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# *Weight loss and undernutrition in community-dwelling patients with Alzheimer's dementia*

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# Weight loss and undernutrition in community-dwelling patients with Alzheimer's dementia

## From population based studies to clinical management

### Introduction

It is estimated that by the year 2030 approximately 65 million people will be affected by dementia worldwide [38]. Alzheimer's disease (AD) is the most frequent cause of dementia [11, 39, 45] and is characterized by cognitive impairment, functional decline and neuropsychiatric symptoms [6, 45]. In addition, AD is associated with weight loss: in 1907 Alzheimer described weight loss in his first patient [26] and weight loss is currently recognized as a clinical feature of AD [30].

The aim of this review is to summarize the state of existing knowledge about weight loss and undernutrition in community-dwelling AD patients and describes (1) the epidemiology of weight loss and undernutrition in community-dwelling AD patients, (2) its consequences and causes, (3) treatment and (4) practical recommendations.

### Epidemiology of weight loss and undernutrition

Various studies have investigated the prevalence of weight loss and undernutrition in community-dwelling AD patients [5, 13, 14, 21, 52, 55]. The number of community-dwelling AD patients with weight loss described in the literature varies between 20% and 45% [5, 13,

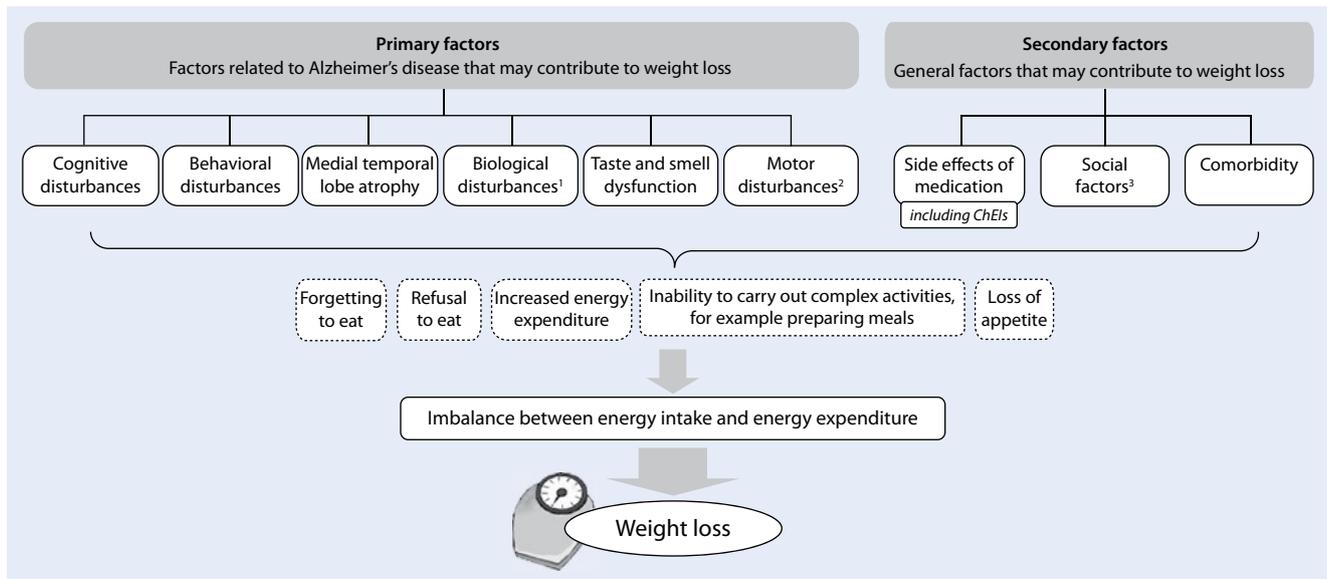
14, 21, 52, 55]. The number of community-dwelling AD patients at risk of undernutrition according to the mini-nutritional assessment (MNA), which is a validated screening and assessment tool to identify risk of undernutrition in older people [23, 49], varies from 14% to 80% [8, 17, 21, 35, 36, 40, 41, 44, 48] and the number of undernourished patients (according to the MNA) varies from 0% to 9% [8, 20, 40, 41]. This wide variation in the number of community-dwelling AD patients with weight loss and (risk of) undernutrition could be explained as follows: the highest prevalence of weight loss and (risk of) undernutrition were reported in studies from the precholinesterase inhibitor (ChEI) era [13, 52, 55]. Recent studies have shown a decreased risk of weight loss in AD patients treated with a ChEI compared to untreated patients [15, 14, 22, 21]. In these studies ChEIs appeared to protect against weight loss. In addition, it could be that weight loss and undernutrition in AD patients are currently less frequently observed due to the increased quality of care of home-dwelling AD patients. In the past decade it is not just the pharmacological treatment that has changed the management of AD. Drugs are given in addition to multiple non-pharmacological interventions, including for instance dietary advice and provision of meals by home services [31,

