY CARBOHYDRATE RESTRICTION AUGMENTS WEIGHT LOSS-INDUCED IMPROVEMENTS IN GLYCAEMIC CONTROL AND LIVER FAT IN T2DM PATIENTS

Thomsen MN,¹ Skytte MJ,² Samkani A,² Carl MH,² Weber P,² Haugaard SB,² Krarup T,^{2,3} Astrup A,³ Larsen TM,³ Magkos F,³ Chabanova E,⁴ Thomsen HS,⁴ Fenger M,⁵ Frystyk J,^{6,7} Hartmann B,^{8,9} Holst JJ,^{8,9} Madsbad S.¹⁰ Dietary carbohydrate restriction augments weight loss-induced improvements in glycaemic control and liver fat in individuals with type 2 diabetes: a randomised controlled trial. *Diabetologia*. 2022 Mar;**65**(3):506-517. PMID: 34993571.

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ABSTRACT

AIMS/HYPOTHESIS: Lifestyle modification and weight loss are cornerstones of type 2 diabetes management. However, carbohydrate restriction may have weight-independent beneficial effects on glycaemic control. This has been difficult to demonstrate as low-carbohydrate diets readily decrease body weight. We hypothesised that carbohydrate restriction enhances the beneficial metabolic effects of weight loss in type 2 diabetes.

METHODS: This open-label, parallel RCT included adults with type 2 diabetes, HbA1c 48-97 mmol/mol (6.5-11 percent), BMI >25 kg/m², eGFR >30 ml min⁻¹ [1.73 m]⁻², and glucose-lowering therapy restricted to metformin or dipeptidyl peptidase-4 inhibitors. Participants were randomised by a third party and assigned to six weeks of energy restriction (all foods were provided) aiming at ~6 percent weight loss with either a carbohydrate-reduced high-protein diet (CRHP, percentage of total energy intake [E percent]: CH30/P30/F40) or a conventional diabetes diet (CD, E percent: CH50/P17/F33). Fasting blood samples, continuous glucose monitoring, and magnetic resonance spectroscopy were used to assess glycaemic control, lipid metabolism, and intrahepatic fat. Change in HbA1c was the primary outcome; changes in circulating and intrahepatic triacylglycerol were secondary outcomes. Data were collected at Copenhagen University Hospital (Bispebjerg and Herlev).

RESULTS: Seventy-two adults (CD 36, CRHP 36, all white, 38 male sex) with type 2 diabetes (mean duration eight years, mean HbA1c 57 mmol/mol [7.4 percent]) and mean BMI of 33 kg/m² were enrolled, of which 67 (CD 33, CRHP 34) completed the study. Body weight decreased by 5.8 kg (5.9 percent) in both groups after six weeks. Compared with the CD diet, the CRHP diet further reduced HbA1c (mean [95 percent CI] -1.9 [-3.5, -0.3] mmol/mol [-0.18 (-0.32, -0.03) percent], p=0.018) and diurnal mean glucose (mean [95 percent CI] -0.8 [-1.2, -0.4] mmol/l, p<0.001), stabilised glucose excursions by reducing glucose CV (mean [95 percent CI] -4.1 [-5.9, -2.2] percent, p<0.001), and augmented the reductions in fasting triacylglycerol concentration (by mean [95 percent CI] -18 [-29, -6] percent, p<0.01) and liver fat content (by mean [95 percent CI] -26 [-45, 0] percent, p=0.051). However, pancreatic fat content was decreased to a lesser extent by the CRHP than the CD diet (mean [95 percent CI] 33 [7, 65] percent, p=0.010). Fasting glucose, insulin, HOMA2-IR, and cholesterol concentrations (total, LDL and HDL) were reduced significantly and similarly by both diets.

CONCLUSIONS/INTERPRETATION: Moderate carbohydrate restriction for six weeks modestly improved glycaemic control, and decreased circulating and intrahepatic triacylglycerol levels beyond the effects of weight loss itself compared with a CD diet in individuals with type 2 diabetes. Concurrent differences in protein and fat intakes, and the quality of dietary macronutrients, may have contributed to these results and should be explored in future studies.

READING 7 – ROLE OF NUTRITION IN MUSCLE HEALTH OF COMMUNITY-DWELLING OLDER ADULTS

Chen LK,^{1,2,3} Arai H,⁴ Assantachai P,⁵ Akishita M,⁶ Chew STH,⁷ Dumlao LC,⁸ Duque G,⁹ Woo J.¹⁰ Roles of nutrition in muscle health of community-dwelling older adults: evidence-based expert consensus from Asian Working Group for Sarcopenia. *J Cachexia Sarcopenia Muscle*. 2022 Jun;13(3):1653-1672. PMID: 35307982.

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ABSTRACT

General muscle health declines with age, and in particular, sarcopenia – defined as progressive loss of muscle mass and strength/physical performance – is a growing issue in Asia with a rising population of community-dwelling older adults. Several guidelines have addressed early identification of sarcopenia and management, and although nutrition is central to treatment of sarcopenia, there are currently few guidelines that have examined this specifically in the Asian population. Therefore, the Asian Working Group for Sarcopenia established a special interest group (SIG) comprising seven experts across Asia and one from Australia, to develop an evidence-based expert consensus.

A systematic literature search was conducted using MEDLINE on the topic of muscle health, from 2016 (inclusive) to July 2021, in Asia or with relevance to healthy, Asian community-dwelling older adults (≥60 years old).

