

# An approach to the management of unintentional weight loss in elderly people

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## Abstract

UNINTENTIONAL WEIGHT LOSS, or the involuntary decline in total body weight over time, is common among elderly people who live at home. Weight loss in elderly people can have a deleterious effect on the ability to function and on quality of life and is associated with an increase in mortality over a 12-month period. A variety of physical, psychological and social conditions, along with age-related changes, can lead to weight loss, but there may be no identifiable cause in up to one-quarter of patients. We review the incidence and prevalence of weight loss in elderly patients, its impact on morbidity and mortality, the common causes of unintentional weight loss and a clinical approach to diagnosis. Screening tools to detect malnutrition are highlighted, and non-pharmacologic and pharmacologic strategies to minimize or reverse weight loss in older adults are discussed.

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Unintentional weight loss is the involuntary decline in total body weight over time. In clinical practice, it is encountered in up to 8% of all adult outpatients<sup>1</sup> and 27% of frail people 65 years and older.<sup>2</sup> Weight loss is an important risk factor in elderly patients. It is associated with increased mortality, which can range from 9% to as high as 38% within 1 to 2.5 years after weight loss has occurred.<sup>1,3,4</sup> Frail elderly people,<sup>5</sup> people with low baseline body weight,<sup>5-7</sup> and elderly patients recently admitted to hospital are particularly susceptible to increased mortality.<sup>8,9</sup> Weight loss is also associated with an increased risk of in-hospital complications,<sup>10,11</sup> a decline in activities of daily living or physical function,<sup>12,13</sup> higher rates of admission to an institution<sup>2,8</sup> and poorer quality of life.<sup>14</sup>

## When is weight loss clinically important?

Unintentional weight loss may reflect disease severity (e.g., in patients with advanced heart disease, lung disease or malignant disease) or undiagnosed illness. Weight loss of 4%–5% or more of body weight within 1 year, or 10% or more over 5–10 years or longer, is associated with increased mortality or morbidity or both (Table 1). This association has also been seen in a number of epidemiologic and clinical studies that adjusted for comorbidity,<sup>5,7,13</sup> disability,<sup>5,13</sup> smoking,<sup>5,7</sup> alcohol use<sup>5</sup> or level of physical activ-

ity<sup>13</sup> and that excluded deaths within the first few years of weight loss to exclude undiagnosed illness.<sup>7</sup> In frail elderly populations, even small weight loss (e.g., 1 kg,<sup>5</sup> or 3% of body weight<sup>18</sup>) may be significant. Voluntary weight loss among elderly patients is also associated with increased risk of death<sup>17</sup> and of hip fracture,<sup>19</sup> which highlights the importance of maintaining weight with age.

## How common is weight loss?

Prevalence estimates of weight loss among elderly people vary tremendously. The results of epidemiologic studies have shown that most elderly patients maintain weight over a reasonably long period of 5–10 years.<sup>13,20,21</sup> Nevertheless, about 15%–20% experience weight loss — defined in these studies as a loss of either 5 kg or more or 5% of usual body weight over 5–10 years — with little difference between sexes.<sup>13,15,20</sup> This prevalence estimate rises to 27% in high-risk populations, such as free-living frail elderly people receiving community services.<sup>2</sup> Increasing age,<sup>13,22</sup> disability,<sup>9,13</sup> coexisting medical illnesses,<sup>19,22</sup> previous admission to hospital,<sup>13</sup> low education level,<sup>22</sup> presence of cognitive impairment,<sup>23</sup> smoking,<sup>13,19,22</sup> loss of a spouse<sup>13,22</sup> and low baseline body weight<sup>9,22</sup> have been associated with a higher likelihood of weight loss. The proportion of elderly people who experience rapid (within 6 months), severe ( $\geq 7.5\%$  of baseline body weight) and unexplained weight loss is only 0.45%.<sup>24</sup>

The incidence of unintentional weight loss in clinical studies involving adults seeking health care varies from 1.3% to 8%, depending on the setting and definition of weight loss.<sup>1,3,4,25</sup> There is also a difference in rates between clinical and epidemiologic studies, probably because most patients with weight loss present within a year of onset of their clinical symptoms.