34]. Gu et al. showed that the body mass index (BMI) of AD patients declined up to the clinical onset of AD; however, after clinical onset there was not a decrease but an increase of the BMI, possibly because care was arranged after the diagnosis of AD [19]. This finding is in accordance with the results from the Frisian Alzheimer's disease cohort (i.e. a longitudinal study of the long-term course of 576 community-dwelling AD patients at a large memory clinic) where contrary to what was expected, AD patients did not lose but gained weight during 3.5 years of follow-up.

Even though severe undernutrition might not be an issue in community-dwelling AD patients, one in seven community-dwelling elderly people with newly diagnosed AD was at risk of undernutrition in a recently published investigation [8] and other studies reported even higher rates [17, 21, 35, 36, 40, 41, 44, 48]. Given the suggested adverse outcomes of weight loss and (risk of) undernutrition, it is important to pay attention to the nutritional status of community-dwelling AD patients.

### Consequences and causes of weight loss and undernutrition

Weight loss and undernutrition have been associated with various adverse out-



**Fig. 1** ▲ Hypotheses regarding the causes and mechanisms for weight loss in patients with Alzheimer's disease (ChEIs cholinesterase inhibitors, <sup>1</sup>biological disturbances: hormonal changes, inflammatory abnormalities, endocrine and metabolic changes, <sup>2</sup>motor disturbances: restlessness, pacing and repetitive tasks, <sup>3</sup>social factors: increasing age, no social support, loneliness and poverty). Based on the following studies: Gillette-Guyonnet et al. 2000, White [51], Gillette-Guyonnet et al. 2007, Aziz et al. [3], Inelmen et al. [26], Sergi et al. [43]

comes in AD patients, such as an accelerated progression of cognitive decline [13, 14, 20, 48], increased care dependency [14, 20, 48], a higher incidence of behavioral problems [20], increased morbidity [13], decreased quality of life of patients and caregivers [13], a higher rate of institutionalization [2] and increased mortality [10, 12, 53]. It should be noted that a cause-effect relationship has not been established. The various hypotheses regarding the causes and mechanisms for weight loss in AD patients are summarized in **Fig. 1** [3, 16, 13, 26, 43, 51]. The factors that may contribute to weight loss in AD patients can be divided in primary and secondary factors [3, 51]. Primary or disease-related factors associated with AD are cognitive disturbances, behavioral problems, taste and olfaction disorders (**Fig. 1**) [3, 51]. Secondary factors are general factors that may contribute to weight loss, such as adverse effects of medication and comorbidities (**Fig. 1**) [3, 51]. These primary and secondary factors may lead to loss of appetite, refusal to eat and inability to prepare meals, finally resulting in an imbalance between energy intake and energy expenditure and hence in weight loss (**Fig. 1**) [3, 16, 13, 26, 43, 51].

None of the proposed mechanisms or causes of weight loss in AD have been proven. A better insight into the causes and mechanisms is relevant given the assumed adverse outcomes. As shown in **Fig. 1**, some authors hypothesized that AD patients lose weight as a result of atrophy of the medial temporal lobe [16, 13, 18, 26, 33]. The medial temporal lobe is a brain area which is involved in the regulation of food intake [18, 29, 33] and a site where AD pathology is typically present [54]. A recently finished but as yet unpublished study investigated the hypothesis that weight loss is associated with medial temporal lobe atrophy (MTA) but no evidence for this association was found (manuscript submitted and review of revision is ongoing). In addition, it is assumed that ChEIs may contribute to weight loss due to gastrointestinal side effects, such as nausea, vomiting and diarrhea [16], which may be caused by the cholinergic action of ChEIs on the stomach and intestines [37]. Given the increasing number of patients treated with a ChEI [15, 28], it is important to establish the role of ChEIs as a potential contributing factor to weight loss. The long-term effects of the ChEI galantamine on weight of community-dwelling AD patients were

investigated. The results of this study showed that long-term treatment with galantamine had no effect on the weight of AD patients [7]. Weight loss in AD patients should therefore not be attributed to long-term treatment with galantamine. This is in accordance with the recommendations of the French guidelines for the diagnosis, management and prevention of weight loss in AD [4].

