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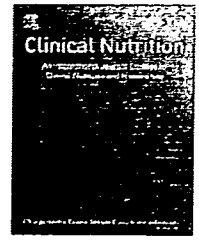

ORIGINAL ARTICLE

Anthropometric measurements of mid-upper arm as a mortality predictor for community-dwelling Japanese elderly: The Nagoya Longitudinal Study of Frail Elderly (NLS-FE)

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Summary
Background & aims: It remains controversial whether mid-arm anthropometric measurements (MAAMs) are reflected with physical impairment or useful predictors of mortality in the frail elderly. We examined the following hypotheses: (1) MAAMs in frail community-dwelling elderly are lower than those of independent elderly, (2) the lower MAAMs are associated with physical function impairment, and (3) are independent predictors of 2-year mortality.
Methods: This study was composed of cross-sectional and prospective cohort analyses of 957 community-dwelling elderly. Data included the clients' demographic characteristics, comorbidity, activities of daily living (ADL), and MAAMs at baseline. The mean scores of MAAMs of participants were compared with Japanese Anthropometric Reference Data. Survival analysis of 2-year mortality was conducted using multivariate Cox proportional hazards models.
Results: Significantly lower arm muscle area (AMA) and higher triceps skinfold (TSF) levels were observed in most of the age groups of the study participants than those of the standard Japanese population. ADL function was correlated with AMA but not with TSF, both of which were independent risk factors for 2-year mortality in the participants (highest tertile versus lowest, AMA, HR:2.03, 95%CI:1.36–3.02; TSF, HR:1.89, 95%CI:1.30–2.75).

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Conclusions: AMA and TSF were independent risk factors for 2-year mortality in the community-dwelling frail elderly.

Introduction

Anthropometric indices of weight, height, body mass index (BMI), skinfold thickness, muscle area, and circumferences are simple, easily obtainable and inexpensive measures of assessing nutritional status. Among them, BMI has been frequently used as an indicator of nutritional status, and is well known as an important predictor of mortality and activities of daily living (ADL) decline among older people.[1,2] However, it is not uncommon that there are frail older people who cannot be weighted or measured for height. In addition, measuring height reliably in older individuals is one of the most problematic areas of anthropometry. In old age there is a decline in sitting and standing height due to vertebral compression, change in the height and shape of vertebral discs, loss of muscle tone and postural changes. When these height measurements are used in the calculation of BMI, BMI will tend to be artificially inflated. In addition, it can be difficult to measure the standing height of older people with ADL impairment.[3,4]

Anthropometric measurements of the mid-upper arm are often performed for measuring body composition because they are a quick, inexpensive, and non-invasive way of measuring nutritional status. Triceps skinfold (TSF) thickness reflects subcutaneous fat, whereas mid-upper-arm circumference (MAC) takes into account the humeral diameter as well as the skeletal muscles and fat covering the limb, therefore reflecting changes in lean body mass and fat. Mid-upper-arm muscular circumference and arm muscle area (AMA), which are derived from MAC and TSF, are also useful indicators of muscle mass.

Although these mid-arm anthropometric measurements (MAAMs) may be useful indicators of undernutrition in older adults, it remains controversial whether these measurements are useful predictors of mortality in the elderly or whether physical impairment reflects these measurements in the older population. In the general population, it has been believed that low muscle mass and high fat mass are associated with mortality.[5] Although, low AMA, an indicator of muscle mass, is associated with high mortality in the elderly,[5–7] the relationship between TSF and mortality in the elderly remains controversial.[8–10] In addition, the relation of the interaction between AMA and TSF to the mortality of the elderly remains unknown. Furthermore, information on the association of these anthropometric measurements of the mid-upper arm with physical impairment or frailty in the elderly remains unknown.

In 2001, Japanese Anthropometric Reference Data (JARD 2001) were newly established as the gold standard for nutritional assessment based on non-invasive methods.[11] It provides the anthropometric norms for healthy men and women without physical function impairment in each 5-year age-bracket, including subjects over age 65, and enables evaluations in relation to body composition.

In the present study targeting frail, community-dwelling elderly persons using the baseline and 2-year follow-up data of the Nagoya Longitudinal Study of Frail Elderly (NLS-FE), the following hypotheses were tested: (1) in frail community-dwelling elderly persons who are disabled or dependent and receiving some assistances using the long-term care insurance program, TSF and AMA levels are lower than those of not-frail, independent elderly persons living in the community; (2) these lower levels of measurements are associated with physical function impairment and comorbidity status; and (3) lower levels of TSF or AMA are independent predictors of relative short-term (2-years) mortality.

Method

Study design and subjects

The present study consisted of baseline data of the participants of the NLS-FE and their mortality during a 2-year follow-up period. Details of the participants and the NLS-FE have been published elsewhere.[12,13]

The study population of NLS-FE consisted of 1875 (men: 632, women: 1243). Community-dwelling elderly (aged 65 years or older) eligible for the LTCI who lived in Nagoya city (Central Japan) and were provided various home care services from the Nagoya City Health Care Service Foundation for Older People, which is comprised of 17 visiting nursing stations accompanying care-managing centers. The LTCI system covers care for both the elderly aged 65 and older. Under the LTCI program, care levels (levels 0–5) are determined according to eligibility criteria. The elderly in the community who are eligible for LTCI are disabled and chronically ill, have physical and mental problems, and easy to admit acute hospital or institute care setting.[14] NLS-FE participants enrolled between 1 December 2003 and 31 January 2004 underwent comprehensive in-home assessments by trained nurses at baseline and 6, 12, and 24 months. At 3-month intervals, data were collected about any events the participants experienced, including admission to the hospital, nursing home admission, and mortality. Death information was obtained from event reports at 3-month intervals. Written informed consent for participation, according to procedures approved by the Institutional Review Board of the Nagoya University Graduate School of Medicine, was obtained from the patients, or, for those with substantial cognitive impairment, from a surrogate (usually the closest relative or legal guardian), and from family member caregivers.

Data collection

The data were collected at the clients' homes from standardized interviews with patients or surrogates, from

caregivers, and from care-managing center records by trained nurses. The data included clients' demographic characteristics and a rating for 10 basic ADL (feeding, mobility on bed, bathing, grooming, dressing, using the toilet, walking inside and outside, transferring, and using stairs) using summary scores ranging from 0 (total disability) to 20 (no disability). Information obtained from care-managing center records included the following physician-diagnosed chronic conditions: ischemic heart disease, congestive heart failure, liver diseases, cerebrovascular disease, diabetes mellitus, dementia, chronic obstructive pulmonary disease, neoplasia, hypertension, and diseases comprising the Charlson comorbidity index,[15] which represents the sum of a weighted index that takes into account the number and seriousness of preexisting comorbid conditions.

Anthropometry

Among 1875 participants, a total 957 (men, 355, women, 602) using visiting nurse services were enrolled for the anthropometric measurements. Anthropometric measurements were conducted by trained nurses at the clients' home. Measurement of TSF (to the nearest 2 mm) was made using caliper and MAC (to the nearest 0.1 cm) using a flexible measuring tape, on the right side of the participant's body unless affected by disability or disease. These measurements were taken at least twice by one trained nurse according to the instruction sheet, and reported values were the means of the repeated measurements. Arm muscle circumference (AMC = MAC (cm)$-\pi \times$ TSF (mm)/10) and AMA were calculated using a standard formula[16] shown below: AMA $cm^2 = (AMC\ (cm))^2/4\pi$. BMI was defined as weight in kg divided by height squared.

The mean scores of anthropometric measurements of patients grouped by age and gender were compared with the JARD 2001. In JARD 2001, a mean value, a central value, standard deviation, maximum value, minimum value, and percentile (5th, 10th, 25th, 75th, 90th, 95th) were determined according to the age division.[11] Therefore, it was possible to compare the obtained measurement values and these reference values.