## Causes and mechanisms

In general, causes of weight loss in elderly people are similar to those in middle-aged people and can be classified as organic (e.g., neoplastic, nonneoplastic and age-related changes), psychological (e.g., depression, dementia, anxiety disorders) or nonmedical (e.g., socioeconomic conditions) (Box 1). Up to one-quarter of all cases have no identifiable

cause, despite extensive investigation.<sup>1,3,24</sup> People with no known cause of weight loss generally have a better prognosis than people with known causes, particularly when the cause is neoplastic.<sup>1,29</sup>

Often a combination of factors will lead to weight loss in elderly people, particularly frail people 75 years or older. Many of these factors are not traditional medical diseases (Box 2). For example, patients with dementia or late-life psychotic disorders may become paranoid and suspicious that the food being served to them is poisoned.<sup>32</sup> Elderly people with dementia and habitual wandering expend significant energy in pacing. As well, some common illnesses may cause weight loss (e.g., gallstones may lead to chronic nausea and decreased appetite or avoidance of high-energy, fatty foods).

Several important age-associated physiologic changes predispose the elderly person to weight loss, such as declining chemosensory function (smell and taste),<sup>33,34</sup> reduced efficiency of chewing,<sup>35</sup> slowed gastric emptying<sup>36</sup> and alterations to the neuroendocrine axis (including changes in levels of leptin, cholecystokinin, neuropeptide Y and other hormones and peptides).<sup>37,38</sup> These changes are associated with early satiety and a decline in both appetite and the hedonistic appreciation of food, and collectively they contribute to the “anorexia of aging.” Other evidence also suggests that, compared with healthy younger adults, elderly people are less able to adapt to periods of over- and undereating and less likely to return to their usual body weight after such periods,<sup>39</sup> which makes them more susceptible to weight change. The importance of medications in contributing to weight loss cannot be overstated, since many elderly people take medications, mostly for chronic conditions (Table 2).

Various mechanisms have been suggested to explain the association between weight loss and adverse outcomes. Weight loss exacerbates the loss of fat-free mass (sarcopenia) associated with aging,<sup>42</sup> which leads to functional decline and fractures.<sup>43,44</sup> Many elderly patients with unintentional weight loss are experiencing concomitant malnutrition<sup>45</sup> and thereby have cachexia.<sup>46</sup> Cachexia is associated with a disproportionate loss of skeletal muscle rather than of body fat and is generally defined as a profound and marked state of constitutional disorder, general ill health and malnutrition. A decline of even 10% of skeletal muscle mass may be associated with a decline in physical function (e.g., decreased exercise tolerance or difficulty performing activities of daily living).<sup>47</sup> In addition, cachexia is associated with a systemic inflammatory response, increased cytokine concentrations and impaired immunity, all of which are thought to contribute to adverse outcomes, including early death.<sup>48</sup>

**Box 1: Common causes of unintentional weight loss in elderly patients (with approximate range of occurrence)**<sup>1,3,4,24–28</sup>

- Malignant disease (16%–36%)
- Psychiatric disorder (especially depression) (9%–42%)
- Gastrointestinal disease (6%–19%)
- Endocrine disorder (especially hyperthyroidism) (4%–11%)
- Cardiovascular disease (2%–9%)
- Nutritional disorders or alcoholism (4%–8%)
- Respiratory disease (~6%)
- Neurologic disorder (2%–7%)
- Chronic infection (2%–5%)
- Renal disease (~4%)
- Connective tissue disease (2%–4%)
- Drug-induced weight loss (medication side effects) (~2%)
- Unknown (10%–36%)

## Optimal clinical approach to weight loss

It is important to establish up front the presence of weight loss. A significant proportion of elderly people with documented weight loss may not complain about losing weight or, less commonly, may mistakenly attribute weight loss to successful diet or lifestyle modifications.<sup>1,24</sup> Furthermore, disturbed eating behaviours and body image (e.g., anorexia tardive)<sup>32</sup> among some elderly people may lead them to regard weight loss as desirable and therefore nonreportable. Conversely, up to half of people who claim to have lost weight have no documented evidence of weight loss.<sup>1</sup> If it is not pos-