» None of the proposed mechanisms or causes of weight loss in AD have been proven

### Treatment of weight loss and undernutrition

Given the prevalence and possible adverse outcomes of weight loss and (risk of) undernutrition, it is important to know what the best approach is to community-dwelling AD patients with a risk of developing a poor nutritional status. Nevertheless, in the current guidelines on diagnosis and treatment of AD [25, 32, 42] no recommendations for treatment of (risk of) undernutrition in community-dwelling AD patients are given. There are several guidelines and studies on the treat-

## Abstract · Zusammenfassung

ment of (risk of) undernutrition in older people without AD; however, it would appear that these results cannot be extrapolated to AD patients, firstly, because the mechanism of weight loss and undernutrition in AD patients is probably not the same as in individuals without AD and secondly, because of expected differences in adherence to the nutritional interventions. Due to cognitive impairment, AD patients may forget to take an oral nutritional supplement (ONS).

» In the current guidelines no recommendations for treatment of undernutrition in community-dwelling patients are given

This research group recently conducted a systematic review, according to the methods outlined by the Cochrane collaboration [24], on the effect of nutritional interventions in community-dwelling AD patients with (risk of) undernutrition, which was published in the journal *International Psychogeriatrics* [9]. Despite a comprehensive literature search, only one study was judged to be relevant for the purpose of that systematic review [9]. In this study Lauque et al. showed that ONS significantly improved nutritional outcomes (e.g. body weight, MNA, energy intake, protein intake and fat-free mass) in community-dwelling AD patients at risk of undernutrition, as evaluated with the MNA [27]; however, no effects were found on clinical and biochemical outcomes [27]. In addition, the risk of bias in the study of Lauque et al. [27] was judged to be high. Based on the results of this recently published systematic review, no recommendations for the best approach to community-dwelling AD patients with (risk of) undernutrition could be formulated. Allen et al. performed a systematic review and meta-analysis of the effects of ONS in people with dementia [1] and concluded that providing ONS has a positive effect on weight gain and cognition [1]. The study of Allen et al. included both institutionalized and community-dwelling patients with dementia but not specifically with AD. Most of the patients included (75%) were residents in long-term

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### Weight loss and undernutrition in community-dwelling patients with Alzheimer's dementia. From population based studies to clinical management

#### Abstract

Weight loss and undernutrition are commonly described in patients with Alzheimer's disease (AD) and have been associated with various adverse outcomes. Therefore, it is important to know what the best approach is to community-dwelling AD patients with a risk of developing a poor nutritional status; however, there is currently no evidence on which to base nutritional recommendations. Expert based recommendations are that the nutritional status should be part of the work-up of all AD patients. If weight loss of 5% or more has occurred in 3–6 months or if the mini-nu-

tritional assessment (MNA) classifies a patient as undernourished, a nutritional intervention should be started. The intervention should be multifactorial and encompass treatment of the underlying proposed causes and risk factors of weight loss and undernutrition as well as improvement of the nutritional status by increasing energy and protein intake combined with daily physical activity.

