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## Editorial

# Aging successfully needs lifelong prevention strategies



### ARTICLE INFO

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Over the next 40 years the number of persons 65 years and older will triple to 1.5 billion; this represents a change from 8% of the world's population being "elderly" to 16%. The increase in the percentage of older persons is due not only to the number of people living longer but also due to a decline in fertility. While these changes are dramatic in the developed countries, the speed of population aging is even more dramatic in developing countries. With the "Aging Tsunami" comes the reality that there is a shrinkage of the workforce (adults aged 18 to 65 years) in most countries. This creates the reality that older persons are going to have to work longer and, in addition, there will be a need for older persons to age in place. This makes the publication by Michel et al. [1] on how to prevent the development of frailty and disability in older persons a key guideline for the future of the aging world.

As Michel et al. [1] point out, there are 3 phases in the prevention of frailty and disability. The first is during childhood, the second is in adulthood and the third is in old age. As is always humorously pointed out, the best way to assure a successful, long life is to choose long-lived parents and grandparents. The next step is to assure that your mother doesn't smoke, take drugs, or drink alcohol during the pregnancy and that she takes her folate and gets regular check-ups with her gynecologist. It is now well established that small babies have a high prevalence of sarcopenia at 70 years of age [2]. During childhood, getting a good mixed diet, exercising regularly, and not becoming obese are important. At puberty, increasing calcium intake by increasing milk intake is protective against osteoporosis [3]. During adult life, eating plenty of fruits and vegetables and having fish a couple of times a week, i.e., a Mediterranean-type diet, appears to decrease cardiovascular and other diseases [4]. Exercise and maintaining a normal body mass index are key features to successful old age, as is not smoking. Early diagnosis and treatment of hypertension and use of statins in persons at cardiovascular risk are other preventive factors [5,6]. Nonsmoking also has a major effect on outcomes including mortality, pulmonary and cardiovascular disease and dementia.

Monitoring waist circumference (or now using metabolomics with  $\alpha$ -hydroxybutyrate, oleic acid, lineoyl-glycerophosphocholine and insulin (Quantose 1R) to detect early insulin resistance and allow early intervention appears also to be promising [7]. Early detection and treatment of osteoporosis represents an important preventive area to reduce hip fracture [8].

As we move to the "third age" there are numerous areas where either primary, secondary or tertiary prevention can be applied. In the area of primary prevention regular exercise (including resistance exercise), a Mediterranean-type diet, socialization and maintaining mental activity all are reasonable recommendations. Also, maintenance of vaccinations (tetanus, influenza [9–12], pneumococcal and herpes zoster) is appropriate. The recognition that pneumococcal vaccination should be given at least twice, although the evidence of whether the second vaccination should be the expensive Prevnar 13 or the cheaper pneumococcal 23 polysaccharide vaccination is unproven [13]. Primary prevention with a statin in persons over 65 years of age is no longer recommended [6].

While treatment of hypertension as a secondary prevention strategy is still appropriate in persons over 70 years it should be only initiated to maintain the blood pressure in a range of below 150 to 160 mmHg and only after a home blood pressure is available [14,15]. Before and during treatment of blood pressure, standing blood pressures [16] and the possible presence of postprandial hypotension [17,18] need to be determined. Home blood pressures need to be regularly obtained, and the possibility of pseudo-hypertension due to arterial sclerosis needs to be determined. It needs to be remembered that with weight loss that occurs with aging often antihypertensive medicines are unnecessary. In contrast to the need to reduce treatment for hypertension, atrial fibrillation needs to be aggressively treated to prevent stroke, falls, syncope and dementia [19–21].

Overtreatment (polypharmacy) due to the person seeing multiple specialists is very common in older persons [22–26]. This often leads to a large anticholinergic burden [27–29]. Also drug–drug interactions are a common problem and numerous drugs are inappropriate in older persons due to the physiological changes associated with aging [30].

While weight loss is recommended for persons under 65 years of age, the evidence suggests that with the exception of massive obesity (BMI > 40), weight loss increases mortality in older persons [31–33]. This is even true in persons with diabetes mellitus [34]. A major reason for this is weight loss results in loss of muscle (sarcopenia) [35] and bone (osteoporosis) [36]. In addition, the anorexia of aging makes some older persons lose weight

excessively when they go on a diet or develop a disease [37–39]. A BMI < 21 is highly predictive of poor outcomes in hospitalized older persons [40].

While salt restriction is commonly recommended, the available data suggests that ingestion of less than 3 g of sodium a day (and this is most probably true for those with heart failure) increases mortality [41,42]. Similarly, ideal calcium intake to prevent osteoporosis, mortality, heart diseases, dementia, kidney stones and constipation is between 600 mg to 1000 mg daily. As most persons in developed countries already eat 600 to 800 mg, adding one yogurt before going to bed to prevent nighttime calcium loss is ideal [43]. Similarly vitamin D intake should be limited to a maximum of 1000 IU a day [44,45]. Measuring vitamin D levels should be avoided as Vitamin D-binding protein is different in different ethnic groups [46].