Statistical analysis

This analysis was conducted using a total of 957 subjects (men: 355; women: 602) extracted from the NLS-FE data set. The difference between male and female were assessed

Table 1 Demographic characteristics of patients.

Variables	Categories	*N* (%), average ± SD		*p*-Value
		Male ($N = 355$)	Female ($N = 602$)	
Age		78.50 ± 7.49	81.57 ± 7.97	<0.001
	65–69	47 (13.2)	46 (7.6)	<0.001
	70–74	63 (17.7)	82 (13.6)	
	75–79	100 (28.2)	119 (19.8)	
	80–84	58 (16.3)	124 (20.6)	
	85+	87 (24.5)	231 (38.4)	
Nutrition	Peroral	322 (90.7)	554 (92.0)	0.622
	Enteral feeding	32 (9.0)	45 (7.5)	
	Parenteral nutrition	1 (0.3)	3 (0.5)	
Basic ADL (0–20)		11.0 ± 6.5	9.9 ± 7.1	0.013
Charlson comorbidity index (0–35)		2.5 ± 1.6	2.2 ± 1.6	0.019
Illness	Ischemic heart disease	31 (8.7)	64 (10.6)	0.496
	Congestive heart failure	32 (9.0)	60 (10.0)	0.818
	Liver disease	13 (3.7)	20 (3.3)	0.714
	Cerebrovascular disease	147 (41.4)	187 (31.1)	<0.001
	Diabetes	38 (10.7)	68 (11.3)	0.914
	Dementia	92 (25.9)	221 (36.7)	0.001
	Chronic pulmonary disease	38 (10.7)	42 (7.0)	0.037
	Neoplasia	37 (10.4)	51 (8.5)	0.242
	Hypertension	70 (19.7)	150 (24.9)	0.068
Anthropometric measurements	Body mass index (kg/m^2)	20.8 ± 3.4 ($n = 219$)	20.8 ± 4.4 ($n = 301$)	0.978
	Mid-arm circumference (cm)	24.3 ± 4.1	23.1 ± 4.5	<0.001
	Triceps skinfold thickness (mm)	14.3 ± 9.4	15.5 ± 9.5	0.200
	Arm muscle area (cm^2)	32.4 ± 11.6	28.0 ± 11.5	<0.001

Statistical analysis: Unpaired *t*-test (age, basic ADL, Charlson comorbidity index and anthrometric measurements), and χ^2-test (age group, nutrition route and illness).

using the χ^2-test for categorical variable or the unpaired t-test for continues variables. The mean scores of anthropometric measurements of participants and the references of Japanese population at 5-year intervals were compared by a Student's t-test. Additionally, partial correlation coefficients between anthropometric measurements and ADL summary scores were calculated.

The following baseline data were used in a Cox proportional hazards model to identify independent predictors of 2-year mortality: age, gender, ADL status, comorbidity status, and levels of AMA and TSF, since the lower ADL status and higher Charlson comorbidity index score were demonstrated to be associated with 21-month mortality in the NLS-FE cohort.[13] The risk of a variable was expressed as a hazard ratio (HR) with a corresponding 95% confidence interval (CI). For the analysis, age was categorized into three groups: 65–74, 75–84, and 85 years or older. The ADL score (range: 0–20), and the Charlson comorbidity index score were categorized into three groups with approximately equal numbers of participants in each group: ADL, high function, $\geqslant$18; mild function, 12–17, and low function, $\leqslant$11; the Charlson comorbidity index score, $\leqslant$1, 2–3, $\geqslant$4. AMA (cm^2) was categorized into three groups by tertile: high, $\geqslant$33.4; mild, 23.5–33.4, and low, <23.5. TSF (mm) was categorized into three groups by tertile: high, $\geqslant$17; mild, 10–16, and low, <10.

Survival curves describing mortality over the 2 years after enrollment in each group (AMA and TSF) were conducted using the Kaplan–Meier method, adjusting for potential confounders. All statistical analyses were performed with the Statistical Package for the Social Sciences (SPSS) version 11.0, and statistical significance was established at $p<0.05$.

Result

Sample description

Details of characteristics of subjects in the present study are given in Table 1 and 2. The mean (SD) age of 957 patients studied was 80.4 (7.9) years, with a range 65–102 years. Among those, 318 patients (33.2% of total) were 85 years or older. Most were capable of oral food intake (91.5% of total). The physical function of the participants (basic ADL, score range: 0–20) was markedly impaired with a mean (SD) score of 10.3 (6.9). A history of cerebrovascular disease was the most frequent diagnosis observed in this cohort (334 patients, 34.9% of total).

Comparison of anthropometry between study participants and Japanese norms

As shown in Figure 1, the MAC levels of male participants of the 75–84 age groups were significantly lower than Japanese norm. In female participants, MAC levels in the 80–84 and 85

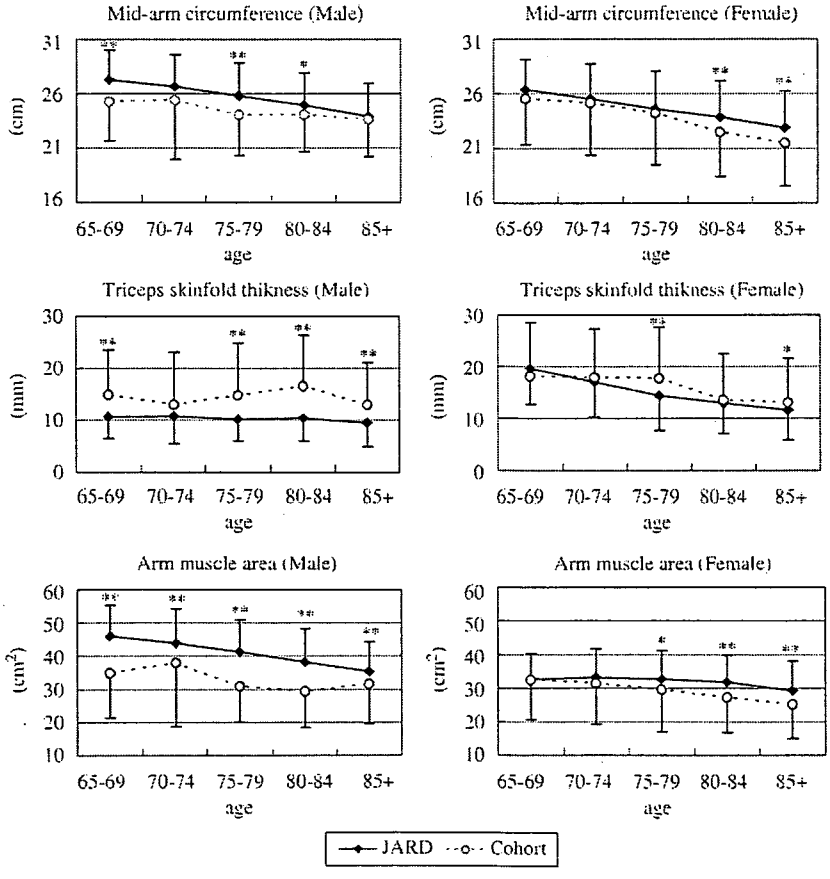

Figure 1 Comparison of anthropometry between cohort and Japanese reference data. Means±SD; Unpaired t-test comparison of JARD versus cohort: $^*p<0.05$, $^{**}p<0.01$.

Table 2 Anthropometric measurements per age group.