#### Keywords

Alzheimer's disease · Review · Nutrition assessment · Nutritional status · Management

### Gewichtsverlust und Unterernährung bei selbstständig lebenden Patienten mit Alzheimer-Demenz. Von populationsbasierten Studien zum klinischen Management

#### Zusammenfassung

Gewichtsverlust und Unterernährung werden bei Patienten mit Demenz vom Alzheimer-Typ (AD) häufig beschrieben, beides ist assoziiert mit einer Reihe unerwünschter Folgen. Den optimalen Ansatz zu kennen für AD-Patienten, die nicht in betreuten Einrichtungen leben und bei denen das Risiko der Entwicklung eines ungünstigen Ernährungszustandes besteht, ist daher von hoher Relevanz. Leider gibt es bisher noch keine Evidenz, auf der Ernährungsempfehlungen basieren könnten. Nach auf Expertenmeinungen beruhenden Empfehlungen sollte das Management des Ernährungszustands integraler Bestandteil bei der Betreuung aller AD-Patienten sein. Mit einer Intervention zu beginnen empfiehlt sich entweder bei einem Gewichtsverlust

von mehr als 5% in 3–6 Monaten oder bei der Klassifizierung eines Patienten als unterernährt nach dem MNA (Mini Nutritional Assessment). Eine solche multifaktorielle Intervention sollte sowohl Risikofaktoren und die zugrundeliegenden Ursachen für Gewichtsverlust und Unterernährung berücksichtigen als auch die Verbesserung des Ernährungszustandes über erhöhte Energie- und Proteinaufnahme anstreben, in Kombination mit täglicher körperlicher Aktivität.

