



# Personalized Nutrition Strategies for Optimizing Healthspan in Older Adults

Hiroshi Tanaka\*

*Institute for Gerontology and Lifespan Studies, University of Tokyo, Tokyo, Japan*

## DESCRIPTION

Nutrition plays a central role in promoting healthy aging, influencing physiological function, cognitive performance, immune resilience, and metabolic regulation. Older adults face unique nutritional challenges, including altered taste perception, reduced appetite, changes in digestion and absorption, and increased prevalence of chronic conditions. Personalized nutrition strategies-tailored to individual health status, lifestyle, genetic predispositions, and functional needs-offer an effective approach to optimizing healthspan and supporting independence in later life.

Energy requirements typically decline with age due to reduced basal metabolic rate and lower physical activity levels. However, nutrient density becomes increasingly important as caloric intake decreases. Diets should prioritize high-quality protein, complex carbohydrates, healthy fats, vitamins, and minerals to maintain muscle mass, support metabolic function, and preserve immune competence. Inadequate protein intake is strongly linked to sarcopenia and functional decline, making individualized protein targets critical for preserving strength and mobility. Micronutrient adequacy is another key of personalized nutrition. Older adults frequently exhibit deficiencies in vitamin D, calcium, B vitamins, and antioxidants, which contribute to impaired bone health, cognitive decline, and oxidative stress. Regular assessment through dietary analysis and laboratory testing allows for targeted supplementation or food-based interventions to correct deficiencies and enhance physiological function.

Hydration is essential in combination with nutrient intake. Age-related reductions in thirst perception increase the risk of dehydration, which can exacerbate cognitive impairment, constipation, renal dysfunction, and cardiovascular strain. Personalized hydration plans consider body weight, activity level, medications, and environmental conditions to ensure adequate fluid intake throughout the day. Water, herbal teas, soups, and water-rich foods provide versatile options for maintaining fluid balance. Gut health and microbiome diversity influence nutrient absorption, immune modulation, and metabolic function. Personalized nutrition approaches incorporate prebiotics,

probiotics, and fiber-rich foods to support a balanced microbiome. Fermented foods, whole grains, legumes, fruits, and vegetables promote beneficial microbial populations, enhance short-chain fatty acid production, and reduce systemic inflammation, contributing to overall health and resilience in aging populations.

Chronic conditions necessitate individualized dietary adjustments. Cardiovascular disease, diabetes, osteoporosis, kidney dysfunction, and gastrointestinal disorders all require specific nutritional considerations. For instance, sodium and saturated fat restriction support cardiovascular health, while adequate protein and calcium intake preserve bone density. Tailoring macronutrient ratios, meal timing, and food selection allows for optimal management of comorbidities without compromising overall nutrient adequacy. Behavioral and psychosocial factors influence adherence to personalized nutrition plans. Taste preferences, cultural practices, accessibility, affordability, and social support must be integrated into dietary recommendations. Engagement with nutrition professionals, meal planning strategies, and community programs can enhance adherence, ensuring that interventions are sustainable, enjoyable, and aligned with individual preferences.

Technology offers innovative tools for personalized nutrition. Mobile apps, digital food diaries, wearable devices, and telehealth consultations allow real-time monitoring of dietary intake, nutrient status, and health outcomes. Genetic testing and metabolomic profiling provide insights into individual nutrient requirements, metabolism, and disease risk, enabling highly targeted dietary interventions that optimize healthspan and functional capacity. Physical activity synergistically enhances the benefits of personalized nutrition. Exercise increases energy expenditure, promotes muscle protein synthesis, and improves insulin sensitivity, complementing tailored dietary strategies. Coordination of nutrition and physical activity supports body composition, cardiovascular health, cognitive function, and metabolic resilience, creating an integrated approach to healthy aging.

Psychological and cognitive outcomes are influenced by diet quality. Nutrient-dense diets rich in omega-3 fatty acids,

**Correspondence to:** Hiroshi Tanaka, Institute for Gerontology and Lifespan Studies, University of Tokyo, Tokyo, Japan, E-mail: h.tanaka@draftmail.org

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antioxidants, and polyphenols are associated with reduced risk of cognitive decline, depression, and neurodegenerative disease. Personalizing nutrition to include these protective nutrients, along with strategies to ensure adequate intake, supports brain health and emotional well-being in older adults. Longitudinal research demonstrates that personalized nutrition interventions improve functional outcomes, reduce disease risk, enhance quality of life, and extend healthspan. Individualized approaches that consider physiological needs, lifestyle factors, microbiome health, and psychosocial context allow older adults to achieve optimal nutrient balance, maintain independence, and sustain vitality throughout later life.

## CONCLUSION

Personalized nutrition is a foundational strategy for promoting healthy aging and maximizing healthspan. By integrating macronutrient and micronutrient adequacy, hydration, microbiome support, chronic disease management, behavioral adaptation, and technological tools, older adults can optimize physiological, cognitive, and emotional function. Tailored dietary approaches empower individuals to maintain independence, resilience, and quality of life, demonstrating the transformative role of nutrition in supporting holistic well-being and functional longevity.