Age	Average ± SD	
	Male	Female
Body mass index (kg/m^2)		
65–69	21.3 ± 3.3	22.2 ± 4.5
70–74	21.3 ± 3.6	21.9 ± 4.5
75–79	20.5 ± 3.8	22.0 ± 4.6
80–84	21.4 ± 2.8	19.9 ± 4.1
85+	20.0 ± 3.0	19.6 ± 3.8
Mid-arm circumference (cm)		
65–69	25.3 ± 3.6	25.6 ± 4.2
70–74	25.4 ± 5.5	25.2 ± 4.8
75–79	24.0 ± 3.7	24.2 ± 4.8
80–84	24.0 ± 3.4	22.5 ± 4.1
85+	23.6 ± 3.5	21.5 ± 3.9
Triceps skinfold thickness (mm)		
65–69	14.9 ± 8.6	18.1 ± 10.4
70–74	13.0 ± 10.1	17.9 ± 9.4
75–79	14.8 ± 10.1	17.7 ± 10.0
80–84	16.5 ± 9.9	13.5 ± 9.0
85+	12.9 ± 8.1	13.1 ± 8.6
Arm muscle area (cm^2)		
65–69	34.9 ± 13.5	32.5 ± 11.9
70–74	38.0 ± 19.3	31.5 ± 12.3
75–79	30.9 ± 10.9	29.6 ± 12.6
80–84	29.4 ± 10.9	27.4 ± 10.5
85+	31.6 ± 11.9	25.2 ± 10.2

years and older age groups were lower than the Japanese norms. There were significantly higher TSF levels in male participants of all age groups except for 70–74 years and higher TSF levels in female participants of the 75–79 and 85 years and older age groups, compared with Japanese norms. The AMA of male participants was significantly lower than the Japanese norm in all age groups. In female participants, lower AMA levels were observed in the 75–79, 80–84 and 85 years and older age groups. BMI data for 520 out of 957 participants were available in our cohort, and there were no differences in BMI levels between the participants and Japanese norms for any age group in either gender.

Anthropometry and activities of daily living

The correlation between anthropometric measurements and ADL function was evaluated using the partial rank correlation coefficients after adjusting for gender and age. ADL score was significantly correlated with BMI ($r = 0.191$, $p<0.01$), MAC (0.288, $p<0.01$), AMA ($r = 0.298$, $p<0.01$), but not with TSF ($r = 0.019$, $p = 0.749$).

Anthropometry of mid-arm and 2-year mortality

Among the 957 participants, 236 died during the 2-year follow-up period. Table 3 shows the univariate and multivariate Cox proportional hazards regression models to identify independent predictors of 2-year mortality. Unadjusted univariate analysis suggested that the oldest age category (≥85), low ADL function, ≥4 Charlson comorbidity index score, <10 mm TSF thickness, and <23.5 cm^2 AMA were associated with 2-year mortality. A multvariate Cox proportional hazards regression model based on all of the variables used in univariate analysis showed that low ADL function, low TSF(<10 mm), and low AMA (<23.5 cm^2) were associated with 2-year mortality.

Figure 2 shows the multivariate-adjusted Kaplan–Meier survival curves exploring the association between AMA or TSF categories and time to death (3-month interval). The lowest category of AMA (<23.5 cm^2) and TSF (<10 mm) showed an increased risk of death during the 2-year follow-up compared with the middle and highest categories (Figure 2A and B).

When participants were divided into 9 groups according to the categories of TSF and AMA levels, a striking increase in the risk of 2-year mortality, adjusted for age and gender, was observed in the low TSF with low AMA group (HR: 3.83, 95%CI: 1.97–7.47), versus the high TSF with high AMA (Figure 3).

Discussion

The main significant findings of this study were: (1) lower levels of AMA were observed in participants of NLS-FE than those of the standard Japanese population in each age group and gender; (2) TSF levels of participants were greater than those of the standard Japanese population; (3) lower ADL function was associated with lower AMA, but not with TSF levels; (4) AMA and TSF were independent risk factors for 2-year mortality in our cohort; (5) the combination of AMA and TSF was a better predictor of 2-year mortality among older people with ADL dysfunction.

BMI is the anthropometric measurement most widely used for assessing nutrition status. However, it is often difficult for older people with impaired physical function to be measured for height and weight at their homes. In fact, in our cohort, BMI data were not available for 437 out of 957 participants, even though we asked visiting nurses and caregivers to measure weight and height as far as possible.

Anthropometric measurements of the mid-upper arm including TSF and MAC can be introduced easily in the community-dwelling elderly, as it is quick, handy, inexpensive and non-invasive method. AMA, as an index for muscle mass, can easily be calculated from TSF and MAC. We observed that AMA or TSF levels were lower and higher, respectively, in participants of NLS-FE than those of the standard Japanese population. The lack of differences in BMI levels for each 5-year-interval, gendered age group between our cohorts with some disabilities and the Japanese norm suggested that though there were clear differences in body composition between Japanese subjects with or without physical impairment, total body mass did not reflect those differences. It has been reported that physical disability is associated with increases in percentage body fat as well as a decrease of fat-free mass.[6,17–19] In agreement with these previous findings, we demonstrated that AMA levels in the

Table 3 Cox proportional hazard model for 2-year mortality.

Variable	Univariate		Multivariate	
	Hazard ratio (95%CI)	p-Value	Hazard ratio (95%CI)	p-Value
Gender				
Female*	1.00		1.00	
Male	1.16 (0.90–1.51)	0.26	1.31 (0.96–1.80)	0.088
Age group				
65–74*	1.00		1.00	
75–84	1.31 (0.92–1.87)	0.135	1.01 (0.67–1.51)	0.966
85 year≤	1.70 (1.19–2.42)	0.004	1.16 (0.76–1.76)	0.486
Basic ADL				
High function (≥18)*	1.00		1.00	
Mild function (12–17)	1.26 (0.78–2.03)	0.340	1.03 (0.62–1.69)	0.922
Low function (≤11)	2.36 (1.53–3.63)	<0.001	1.76 (1.09–2.83)	0.020
Charlson comorbidiy index				
<2*	1.00		1.00	
2–3	1.36 (0.96–1.92)	0.083	1.33 (0.94–1.90)	0.112
≥4	1.70 (1.17–2.46)	0.005	1.35 (0.91–2.02)	0.141
Triceps skinfold thickness (mm)				
High (≥17)*	1.00		1.00	
Mild (10–16)	1.14 (0.81–1.59)	0.459	1.26 (0.85–1.88)	0.230
Low (<10)	1.75 (1.26–2.42)	0.001	1.89 (1.30–2.75)	0.001
Arm muscle area (cm^2)				
High (≥33.4)*	1.00		1.00	
Mild (23.5–33.4)	1.34 (0.93–1.92)	0.115	1.26 (0.85–1.88)	0.256
Low (<23.5)	2.04 (1.47–2.85)	<0.001	2.03 (1.36–3.02)	<0.001

CI = confidence interval.
*Reference category.

study participants were less than Japanese norms and that AMA levels of the study participants were correlated with ADL score after adjusting for gender and age (i.e., lower AMA levels with lower ADL function).Our study results were also consistent with previous findings of higher TSF levels in the study participants than those in Japanese subjects without impairment of physical function. However, we observed that TSF levels were not correlated with ADL function after adjusting for gender, age among study participants. When analysis was conducted after adjustment for BMI, ADL score was still correlated with AMA, but not with TSF (data not shown). These results indicated that TSF levels are influenced by other factors such as nutritional status besides just the level of physical function, at least among our participants with ADL disabilities.