**Table 1: Studies on the effect of unintentional weight loss in patients 65 years and older**

Study	Country	Study design	No. of patients	Definition of weight loss	Outcomes	Relative risk (95% CI)
Coroni-Huntley et al, 1991 <sup>6</sup>	United States	National multiphase surveys	14 407	> 10% over 10 yr	Increased mortality risk	Men: 1.5 (1.2–2.0) Women: 1.8 (1.4–2.5)
Deeg et al, 1990 <sup>15</sup>	The Netherlands	Prospective cohort	512	≥ 10% over 5 yr	Increased mortality risk, worsening overall health	Not reported
Losonczy et al, 1995 <sup>16</sup>	United States	Prospective cohort	6 387	> 10% after age 50	Increased mortality risk	Men: 1.69 (1.45–1.97) Women: 1.62 (1.38–1.90)
Wallace et al, 1995 <sup>17</sup>	United States	Prospective cohort	247	≥ 4% over 1 yr	Increased mortality	2.43 (1.34–4.41)

Note: CI = confidence interval.

sible to measure weight directly, a change in clothing size, corroboration of weight loss by a relative or friend, or a numerical estimate of weight loss provided by the patient are suggestive enough of true weight loss.<sup>1,3,29</sup> A careful history may elicit localizing symptoms (e.g., changes in defecation frequently imply involvement of the gastrointestinal tract) that may guide further investigations in almost half of patients.<sup>4,29</sup> All elderly patients with weight loss should undergo screening for dementia and depression<sup>30</sup> by using instruments such as the Mini-Mental Status Examination<sup>49</sup> and the Geriatric Depression Scale<sup>50</sup> respectively. Specific features on physical examination, such as cachexia, lymphadenopathy or palpable masses, may suggest a physical cause of weight loss (e.g., malignant disease).<sup>1,4</sup> However, the diagnostic utility of the medical history and physical examination in identifying the cause of weight loss have not been adequately evaluated.

Although few studies have systematically evaluated the utility of screening investigations for weight loss, the most useful non-invasive procedures appear to include a complete blood count, tests of liver enzyme levels (including alkaline phosphatase and bilirubin), measurement of lactate dehydrogenase level, and chest radiography.<sup>1,4,25,29</sup> Patients with iron-deficiency anemia or symptoms likely to originate in the gastro-

intestinal tract, and patients with elevated liver enzyme levels on initial screening, should undergo investigation of their gastrointestinal tract (either endoscopy or upper gastrointestinal series) or an abdominal ultrasound, respectively.<sup>1,4,24,29</sup>

Three scoring systems have been developed to help clinicians identify which patient with weight loss is likely to have a physical<sup>1,4</sup> or malignant<sup>51</sup> cause as opposed to a psychological or unknown cause. None of these scoring systems has been validated in independent populations presenting with weight loss.<sup>1,4,51</sup>

When weight loss is apparent in the elderly patient with no evidence of an organic disorder, primary malnutrition (i.e., resulting from inadequate food intake) must be considered as a contributor.

In general, elderly people are at increased risk of malnutrition because of insufficient food intake (quantity) rather than inappropriate selection of food (quality). Two screening tools, ENS<sup>52,53</sup> ([www.dietitians.ca/seniors/content/other/clsc\\_overview.asp](http://www.dietitians.ca/seniors/content/other/clsc_overview.asp)) and SCREEN<sup>54,55</sup>

([www.dietitians.ca/seniors/index.asp](http://www.dietitians.ca/seniors/index.asp)), have been developed and validated in Canada to identify community-dwelling elderly people who are at risk of malnutrition. Two other assessment tools, the Mini Nutritional Assessment ([www.mna-elderly.com](http://www.mna-elderly.com)) and the Nutrition Screen-

**Box 2: "Meals on Wheels": a mnemonic for common treatable causes of unintentional weight loss in the elderly<sup>30,31</sup>**

- M Medication effects
- E Emotional problems, especially depression
- A Anorexia tardive (nervosa), alcoholism
- L Late-life paranoia
- S Swallowing disorders
- O Oral factors (e.g., poorly fitting dentures, cavities)
- N No money
- W Wandering and other dementia-related behaviours
- H Hyperthyroidism, hypothyroidism, hyperparathyroidism, hypoadrenalism
- E Enteric problems (e.g., malabsorption)
- E Eating problems (e.g., inability to feed self)
- L Low-salt, low-cholesterol diets
- S Social problems (e.g., isolation, inability to obtain preferred foods), gallstones