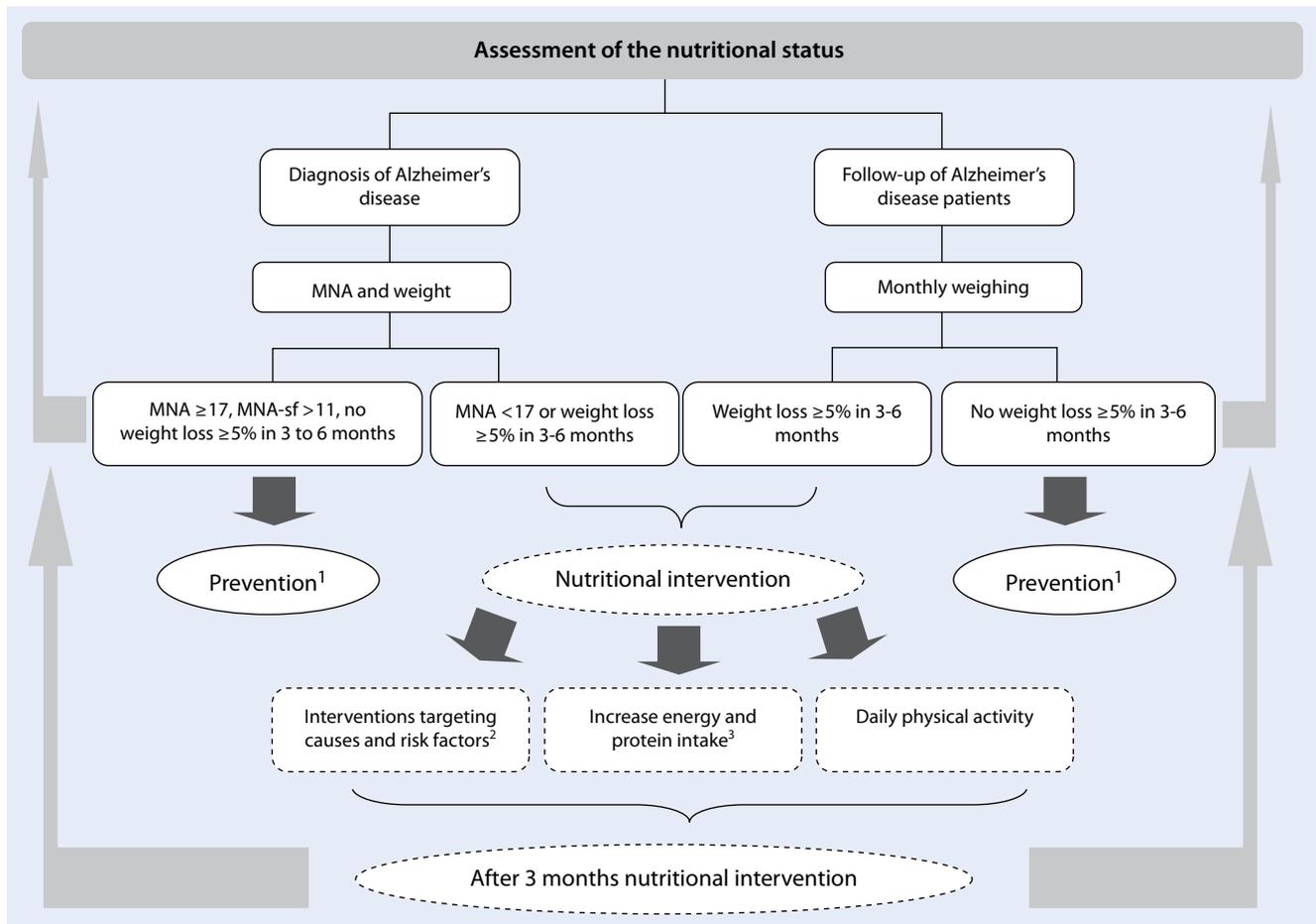
#### Schlüsselwörter

Morbus Alzheimer · Review · Ernährungs-Assessment · Ernährungszustand · Management

care establishments [1] which might explain the differences in results compared to our systemic review, e.g. the compliance in institutionalized patients may be better than in community-dwelling patients, because community-dwelling patients have no professional caregiver to ensure that the patient adheres to therapy.

### Practical recommendations with regard to weight loss and undernutrition

In the absence of evidence, expert-based practical recommendations are given on how to approach the nutritional status of community-dwelling AD patients. In 2007, Belmin et al. provided practical guidelines for the diagnosis, management and prevention of weight loss in AD [4]. These guidelines were based on a 23 member expert panel drawn from French geriatricians [4] and the present authors



**Fig. 2** ▲ Approach to the nutritional status of community-dwelling patients with Alzheimer's disease (MNA mini-nutritional assessment; MNA-sf MNA short form; <sup>1</sup>By a varied, balanced diet and daily physical activity; <sup>2</sup>See Fig. 1; <sup>3</sup>By dietary fortification, dietary counseling, oral nutritional supplements and, occasionally, tube feeding, e.g. energy goals: at least 400 kcal extra per day, with a minimum of 1500 kcal/day. Protein goals: 1.2 g/kg body weight/day (based on expert based recommendations, partly derives of Belmin et al. [4])

support these practical recommendations, which are summarized in Fig. 2 and described here:

### Assessment of the nutritional status

Given the prevalence of risk of undernutrition in community-dwelling elderly with newly diagnosed AD, it is felt that the nutritional status should be part of the work-up of all AD patients. The recommendation from the guidelines of Belmin et al. is to assess the nutritional status for every AD patient at the time of diagnosis and/or the start of treatment [4]. Nutritional assessment of a newly diagnosed AD patient comprises at least measurement of weight and performing the MNA. It is important to note that to account for the cognitive problems associ-

ated with AD, the MNA must be obtained with the help of the family and/or caregiver. The recommendation with regard to nutritional follow-up of AD patients comprises at least monthly weighing [4].

### Management of weight loss and undernutrition

If weight loss of 5% or more has occurred in 3–6 months or if the MNA classifies a patient as undernourished, a nutritional intervention should be started [4]. The nutritional interventions described by Belmin et al. are (1) searching for reversible medical or socioenvironmental causes, (2) increase calorie and protein intake and (3) daily physical activity [4]. Like Belmin et al. in the authors' opinion, treatment of weight loss and (risk

of) undernutrition in community-dwelling AD patients should be multifactorial and encompass treatment of the underlying proposed causes and risk factors of weight loss and undernutrition as well as improvement of the nutritional status by increasing energy and protein intake in combination with daily physical activity.

### Interventions targeting the underlying proposed causes and risk factors of weight loss and undernutrition

The various hypotheses regarding the causes and mechanisms for weight loss in AD patients are summarized in Fig. 1 [3, 16, 13, 26, 43, 51]. As shown in this figure, it could be that general factors, such as side effects of medication or social factors, such as loneliness or poverty contrib-

ute to weight loss in AD patients. Therefore, these factors need to be addressed. In the study on the prevalence of undernutrition and its relation to various factors in community-dwelling elderly with newly diagnosed AD, it was shown that the degree of impairment in daily functioning is independently related to nutritional status [8]. In addition, it was shown that community-dwelling AD patients without an informal caregiver or partner had a lower average weight compared to patients with an informal caregiver or partner [7]. Therefore, if AD patients develop a poor nutritional status, it is important to establish whether care is sufficient and if necessary that appropriate care is arranged, for example starting meals at home services or supervision of meal intake.