In the general population, it has been demonstrated that fat-free mass and TSF, an indicator of fat mass, have clear negative and positive relationships, respectively, with mortality (lower fat-free mass and higher TSF with higher mortality).[20,21] Consistent with those findings, a number of studies have demonstrated that AMA, or AMC, another indicator of muscle mass, is a predictor of mortality of older people.[5,8] On the other hand, controversial results have been reported in terms of the relationships between TSF and mortality in older people. Some studies have demonstrated that low TSF is associated with a significantly increased risk of subsequent mortality,[9] but others could not confirm this result.[7,8] Our prospective observation demonstrated that lower AMA or lower TSF were independent predictors of 2-year mortality among community-dwelling frail older people, even after adjusting for possible confounding factors. The inconsistency between our study and previous studies targeting the general population in terms of the relationship between TSF and mortality may be due to the difference in study population, i.e., a healthy younger population versus frail older people with some disabilities. A higher TSF seems to reflect obesity, hyperalimentation in the general population, but in our frail elderly participants, a lower TSF seems to reflect undernutrition. However, it may be possible that cultural differences between Japanese and other western countries may affect this inconsistency.

We further characterized study participants using a 9-level measurement that combined AMA levels and TSF levels. Within each level of TSF, risk of mortality rose as levels of AMA decreased. Within each level of AMA, risk of mortality rose as TSF decreased. These findings indicate that a combined evaluation of AMA and TSF strengthens the

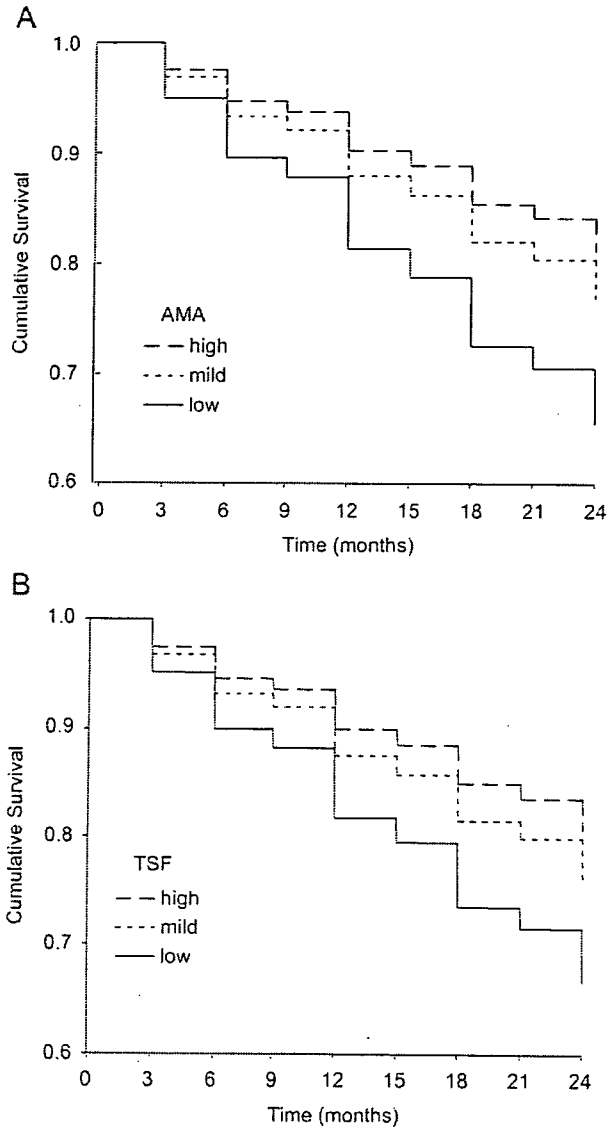

Figure 2 Kaplan–Meier survival curves for elderly subjects with various levels of AMA (cm^2) (A) and TSF (B). (A), AMA (cm^2) levels were classified with low (<23.5), mild (23.5–33.4), and high (33.4⩽). B, TSF (mm) levels were classified with low (<10), mild (10–16), and high (17⩽). Survival curves of (A) and (B) were plotted using the Kaplan–Meier method, adjusting for age, gender, ADL status and Charlson comorbidity index.

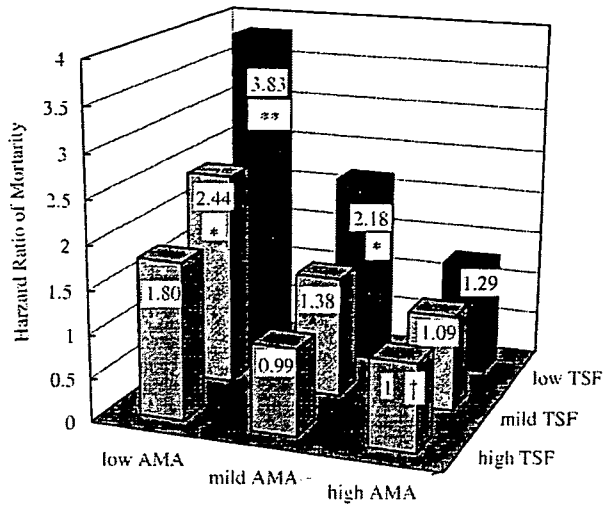

Figure 3 Relative risks for all-cause mortality. Estimations were obtained from Cox regression models adjusting for age and gender. Eight independent variables, created for each level of AMA (low: <23.5 cm^2, mild: 23.5–33.4 cm^2, high: 33.4 cm^2⩽) and TSF (low: <10 mm, mild 10–16 mm, high: 17 mm<) combined, were used as indicator variables and compared with the reference group (defined as those with high AMA and high TSF). Number on each bar indicates hazard ratio. *$p<0.05$, **$p<0.01$, †reference group.

prediction of relative short-term mortality among community-dwelling older people.

The current study had several limitations. NLS-FE is a large-scale observational study but does not include the complete spectrum of elderly patients in the Nagoya area. In the analysis, baseline data of the anthropometric measurements were included, but changes in the measurements during the follow-up period were not considered. Although recent study suggested that muscle strength is more powerful predictor of mortality than muscle mass,[22] data of muscle strength were not available in our study. Another limitation is that we enlisted each station to perform evaluation because of a shortage of hands and the large number of settings. This may have biased assessors' evaluations and limited the validity of the results. The results of the present study cannot transfer to the non-frail independent older, since there should be many differences between the participants of NLS-FE and the standard non-frail older including ADL levels and comorbidity. In addition, these findings may not be generalizable to other populations given that they may have been influenced by cultural differences, health practices, and a variety of social and economic factors.

Anthropometric measurements of the mid-upper arm are performed often in research, but rarely on a clinical basis, even although they are a quick, inexpensive, and non-invasive way of measuring nutritional status. In the present study, we demonstrated a striking picture of increased mortality risk associated with lower AMA levels and lower TSF. Anthropometric measurements of the mid-arm may be a more practical and suitable index not only for nutritional assessment but also for capturing the vulnerable subset of older people living in the community.

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Author contributions:

Hiromi Enoki: Study concept, design, conduct of study, interpretation of data, Analysis and preparation of manuscript.

Masafumi Kuzuya: Study concept, design, conduct of study, interpretation of data, and preparation of manuscript.

Yuichiro Masuda: Conduct of study, interpretation of data.

Yoshihisa Hirakawa: Conduct of study, interpretation of data.

Mitsunaga Iwata: Analysis and interpretation of data.

Jun Hasegawa: Acquisition of data.

Sachiko Izawa: Acquisition of data.

Akihisa Iguchi: Study concept and study supervision.

Sponsor's role: The sponsor had no role in the design, methods, subject recruitment, data collection, analysis, or paper preparation.

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effect in relation to myocardial infarction.[9] This is in line with various findings in an animal model,[10] yet our study does not show evidence of an association between CETP and CHD mortality in Caucasian men and women aged 55 and older. These findings combined suggest that the effect of the I405V CETP polymorphism may be relevant for CHD morbidity but that, by itself, its role is limited in terms of mortality. Further research aiming at the elucidation of the role of CETP in the metabolism of cholesterol and cellular functions will be pivotal for understanding CHD risk.