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**Table 2: Side effects of drugs and supplements that can contribute to weight loss<sup>30,40,41</sup>**

Side effect	Drug or supplement
Anorexia	Amantadine, amphetamines, antibiotics (e.g., atovaquone), anticonvulsants, benzodiazepines, decongestants, digoxin, gold, levodopa, metformin, neuroleptics, nicotine, opiates, SSRIs, theophylline
Dry mouth	Anticholinergics, antihistamines, clonidine, loop diuretics
Dysgeusia or dysosmia or both	Acetazolamide, alcohol, allopurinol, amphetamines, ACE inhibitors, antibiotics (e.g., atovaquone, ciprofloxacin, clarithromycin, doxycycline, ethambutol, griseofulvin, metronidazole, ofloxacin, pentamidine, rifabutin, tetracycline), anticholinergics, antihistamines, calcium-channel blockers, carbamazepine, chemotherapy agents, chloral hydrate, cocaine, etidronate, gold, hydralazine, hydrochlorothiazide, iron, levodopa, lithium, methimazole, metformin, nasal vasoconstrictors, nitroglycerin, opiates, penicillamine, pergolide, phenytoin, propranolol, selegiline, sodium cromoglycate, spironolactone, statins, terbinafine, tobacco products, triazolam, tricyclics
Dysphagia	Alendronate, antibiotics (e.g., doxycycline), anticholinergics, bisphosphonates, chemotherapeutic agents, corticosteroids, gold, iron, levodopa, NSAIDs, potassium, quinidine, theophylline
Nausea or vomiting or both	Amantadine, antibiotics, bisphosphonates, digoxin, dopamine agonists, hormone replacement therapy, iron, levodopa, metformin, metronidazole, nitroglycerin, opiates, phenytoin, potassium, SSRIs, statins, theophylline, tricyclics

Note: SSRI = serotonin-specific reuptake inhibitor, ACE = angiotensin-converting enzyme, NSAID = nonsteroidal anti-inflammatory drug.