The major area for preventing disability in older persons is the early recognition and management of frailty [47–49]. Screening can be done with the simple FRAIL [50–54] and SARC-F [55–59]. There is approximately a 60% overlap between frailty and sarcopenia [59]. For sarcopenia, the management of choice is exercise (both aerobic and resistance), vitamin D and a leucine-enriched essential amino acid supplement [60–64]. Recent studies have shown a decrease in frailty also occurs with this approach [65–67]. In persons with frailty, if they have fatigue they need to be investigated for depression [68,69], sleep apnea [70,71], hypothyroidism [72], vitamin B12 deficiency [73], anemia [74] and

hypotension [75]. If they have weight loss, the causes should be investigated using the MEALS-ON-WHEELS mnemonic [75,76]. A Mediterranean diet has been shown to decrease frailty [77]. Numerous preventive strategies for falls focusing on both intrinsic and extrinsic factors have been developed [78–84].

The IAGG Brain Health Consensus suggested that a minimal of case finding should be done for mild cognitive impairment and dementia [85], although there is considerable disagreement concerning this [86–88]. The reasons for screening are foremost that physicians, who often give complex instructions to their patients, need to know if they can understand them. Further, there are a number of treatable causes of cognitive impairment, eg, sleep apnea, hypothyroidism, drugs, depression, vitamin B12 deficiency. In addition, exercise [89–92], and a Mediterranean diet with extra virgin olive oil [93–95] can slow cognitive deterioration.

Tertiary prevention in older persons should focus on reversing disability wherever possible. Geriatric Evaluation and Management Units (GEMUs) have been shown to be successful at doing this [96,97]. In nursing homes, the FRAIL-NH scale has been shown to be able to identify persons who are most likely to benefit from aggressive rehabilitation in nursing homes [98–100].

In agreement with the Michel article [1], this editorial has highlighted the fact that aging successfully [101,102] requires a lifetime of preventive measures. These measures are summarized in Table 1.

**Table 1**  
A guide to health promotion over the lifespan.

Prior to birth	0–20 years	20–40 years	40–60 years	60–80 years	80+ years
Choose long-lived parents	Exercise regularly	Exercise regularly	Exercise regularly	Exercise regularly including balance and resistance exercises	Exercise regularly, including balance and resistance exercises
Do not be a small baby	Avoid obesity	Avoid obesity	Avoid obesity	Avoid weight loss	Avoid weight loss
Have your mother get regular check-ups during pregnancy	Ingest adequate calcium over puberty	Eat fish	Ingest adequate calcium (600–1000 mg/daily) and vitamin D	Ingest adequate calcium (600–1000 mg/daily) and vitamin D (1000 IU/daily)	Eat Mediterranean diet
Have your mother take pre-natal vitamins including folate	Wear your seatbelt	Wear your seatbelt	Wear your seatbelt	Wear your seatbelt	Wear your seatbelt
Have your mother not smoke or drink alcohol	Do not smoke or drink	Drink in moderation and do not smoke	Drink in moderation and do not smoke	Drink in moderation and do not smoke	Drink in moderation and do not smoke
	Eat nutritious foods	Drive at a safe speed	Have your blood pressure checked	Screen for breast and colon cancer, high blood pressure, osteoporosis, and diabetes	Check your blood pressure at home
	Avoid violence and illicit drugs	Avoid violence and illicit drugs	Get your cholesterol and glucose checked	Have flu/tetanus/pneumococcal vaccinations	Have flu/tetanus/pneumococcal vaccinations
	Get your vaccinations	Check your breasts regularly (females)	Screen for breast and colon cancer, high blood pressure, and diabetes	Eat fruits and vegetables and extra virgin olive oil (Mediterranean diet)	Ingest adequate calcium and vitamin D or spend 30 min a day in sunlight
	Get sunlight (vitamin D)		Have Pap smears (females)	Have Pap smears (females)	Do monthly breast self-exams
			Have regular mental activity and socialize!	Have regular mental activity and socialize!	Have regular mental activity, socialize, and avoid being depressed
			Avoid taking too many medicines	Avoid taking too many medicines	Avoid taking too many medicines
			Ingest between 3 to 6 g sodium a day		Safety-proof your home to prevent falls. If you are unsteady, use a cane and consider hip protectors
					Be screened for osteoporosis
					Be involved in multidomain program for frailty/falls/sarcopenia/cognitive decline
					Keep doing what you are doing.
					Remember, most of your physicians won't reach your age!

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