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ASSOCIATION BETWEEN FEEDING VIA PERCUTANEOUS ENDOSCOPIC GASTROSTOMY AND LOW LEVEL OF CAREGIVER BURDEN

To the Editor: Percutaneous endoscopic gastrostomy (PEG) has become the preferred method of providing enteral tube feeding to older people who have difficulty eating.[1] Although a number of studies have been conducted to evaluate the effects of long-term nutritional support via a PEG tube on the outcomes of the patients, including mortality and morbidity, the outcomes of PEG placement from a caregivers' perspective has received little attention. Over the years, research on family caregivers has consistently demonstrated that greater caregiver burden relates to poorer mental and physical health,[2,3] but little attention has been paid to the effect that providing care to a family member with PEG placement has on caregivers. This study assessed the caregiver burden of patients who underwent PEG tube placement and compared it with that of those who feed via other nutritional routes.

The present study consisted of a cross-sectional analysis of the baseline data of a subgroup of participants in the Nagoya Longitudinal Study of Frail Elderly.[4,5] The study population consisted of 1,196 caregivers (mean age ± standard deviation 63.9 ± 12.3, 75.7% female, 43.7% spouse, 33.2% adult child, 20.2% daughter-in-law, 3.0% other) and matched care recipients who were community-dwelling older people (aged 80.8 ± 8.2, 63.4% female) and were provided various home care services under the long-term care insurance (LTCI) program. The data included clients' demographic characteristics, a rating for 10 activities of daily living (range 0–20, mean score 11.4 ± 6.7), a rating for instrumental activities of daily living (IADLs, range 0–8, mean score 2.5 ± 2.4), and the Charlson Comorbidity Index (mean score 2.1 ± 1.6). Severity of dementia was evaluated according to the criteria provided by the public LTCI policy, which are classified into five levels (42.0% had at least some cognitive impairment).[6] The routes of nutrition and types of diet were classified into five categories: oral intake (1, solid regular-texture diet; 2, modified-texture diet (a minced or pureed texture); 3, nasogastric tube feeding; 4, PEG tube feeding; and 5, oral intake with enteral nutrition). Data were also obtained from caregivers concerning their own personal demographic characteristics, and their subjective burden as assessed using the Japanese version of the Zarit Burden Interview (ZBI, mean score 28.8 ± 17.0).[7] One-way analysis of variance (ANOVA) and analysis of covariance (ANCOVA) were used to compare caregiver burden according to the groups of nutrition routes and types of diet. Covariates of ANCOVA included relationship to the care recipient, IADL score, and cognitive levels. ANOVA with a Bonferroni correction for multiple comparisons was used to determine the difference in ZBI scores between groups.

Table 1. Routes of Nutrition, Types of Diet, and Caregiver Burden Score

Route of Nutrition and Type of Diet	Unadjusted* Mean ± Standard Error	Adjusted† Mean ± Standard Error
Oral intake		
Solid regular-texture diet (n = 885)	27.9 ± 0.6‡	29.2 ± 0.6§
Modified-texture diet (n = 239)	31.8 ± 1.1‡	28.6 ± 1.1§
Tube feeding		
Via nasogastric tubes (n = 13)	32.2 ± 4.4	25.6 ± 4.5
Via percutaneous gastrostomy (n = 44)	29.3 ± 2.6	21.0 ± 2.6§
Oral diet with tube feeding (n = 15)	34.3 ± 3.7	30.1 ± 4.2

*One-way analysis of variance.
†Analysis of covariance: covariates include relationship to care recepient, instrumental activity of daily living (IADL) score, and cognitive levels, which were significantly associated with the Zarit Burden Interview score in a stepwise multiple linear regression analysis. Incorporated variables were caregiver's age, caregiver's sex, activity of daily living score, IADL score, relationship, cognitive levels, Charlson Comorbidity Index, frequency of day care service use, and number of family members.
$P <$ ‡.05, §.01.

Table 1 provides a comparison of ZBI scores between groups. In the crude model (ANOVA), there were significant differences in ZBI score between a solid regular-texture diet and a modified-texture diet ($P < .05$), but no differences were observed between the other groups. In the adjusted model (ANCOVA), of the five groups, the lowest ZBI score was observed in caregivers with PEG use, and there were significant differences in ZBI score between the PEG group and the oral intake groups (solid regular-texture diet, $P < .01$; modified-texture diet, $P < .01$).

The present study demonstrated that receiving enteral nutrients via PEG is associated with the lowest level of caregiver burden after adjusting for covariates and that a higher burden is observed for caregivers of participants who receive oral feedings. The participants in the present study were older people living in the community with functional disabilities. Therefore, even if they were receiving oral feedings, many caregivers seem to be engaged in feeding them. It is assumed that oral feeding for disabled elderly people is often difficult, time-consuming, and demanding for caregivers. It has been demonstrated that eating difficulties in older patients lead to a considerable burden for caregivers.[8] PEG placement may reduce the time required for assisted feeding, although our results do not encourage PEG placement for elderly people only because of the association between PEG use and the low levels of caregiver burden. Even when caregiver time is limited, it is unacceptable to initiate tube feeding via PEG merely to facilitate care or reduce care burden. Efforts to enhance oral feeding by altering the environment and creating patient-centered approaches to feeding should be part of routine care for patients with difficulty eating. Nevertheless, the association between feeding via PEG and a low level of caregiver burden is another consideration in decision-making for long-term enteral feeding in older adults.

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UPTAKE OF INFLUENZA VACCINATION IN DUTCH NURSING HOME PERSONNEL FOLLOWING NATIONAL RECOMMENDATIONS

To the Editor: Because recent studies have demonstrated substantial benefits from routine influenza vaccination in healthcare personnel of long-term care institutions, the Dutch association of nursing home physicians (Nederlandse Vereniging van Verpleeghuis Artsen) issued a guideline on influenza vaccination in nursing homes in 2004.[1] The disrupting effect of influenza on nursing home care has been acknowledged, and vaccinating healthcare workers against influenza reduces the occurrence of influenza infections and associated productivity loss.[2–4] Even more important, frail patients who may benefit less from immunization against influenza are indirectly protected by a reduction of influenza virus transmission.[4–6] Before the guideline, vaccine uptake in Dutch personnel was 5% to 8%.[1] Considering the fact that influenza vaccination rates in recommended patient groups in the Netherlands are among the highest in the world, such an uptake is extremely low. It was therefore hypothesized that introducing a national guideline might result in substantial improvement.

PARTICIPANTS, METHODS, AND RESULTS

In October 2005, a self-administered questionnaire was sent to the staff of all Dutch nursing homes (n = 335). Participants reported on uptake of influenza vaccination in patients and personnel in the preceding season (2004–2005 season), whether the institution had a written policy on influenza vaccination for personnel, what the current offering policy was (active request, employee's initiative, or none), and whether personnel were currently offered information on influenza vaccination.

In all, 149 of the 335 (45%) questionnaires were completed and returned. The average vaccination rate was 10.5% for personnel (95% confidence interval of the mean (CI) = 8.7–12.3%) and 90.5% in patients (95% CI = 88.3–92.8%). Only 67 (45%) homes had a written policy. In all, 107 (72%) homes actively requested their employees to be vaccinated. Of homes with a written policy (n = 67), 65 (97%) actively requested their employees to be vaccinated. Of homes in which there was no written policy (n = 72), influenza vaccination was not offered in 27 (37%) and in seven (10%) was offered only if an employee asked for vaccination. Having a written policy, actively requesting personnel to be vaccinated, and informing personnel about influenza vaccination resulted in significantly higher mean vaccination rates in personnel (Table 1).