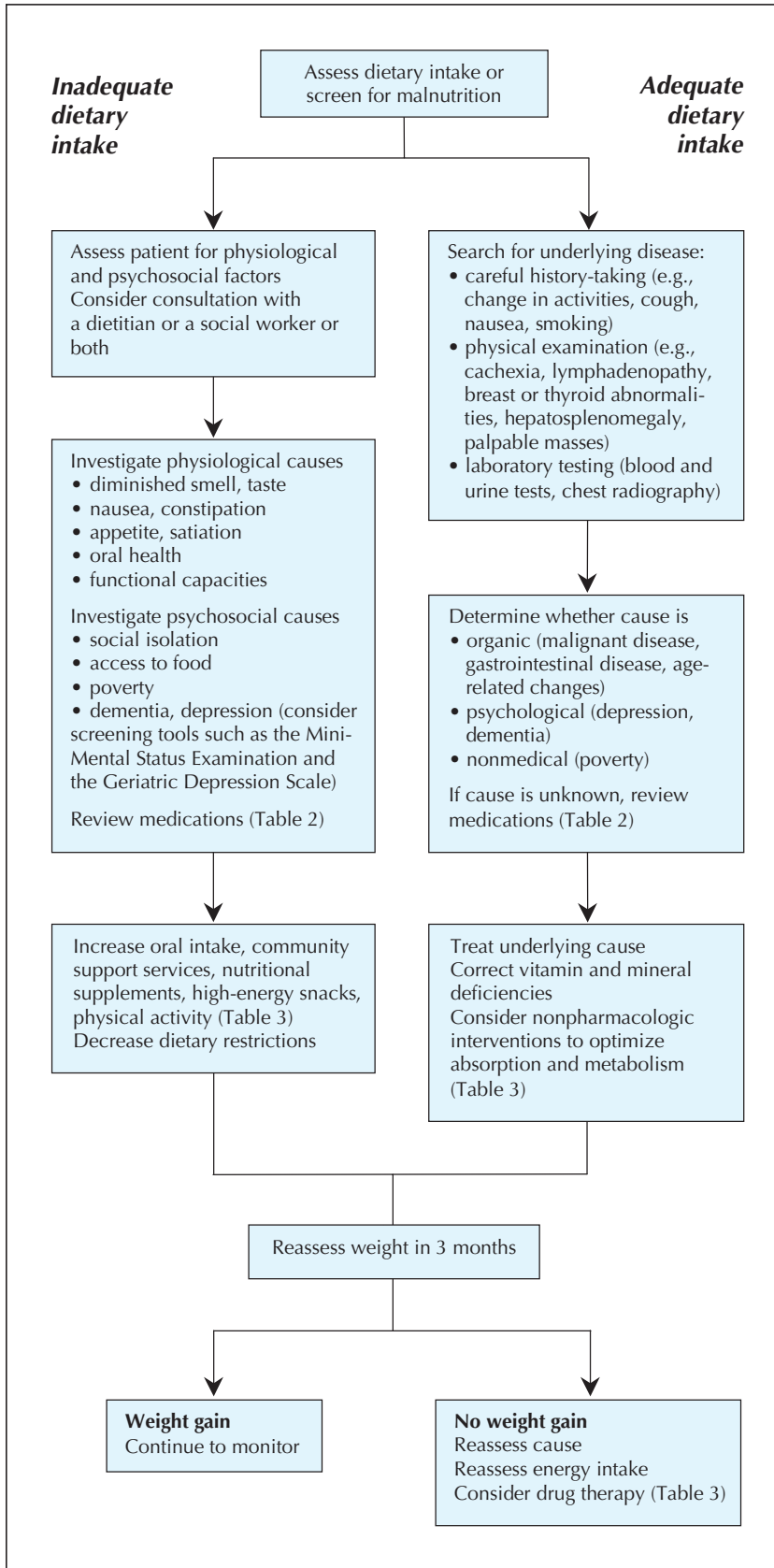


Fig. 1: Strategies for treating weight loss in elderly patients.

ing Initiative ([www.aafp.org/x16081.xml](http://www.aafp.org/x16081.xml)), which was created by the American Academy of Family Physicians with the American Dietetic Association, are also freely available to be used for nutritional assessment of elderly patients.

### How should weight loss be managed?

The first priority in managing weight loss is to systematically identify and treat the underlying causes (Fig. 1). Treatment of unintentional weight loss often requires enabling access to good nutrition, and several important nonpharmacologic strategies can be implemented to prevent or treat malnutrition and enhance food intake (Table 3). Factors such as poverty, poor dental health, difficulty in chewing or swallowing, vision or hearing loss, arthritis, stress (e.g., illness or death of a loved one) and unhappiness, which are associated with poor diet quality, should be targeted.<sup>52,80</sup> It is therefore prudent to involve a dietitian and a social worker to assist with assessment and management, particularly in cases where an obvious organic cause has not been identified. A physiotherapist may help patients increase their amount of exercise, to thereby stimulate appetite and increase energy intake and muscle mass.<sup>68,74-76</sup>

The use of oral nutritional supplements, such as high-energy drinks, as a means of reversing weight loss and increasing food intake may sometimes, but not always, reverse weight loss.<sup>66,69,81,82</sup> Counselling and encouraging patients to consume supplements in addition to their usual food intake rather than as a replacement of that intake is essential, since weight gain is confined to those who actually increase their energy intake.<sup>69,82</sup> Advising patients to consume supplements between meals, rather than with the meal, may help minimize appetite suppression and facilitate increased overall intake.<sup>71</sup> Although supplement use has been associated with short-term weight gain and improvements in biochemical, anthropometric and quality-of-life parameters in a number of trials, long-term beneficial effects on health, ability to function and survival in undernourished elderly people are yet to be consistently demonstrated.<sup>66,83</sup> A systematic review showed a reduction in mortality among el-



derly patients who received protein-energy supplements, irrespective of whether they had weight loss.<sup>70</sup>

Many elderly people consume too little food to meet their nutritional needs,<sup>84,85</sup> which puts them at risk of vita-

min and mineral deficiency. A broad-spectrum vitamin and mineral supplement should be considered for people at risk of malnutrition or where improvements in food intake are not observed.<sup>85</sup>

**Table 3: Nonpharmacologic interventions and recommendations that may reverse unintentional weight loss in older adults**