### Increase energy and protein intake

In agreement with Belmin et al. [4] the authors recommend dietary fortification, dietary counseling and ONS to increase calorie and protein intake. Despite the limited evidence, the only study that was relevant for the purpose of the recently published systematic review showed that ONS significantly improved nutritional outcomes in community-dwelling AD patients at risk of undernutrition, as evaluated with the MNA [27]. The ONS used contained between 300 and 500 kcal in addition to the patients' spontaneous food intake and was enriched with proteins, vitamins and minerals. It was given for 3 months. With regard to energy intake, the authors recommend that at least 400 kcal extra per day is added with a minimum of 1500 kcal/day [47]. Protein needs in older patients are suggested to be as high as 1.2 g/kg body weight/day [47]. The nutritional intervention should be continued for at least 3 months, because it is assumed that at least 3 months are needed to improve the nutritional status by a nutritional intervention [47]. If an ONS is prescribed it is important that there is someone who ensures that the patient is adherent to this intervention because AD patients may forget to take an ONS due to cognitive impairments. There is also evidence that tube feeding may lead to an improvement in nutritional status in patients with dementia [50]. The Europe-

an Society for Parenteral and Enteral Nutrition (ESPEN) geriatrics guidelines recommend in early and moderate dementia considering ONS and occasionally tube feeding, to ensure adequate energy and nutrient supply and to prevent undernutrition [50]. The decision whether or not to start tube feeding has to be made on an individual basis [50]. Aspects that have to be considered in decision-making are: (1) the wishes of the patient with regard to tube feeding, (2) severity of the dementia (e.g. tube feeding is not recommended for patients with advanced dementia), (3) prognosis and life expectancy of the patient, (4) the expected quality of life of the patient with or without tube feeding, (5) the expected complications and impairments due to tube feeding and (6) the mobility of the patient [50].

### Daily physical activity

Daily physical activity prevents muscle wasting, stimulates appetite and so restores the energy balance in AD patients [16]. In addition, when dietary fortification and/or ONS are combined with simple physical activity, for example a 15 min walk every day, it is more likely that the additional calories and proteins will be converted into muscle mass, which in turn will improve functioning [46].

### Prevention of weight loss and undernutrition

Belmin et al. recommend a varied, balanced diet and daily physical activity for every AD patient to prevent weight loss and undernutrition [4]. In addition, they advised that health care professionals and family should follow a training course that focuses on the nutritional status of AD patients [4].

### Conclusion

- There is a wide variation in the number of community-dwelling AD patients with weight loss and (risk of) undernutrition in the literature.
- Severe undernutrition may currently be a non-issue in community-dwelling AD patients possibly due to the increased quality of care, although weight loss and risk of undernutrition

are commonly reported and may be associated with adverse outcomes.

- Various mechanisms for weight loss in AD patients have been proposed, although none have been confirmed.
- Based on the current evidence it is not possible to state what the best approach is to the nutritional status of community-dwelling AD patients.
- Given the prevalence and possible adverse outcomes of weight loss and risk of undernutrition, the nutritional status should be part of the work-up of all AD patients:
  - Nutritional assessment of a newly diagnosed AD patient should comprise at least weighing and performing the MNA and nutritional follow-up should comprise at least monthly weighing.
  - If weight loss of 5% or more has occurred in 3–6 months or if the MNA classifies a patient as undernourished, a nutritional intervention should be started.
  - A nutritional intervention should be multifactorial and encompass treatment of the underlying proposed causes and risk factors of weight loss and undernutrition as well as improvement of the nutritional status by increasing energy and protein intake combined with daily physical activity.
  - Like Belmin et al. [4] a varied, balanced diet and daily physical activity is recommended for every AD patient to prevent weight loss and undernutrition.

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## Compliance with ethical guidelines

**Conflict of interest.** E. Droogsma received funding from the Wetenschapsfonds MCL (Science Institute of the Medical Center Leeuwarden MCL), Frison (the research foundation of the department of geriatric medicine of the MCL) and Neurosearch Antwerp VZW. D. van Asselt and P.P. De Deyn declare that there are no conflicts of interest.

This article does not contain any studies on humans or animals.

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Hier steht eine Anzeige.