DISCUSSION

Compared with data from a similar questionnaire study from 2000,[7] only a 5% absolute increase was observed in having a written policy (40% vs 45%), although in homes with a written policy, the proportion with an active request rose substantially, from 22% to 97%. Despite these organizational improvements, the uptake of influenza vaccination in personnel did not improve substantially (from 5–8% before to 11% in the year after the introduction of the guideline). The response rate of the previous questionnaire study was higher (73% vs 45%), but similar vaccination rates were found in patients (86% vs 90%). Also, the method used was similar, and bias is therefore highly unlikely. After all, awareness of a newly issued guideline should be most prominent in the first year. Even so, having a written policy, actively requesting personnel to get vaccinated, and informing personnel about influenza vaccination resulted in only slightly higher mean vaccination rates (12%). To implement the guideline successfully, more strategies are clearly needed. International research has shown a number of behavioral and organizational determinants to be of importance in raising vaccination levels among healthcare personnel in general, such as perceived influenza risk and severity, perceived vaccine effectiveness, and easy access to free vaccination.[8–10] Further research is needed to asses which behavioral, organizational, and ethical determinants of vaccine uptake in Dutch nursing home personnel should be focused on when developing an effective influenza vaccination campaign.

Table 1. Effects of Policy Determinants on Mean Influenza Vaccination Rates in Nursing Home Personnel (N = 149)

Policy Determinant	Yes	No	*P*-Value†
	Number of Homes (%*)		
Having a written policy	67 (12.4)	72 (7.8)	.01
Actively requesting personnel to get vaccinated	107 (12.1)	37 (5.3)	.002
Offering information to personnel in any way	111 (11.9)	22 (3.6)	.001

*Mean vaccination rate of nursing home personnel.
†Differences in mean vaccination rates were considered significant if $P<.05$.

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特集　アンチエイジングと生活習慣

アンチエイジングのための食事

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アンチエイジングのための食事

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◇アンチエイジングが期待される食品成分には、抗酸化性物質（ビタミンE、β-カロテン、カロテノイド、ビタミンC、フラボノイド、カテキン類、ポリフェノール類）、免疫賦活物質、ホルモン様物質、フィトケミカルなどがある。
◇アンチエイジングが期待される食品成分は多種多様だが、その有効性、適正摂取量、安全性が疫学的に確認されているものは少ない。
◇食生活のなかでアンチエイジングが期待できる食品としては、野菜・果物がある。これらには有効性の根拠がある。しかし「これさえ食べておけばよい」という食品は存在しない。
◇長寿者の調査から明らかなことは、“バランスのよい食事”を“規則正しく”取り、“睡眠と運動を適度に”とることである。

Key words

抗酸化性物質
フィトケミカル
長寿研究
食事バランスガイド

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高齢者（65歳以上）の死因は、癌が全死亡の28％、心疾患17％、脳血管疾患13％、肺炎が12％（2005年度厚生労働省人口動態統計）、要介護になる原因は衰弱29％、脳血管疾患27％、骨折17％、関節疾患・認知症が16％を占める（2004年度『厚生労働省国民生活基礎調査』による）。健康長寿を全うするにはこれらの疾患や病態に陥らないことが肝要である。抗加齢医学会ではアンチエイジング療法として抗酸化療法、免疫療法、ホルモン補充療法を挙げている。アンチエイジングのための食事を考える場合は、抗酸化性、免疫賦活作用、ホルモン様作用などのある食品成分を積極的に食生活に取り入れることが有効と考えられる。そこでまず、これらの成分を含む食品とその有効性について、次に最近の疫学研究の成果に基づいたアンチエイジングに有効な食事について考察する。

アンチエイジングが期待される食品成分

1．抗酸化性物質

老化の機序を説明するフリーラジカル説とは、「酸化ストレスが細胞に障害を与え、老化を引き起こす」と考える説である。酸素呼吸を行う生物は酸素の酸化反応からエネルギーを得るが、酸化反応の過程で産生される活性酸素が、DNAや細胞膜に損傷を与える“酸化ストレス”となる。生体には酸化ストレスを消去するための抗酸化防御系があるが、抗酸化物質はこの機能を補うものである。食品中の主な抗酸化物質は以下のとおりである。

（1）ビタミンE（トコフェロール）

リポ蛋白、生体膜中の酸化LDL生成を抑制し、細胞膜機能の正常化、赤血球の溶血防止などに関与する。4種類の異性体があり、α型が最も生理作用が強い(α型＝100の場合、β型＝40、γ型＝10、δ型＝1)。体内に分布するビタミンEの大部分はα型である。α-トコフェロールの1日量の目安は成人男性7～9mg、成人女性7～8mg(2005年版『食事摂取基準』)、日本人の平均摂取量は8.2mg/日(2004年度『国民健康栄養調査』)である。植物油、小麦胚芽、種実類(ゴマ、アーモンドなど)、かぼちゃ、さつまいもなどに多い。上限値は成人男性700～800mg/日、成人女性600～700mg/日(『食事摂取基準』より)。ビタミンEは冠動脈疾患のリスクを下げるという報告[1]があるが、その他の疾患に対する効果は明確ではない。

(2) β-カロテンとその他のカロテノイド類

免疫賦活作用、抗癌作用もある。にんじん、かぼちゃなどの緑黄色野菜、海藻、緑茶に多い。β-カロテンは冠動脈疾患死亡率を下げる[1]、β-カロテン摂取不足が認知機能低下と関連する[2]、サプリメントなどから大量摂取すると肺癌罹患率が上がる[3]など、さまざまな報告がある。疫学的には不明確なところが多い。適正摂取量も未策定である。

カロテノイド類の一種であるリコペン(トマト・スイカなど)には心臓病予防効果、クリプトキサンチン(柑橘類)には肺・子宮・食道癌予防効果が期待されている。

(3) ビタミンC(アスコルビン酸)

生体膜、リポ蛋白表面の酸化を予防する。野菜(ブロッコリーなど)、果物(みかん、いちごなど)、いも類、緑茶に多い。成人の推奨量は100mg/日(食事摂取基準)、日本人のビタミンC摂取量は平均99mg/日(『国民健康栄養調査』より)である。ビタミンC摂取不足と死亡リスクは関連する[4]、血清ビタミンCを適正濃度に保つには喫煙者は非喫煙者よりも多くビタミンCを摂取することが望ましい[5]、ビタミンCをサプリメントとして摂取しても死亡率は下がらないなどの報告[6]もあるが、疫学的には結論は出ていない。

(4) フラボノイド類

ポリフェノールの一種で、現在2,000種以上が同定されている。野菜・果物中のフラボン、フラボノール、フラバノン、大豆中のイソフラボンとその誘導体を言う。そのほかケンフェロール(ブロッコリー)、ケルセチン(レタス、たまねぎ、パセリ)、ルチン(蕎麦)、ヘスペリジン(柑橘類)、ナリンギン(柑橘類)、ダイゼニン(大豆)、ゲニステイン(大豆)などがある。癌、動脈硬化、心臓病予防効果が期待される。Hertogらの研究では、オランダ人男性でフラボノイドの摂取量が多いほど虚血性心疾患の死亡率・発症率が低かった[7]。Knektらがフィンランドで行った研究ではリンゴ、イチゴ、たまねぎなどの摂取と虚血性心疾患に負の関連が認められた[8]。しかし、個々のフラボノイドの有効性については明確な結論は出ていない。

大豆イソフラボンは女性ホルモン、エストロゲンに似た構造をしており(エストロゲン様物質)、虚血性心疾患や更年期・閉経女性の骨粗鬆症予防効果が期待される。特定保健用食品の対象成分でもあるが、大量摂取は乳癌の発症・再発リスクを上げるという報告もあり、2006年、食品安全委員会は大豆イソフラボンの安全な1日上乗せ摂取量の上限をアグリコン換算(配糖体ではなく糖が外れた構造に換算)で上限70～75mg/日、特定保健用食品としての安全な1日上乗せ摂取量の上限をアグリコン換算で上限30mg/日とし、大量摂取への注意を喚起している。アレルギー疾患を持つ者、妊婦や授乳婦は特に注意が必要である。