Intervention or recommendation	Rationale	Evidence
Minimize dietary restrictions <sup>30,56</sup>	Restricted diets are often energy-poor, have poor palatability and are not always medically indicated	Elderly people whose diets are restricted are at increased risk of weight loss <sup>13,57,58</sup>
Optimize energy intake by: <ul style="list-style-type: none"> <li>maximizing intake with high-energy foods at the best meal of the day<sup>30,56</sup></li> <li>eating smaller meals more often</li> <li>eating favourite foods and snacks</li> <li>providing finger foods</li> </ul>	May increase total daily energy intake by minimizing gastric distension seen with large meals and increasing the amount of food consumed	Many elderly people consume most of their daily energy intake at breakfast <sup>59,60</sup> Eating favourite foods led to reversal of malnutrition and return of appetite among severely anorectic, malnourished elderly patients <sup>61</sup> Providing finger foods increased food consumption and led to cessation of weight loss in patients with dementia <sup>62</sup>
Optimize and vary dietary texture <sup>63</sup>	Enhancing chewing and palatability of foods may stimulate positive feedback to eat more and minimizes fatigue associated with chewing	In a study involving patients with dementia, altering food texture according to observed patient preferences led to increased food intake and weight maintenance; <sup>63</sup> diversity of food texture was highly valued by adults with congenital anosmia, who may be at high risk of weight loss <sup>64</sup>
Avoid gas-producing foods <sup>56</sup>	May lead to gastric distension with air and earlier satiety	
Ensure adequate oral health <sup>47,56</sup>	Poor oral hygiene and dry mouth are risk factors for decreased oral intake through altered taste sensation and difficulty in chewing and swallowing	Improved ability to detect sweet and salty tastes was found after professional oral hygiene therapy 3 times weekly for 5 wk <sup>65</sup>
Take high-energy and nutritionally dense supplements or add fats or oils to usual foods	Increased energy intake may increase weight; nutrient-dense food (more energy per gram) may avoid satiety-related limitations in intake	Daily energy intake and weight gain significantly increased within 3–6 wk in malnourished elderly patients <sup>66–69</sup> and number of falls decreased; <sup>66</sup> oral supplements were associated with lower mortality and shorter length of hospital stay but not lower risk of complications; <sup>70</sup> studies were not restricted to elderly patients with weight loss
Take supplements between meals	May minimize appetite suppression and compensatory decreased intake of foods	Providing liquid supplements at least 60 min before a meal was associated with less appetite suppression and greater overall energy intake than when supplements were provided immediately before a meal in healthy older subjects <sup>71</sup>
Eat in company or with assistance <sup>47,56</sup>	May lead to enhanced enjoyment of meals and increased energy intake; many older adults need assistance with taking their meals because of physical or cognitive disabilities	
Use flavour enhancers	May counteract age-related increase in smell and taste thresholds (components of anorexia of aging)	Intake of most enhanced foods was increased and immune function and grip strength improved; <sup>72</sup> hunger increased and energy intake and weight gain improved; <sup>73</sup> studies were not restricted to patients with weight loss
Participate in regular exercise	Promotes muscle hypertrophy and gain in lean-body mass and may stimulate appetite	Improvements were seen in strength and muscle volume, especially with resistance exercises; <sup>74</sup> increased energy intake or weight gain or both occurred <sup>68,75,76</sup>
Take a multiple vitamin supplement daily <sup>56</sup>	Most older patients with weight loss have 1 or more nutritional deficiencies	Equivocal evidence showed association between multivitamin supplementation and reduced infections <sup>77</sup>
Use community nutritional support services <sup>47,78</sup>	Functional limitations related to supply, preparation and consumption of food greatly reduce the capacity of elderly people to have access to sufficient food of good quality	Meals-on-Wheels programs improved dietary intake of older recipients <sup>79</sup>

## Pharmacologic therapy to reverse weight loss

In our experience, the evidence supporting any pharmacologic agent for the treatment of weight loss is limited to mostly small, uncontrolled studies, and benefits are generally restricted to a small gain in weight without evidence of decreased morbidity and mortality or improved function and quality of life. Most of these agents have significant side effects, particularly in frail elderly people, which limits their usefulness. Various pharmacologic agents, including orexigenic (appetite-stimulating) and anabolic medications, have been used to improve appetite or cause weight gain in subjects with weight loss. Only 4 have been studied in randomized trials (Table 4).