Several key topics were identified: (1) nutritional status: malnutrition and screening; (2) diet and dietary factors; (3) nutritional supplementation; (4) lifestyle interventions plus nutrition; and (5) outcomes and assessment. Clinical questions were developed around these topics, leading to 14 consensus statements. Consensus was achieved using the modified Delphi method with two rounds of voting. Moreover, the consensus addressed the impacts of COVID-19 on nutrition, muscle health, and sarcopenia in Asia.

These statements encompass clinical expertise and knowledge across Asia and are aligned with findings in the current literature, to provide a practical framework for addressing muscle health in the community, with the overall aim of encouraging and facilitating broader access to equitable care for this target population.

READING 8 – ADHERENCE TO PLANT-BASED DIET WITH 3-YEAR WEIGHT-LOSS MAINTENANCE

Zhu R,¹ Møller G,¹ Raben A,^{1,16} Fogelholm M,² Jalo E,² Poppitt SD,³ Silvestre MP,^{3,4} Huttunen-Lenz M,⁵ Stratton G,⁶ Sundvall J,⁷ Råman L,⁷ Taylor MA,⁸ Macdonald IA,⁹ Handjiev S,¹⁰ Handjieva-Darlenska T,¹⁰ Martinez JA,^{11,12,13,14} Muirhead R,¹⁵ Brand-Miller J.¹⁵ Adherence to a Plant-Based Diet and Consumption of Specific Plant Foods-Associations with 3-Year Weight-Loss Maintenance and Cardiometabolic Risk Factors: A Secondary Analysis of the PREVIEW Intervention Study. *Nutrients*. 2021 Nov 1;13(11):3916. PMID: 34836170.

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ABSTRACT

Plant-based diets are recommended by dietary guidelines. This secondary analysis aimed to assess longitudinal associations of an overall plant-based diet and specific plant foods with weight-loss maintenance and cardiometabolic risk factors.

Longitudinal data on 710 participants (aged 26-70 years) with overweight or obesity and pre-diabetes from the 3-year weight-loss maintenance phase of the PREVIEW intervention were analysed.

Adherence to an overall plant-based diet was evaluated using a novel plant-based diet index, where all plant-based foods received positive scores and all animal-based foods received negative scores. After adjustment for potential confounders, linear mixed models with repeated measures showed that the plant-based diet index was inversely associated with weight regain, but not with cardiometabolic risk factors. Nut intake was inversely associated with regain of weight and fat mass and increments in total cholesterol and LDL cholesterol. Fruit intake was inversely associated with increments in diastolic blood pressure, total cholesterol, and LDL cholesterol. Vegetable intake was inversely associated with an increment in diastolic blood pressure and triglycerides and was positively associated with an increase in HDL cholesterol.

All reported associations with cardiometabolic risk factors were independent of weight change. Long-term consumption of nuts, fruits, and vegetables may be beneficial for weight management and cardiometabolic health, whereas an overall plant-based diet may improve weight management only.

READING 9 – NUTRITION KNOWLEDGE AND REMAINING CHALLENGES

Marchignoli F,¹ Sasdelli AS,¹ Petroni ML,^{1,2} Brodosi L,^{1,2} Caraceni P,^{1,2} Ravaioli F,^{1,2} Marchesini G.² Nutrition in Patients with Type 2 Diabetes: Present Knowledge and Remaining Challenges. *Nutrients*. 2021 Aug 10;13(8):2748. PMID: 34444908.

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ABSTRACT

Unhealthy behaviours, including diet and physical activity, coupled with genetic predisposition, drive type 2 diabetes (T2D) occurrence and severity; the present review aims to summarise the most recent nutritional approaches in T2D, outlining unmet needs. Guidelines consistently suggest reducing energy intake to counteract the obesity epidemic, frequently resulting in sarcopenic obesity, a condition associated with poorer metabolic control and cardiovascular disease.

Various dietary approaches have been proposed with largely similar results, with a preference for the Mediterranean diet and the best practice being the diet that patients feel confident of maintaining in the long term based on individual preferences. Patient adherence is indeed the pivotal factor for weight loss and long-term maintenance, requiring intensive lifestyle intervention.

The consumption of nutritional supplements continues to increase even if international societies do not support their systematic use. Inositols and Vitamin D supplementation, as well as micronutrients (zinc, chromium, magnesium) and pre/probiotics, result in modest improvement in insulin sensitivity, but their use is not systematically suggested.

To reach the desired goals, patients should be actively involved in the collaborative development of a personalised meal plan associated with habitual physical activity, aiming at normal body weight and metabolic control.

READING 10 – NUTRITION IN CHRONIC KIDNEY DISEASE. THE ROLE OF PROTEINS AND SPECIFIC DIETS

Apetrii M,¹ Voroneanu L,¹ Covic A,¹ Timofte D.² Nutrition in Chronic Kidney Disease – The Role of Proteins and Specific Diets. *Nutrients*. 2021 Mar 16;13(3):956. PMID: 33809492.

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ABSTRACT

Chronic kidney disease (CKD) is a global public health burden, requiring comprehensive management for preventing and delaying the progression to advanced CKD.

The role of nutritional therapy as a strategy to slow CKD progression and uraemia has been recommended for more than a century.

Although a consistent body of evidence suggests a benefit of protein restriction therapy, patients' adherence and compliance have to be considered when prescribing nutritional therapy in advanced CKD patients.

Therefore, these prescriptions need to be individualised since some patients may prefer to enjoy their food without restrictions, despite knowing the potential importance of dietary therapy in reducing uraemic manifestations and maintaining protein-energy status.