(5) カテキン類

ポリフェノールの一種。緑茶に多い。カテキン、エピカテキン、ガロカテキン、エピガロカテキン、エピガロカテキンガレートなどがある。緑茶中のエピガロカテキンガレートの抗癌作用が最も期待される。抗酸化作用はビタミンEの25倍、ビタミンCの100倍とも言われる。喫煙率が高い日本人に虚血性心疾患が少ないのは、緑茶のカテキンによる(「ジャパニーズ・パラドックス」)とも言われる。

殺菌効果、肥満予防効果、コレステロール低下作用、抗ウイルス作用、ヘリコバクター・ピロリ菌の殺菌効果も認められる。緑茶の前立腺、結腸、食道癌予防効果が報告される一方、膀胱癌リスクが上がるという報告もある。宮城県でのコホート研究では

緑茶飲量が増えても胃癌リスクは下がらず[9]、厚生労働省研究班・多目的コホート研究でも関連性が見られなかった[10]。多量飲茶はヒト体細胞を攻撃し、DNAを傷つける危険性が指摘されている。世界癌研究基金は、茶は胃癌になる危険性を低下させる可能性があるが、確実に癌を予防できるとは明言しておらず、適正摂取量も明確ではない。

(6) その他のポリフェノール類(アントシアニン類など)

赤色野菜(なす、赤キャベツなど)、果物(いちご、葡萄、ベリー類など)中のアントシアニン類、ゴマ種子中のリグナン類、ウコン中のクルクミン、紅茶、柿の渋中のタンニン、カカオ豆中のポリフェノール類などがある。癌、動脈硬化、心臓病、老化の予防効果などが期待される。

脂肪摂取量が多いフランス人に動脈硬化が少ないのは、赤ワイン中のアントシアニンによる(フレンチ・パラドックス)と言われる。ベリー類のアントシアニンには視力低下の回復効果も期待される。しかし、これらの抗酸化性物質と各種疾病・老化との関連は明確ではない。サプリメントなどによる過剰摂取の危険性、医薬品との総合作用を十分に考慮して利用する必要がある。

2. 免疫賦活物質

食品としての免疫賦活物質には、ビタミン類(ビタミンA、ビタミンE、ビタミンC)、ミネラル類(亜鉛、セレン)、カロテノイド、フラボノイド、多価不飽和脂肪酸(DHA、EPA)、乳酸菌、キノコ中のβ-グルカン(抗腫瘍性も期待できる)などがある。加齢により免疫機能は低下するが、エネルギー、蛋白質などが不足する低栄養状態が慢性化した場合、高齢者の免疫機能は低下しやすい。低栄養は肺炎などの感染症の重症化、寝たきりの危険性を増やすなど高齢者のQOLを脅かす要因ともなる。

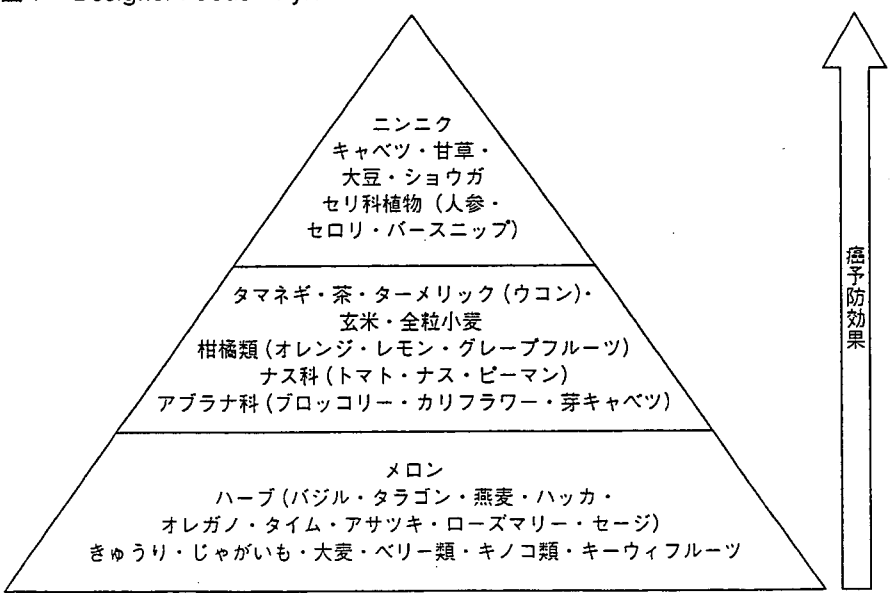
3. ホルモン様物質

大豆イソフラボン以外に、ザクロ、プエラリアなどの植物はエストロゲンやエストロゲン様物質を含む。植物性エストロゲンとして利用されることがあるが、内分泌攪乱物質となる危険性もあり、慎重に扱う必要がある。

4. その他の機能性成分とフィトケミカル

イチョウ葉エキスのテルペンなどは軽度認知症・アルツハイマーに効果があり、欧米では医薬品として利用されている。魚油(DHA、EPA)、クルクミン(カレー粉)などにも同様の効果が期待される。グルコサミン・コンドロイチン硫酸は関節症の症状緩和に、コエンザイムQ10、α-リポ酸などはエネルギー代謝能力の補完に利用されるが、不明な点も多い。スパイス、野菜、香辛料、ハーブには数千種類の有効成分(フィトケミカル)が含まれる。米国国立癌研究所の"Designer Foods" Program(1990年)では、600種類ものフィトケミカルをリスト化し、癌予防効果が高い約40種類の食品をピラミッド状に3段に格付けして「デザイナーフーズピラミッド」とした(図1)。フィトケミカルの疫学研究は現在も進行中である。

図1 "Designer Foods" Pyramid



特定保健用食品では、「保健効果がヒト試験で科学的に検討された成分」を厚生労働省が認可しているが、プロバイオティクス(乳酸菌・ビフィズス菌など)、オリゴ糖、ガラクトマンナンなど179種(平成

19年4月現在)の食品が認可されている。健康食品の消費拡大に伴い安全性確保のための抜本的対策が検討されている。

アンチエイジングが期待される食品成分はこのように多種多様だが、その有効性、適正摂取量、安全性が疫学的に確認されているものはまだ少ない。

アンチエイジングが期待される食生活

1．野菜・果物の有効性

食品成分とは異なり、野菜、果物の有効性についてはいくつかの根拠や提言がある。米国対癌協会のガイドライン(2002年)では、「野菜、果物は癌予防に確実、あるいはおそらく確実に有益であるとする根拠があるが、ビタミン、ミネラル剤などのサプリメントの有効性は確実な科学的根拠が確立していない。その他の食品有効成分、フィトケミカルについては、現在結論を出せるだけの十分な研究が行われていない。」としている。世界癌研究基金は1日400～800g、または1日5皿以上の野菜・果物を食べることを推奨し、「健康日本21」は野菜の目標摂取量を350g(成人)としている(大人の両手1杯が約100gの野菜に相当する。目安として両手1杯の緑黄色野菜と、両手2杯の淡色野菜を毎日摂取するとよい)。また米国では1日5皿以上の野菜、果物を推奨する「5 A Day(ファイブ・ア・デイ)」運動が始まり(1991年)、90年代後半には米国民の野菜、果物摂取量が増加、癌死亡率が低下した。野菜や果物にはビタミン、ミネラル、抗酸化性物質が豊富なこと、これらの多くの有効成分が相乗的に老化予防に寄与する可能性があることを示唆している。