The synthetic progestational agent megestrol acetate is best associated with weight gain in well-designed, randomized trials in populations of patients with malignant disease or HIV infection.<sup>90,91</sup> Evidence for its use with elderly people is limited.<sup>89,91-93</sup> Ornithine oxoglutarate led to weight gain in one randomized trial but has not been studied in other trials.<sup>86</sup> There are no randomized trials of either cyproheptadine or dronabinol in elderly people with weight loss, although dronabinol has been studied in one trial involving patients with dementia who were refusing food.<sup>88</sup> Both medications are associated with significant side effects, particularly central nervous system toxicity.<sup>88,94,95</sup>

Among anabolic agents, a 4-week randomized trial of human growth hormone in 20 undernourished elderly people demonstrated slightly faster weight gain and improved

walking time in those receiving the hormone. After 4 weeks, between-group differences in weight were no longer statistically significant.<sup>87</sup> Use of human growth hormone in other settings has been associated with increased mortality.<sup>96</sup> Several small clinical studies or cross-over trials of androgenic agents have not shown that they lead to weight gain.<sup>95,97</sup> Other pharmacologic approaches, such as anticytokine therapies, antiepileptic therapies and anti-inflammatory medications, are being investigated.<sup>95,98</sup>

## Conclusion

Unintentional weight loss is common in elderly people and is associated with significant adverse health outcomes, increased mortality and progressive disability. The differential diagnosis is broad, ranging from reduced food intake to organic causes to psychological disorders. Medications may also contribute to weight loss, as may social or economic factors. Up to 1 in 4 elderly people with unintentional weight loss will have no obvious medical cause. In others, a limited set of initial symptom-oriented investigations may reveal the underlying causes. A variety of nonpharmacologic interventions may improve energy intake and lead to weight gain, whereas the role for pharmacotherapy remains limited.

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**Table 4: Results of randomized double-blind placebo-controlled trials of pharmacologic interventions to treat weight loss in elderly patients**

Trial	No. of patients	Patient characteristics	Intervention	Outcome measures	Patient weight change*			Comments
					Study arm	Control arm	p value	
Brockner et al <sup>86</sup>	185	Independent-living, > 65 yr, recovering from acute illness or surgery; weight loss not necessary	Ornithine oxoglutarate† 10 g twice daily for 2 mo	Weight	1.7 ± 0.5	1.2 ± 0.7	< 0.001	Improvements in quality of life, appetite and activities of daily living; therapy well tolerated
Chu et al <sup>87</sup>	20	> 70 yr, BMI < 19 kg/m <sup>2</sup> , low albumin level	Recombinant human growth hormone 0.09 IU/kg 3 times weekly for 4 wk	Lean body mass, 5-m walking time	1.4	-0.1	NS	56% refusal rate; therapy used for short duration; therapy was costly; no serious adverse effects; associated with better walking time
Vollicer et al <sup>88</sup>	15	Mean age 73, with Alzheimer's disease, refusing food	Dronabinol 2.5 mg twice daily for 6 wk	Weight gain, agitation	7.0 ± 1.5 lb in first 6 wk	4.6 ± 1.3 lb in first 6 wk	NS	Only 11 subjects completed study; numerous central nervous system side effects
Yeh et al <sup>89</sup>	51	> 55 yr, living in nursing home, with ≥ 5% loss of body weight in previous 3 mo or 20% below ideal body weight	Megestrol acetate 800 mg daily for 12 wk	Weight gain, improvement in appetite at 12 and 25 wk	1.05 ± 1.0 at 12 wk; 2.95 ± 1.4 at 25 wk	0.91 ± 0.7 at 12 wk; -0.45 ± 0.9 at 25 wk	> 0.2 at 12 wk; 0.043 at 25 wk	Not an intention-to-treat analysis; 18 patients dropped out; appetite and weight continued to increase after 12 wk of therapy; no change in depression scores; no impact on survival

Note: BMI = body mass index, NS = not significant.

\*Weight is measured in kilograms unless otherwise indicated.

†Not licensed as a drug in Canada but available in health food stores.

tional Sciences, University of Toronto, the Kunin Lunenfeld Applied Research Unit and the Department of Food and Nutrition Services, Baycrest Centre for Geriatric Care, Toronto, Ont. (Greenwood); and the Faculty of Medicine, University of Sherbrooke, and the Research Centre on Aging, Sherbrooke Geriatric University Institute, Sherbrooke, Que. (Payette)

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