「これさえ食べておけば長生きする」「これを食べると病気になる」と、ある食べ物や食品成分がすべての健康問題を解決すると思い込み、脅迫観念に捕らわれることをフードファディズムと言う。近年はテレビやインターネットなどから情報を入手しやすいが、偏った情報も氾濫している。消費者はマスメディアに振り回されず、科学的根拠の明らかな情報を見極める必要がある。いずれの食品も「多種多様に、満遍なく、適量に」を心がけるべきである。

2．長寿者の食生活

日本には百寿者(百歳以上の高齢者)が2万5,000人以上もおり、元気な高齢者も多い。長寿者の多い沖縄の郷土料理は、①肉類(特に豚肉)、②豆類(豆腐)、③野菜類(緑黄色野菜)、④海藻類(昆布・もずく)が豊富で、⑤薄味である。高齢者が敬遠しがちな肉類をしっかり食べることは、低栄養防止の意味でも重要である。また⑥温暖な気候、⑦ものにこだわらない、⑧よく働く、⑨よく寝る、⑩お年寄りを大切にし、生きがいを持って活躍できる風土・文化があることも長寿の要因と見られる。

全国の百寿者4,000人以上を調査している長寿保健福祉調査(1993年、健康・体力づくり事業財団)では、長寿のために心がけていることのベスト5は「食事に気をつける」「物事にこだわらない」「規則正しい生活」「睡眠・休養を十分にとる」「適当な運動をする」、また中年以降の食事で心がけていることは、「毎日3回規則正しく食事をする」「腹八分目」「緑黄色野菜や魚・肉・卵を食べる」、長寿の秘訣のトップは「物事にこだわらない」であった。福井県は長寿県(2000年の平均寿命全国第2位)だが、ここでも①米を中心としたバランスのよい食事、②量・質ともにバランスのよい脂肪摂取、③豆類、いも類を好ん

表1　東京都老人総合研究所による老化遅延のための食生活指針

1．3食のバランスをよくとり、欠食は絶対避ける
2．動物性蛋白質を十分に摂取する
3．魚と肉の比率は1：1程度の割合とする
4．肉はさまざまな種類を摂取し、偏らないようにする
5．油脂類の摂取が不足にならないように注意する
6．牛乳は毎日200mL以上飲むようにする
7．野菜は緑黄色野菜、根野菜など豊富な種類を毎日食べ、火を通して摂取量を確保する
8．食欲がないときは特におかずを先に食べご飯を残す
9．食材の調理法や保存法を習熟する
10．酢、香辛料、香り野菜を十分に取り入れる
11．味見してから調味料を使う
12．和風、中華、洋風とさまざま料理を取り入れる
13．会食の機会を豊富につくる
14．かむ力を維持するため義歯は定期的に点検を受ける
15．健康情報を積極的に取り入れる

(熊谷　修，他．日本公衆衛生雑誌 1999より引用)

で食べる、④塩分控えめ、また⑤よく働く、⑥奉仕活動・地域交流が活発、⑦三世代同居が多い(1996年県民調査)、などが挙げられている。このように長寿者の食生活には共通点が多い。

残念ながら、これさえあればアンチエイジングを約束する特別な食品はないと言えよう。極端に偏らず、量、質ともバランスのよい食生活を日々心がけることが大事なようである。最後に、東京都老人総合研究所の指針(表1)を掲示した。参照されたい。

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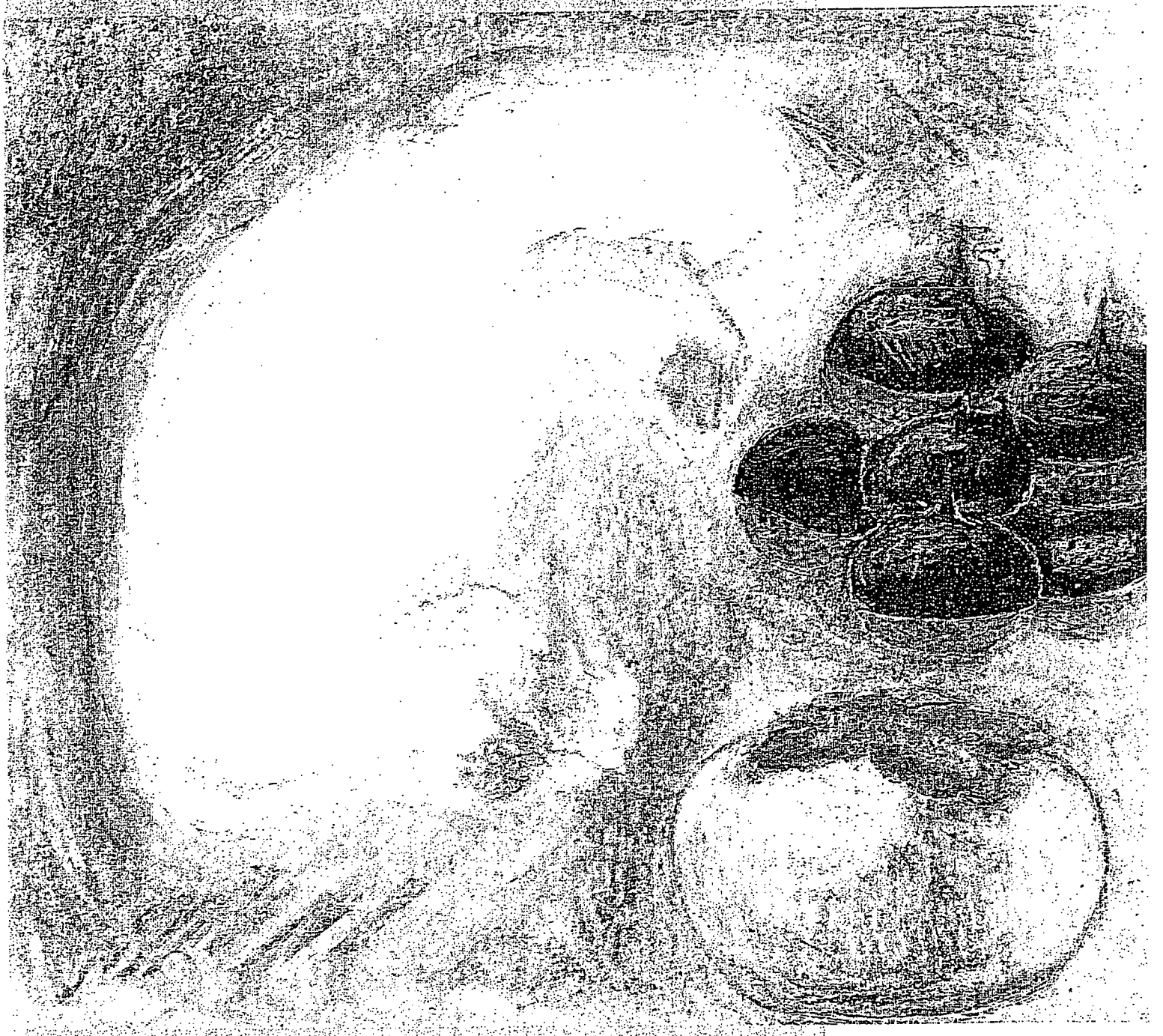
果実日本

特集●果樹園の草管理を考える



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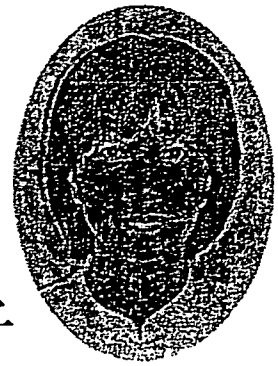
私の主張

「美味しい」食生活



国立長寿医療センター研究所 疫学研究部
長期縦断疫学研究室長　安藤　富士子

高度成長時代には、生活が一気に豊かになり、巷にファーストフードのお店があふれました。その嵐が過ぎ去った後残された物は、自動車社会・インターネット社会による運動不足と西欧化した食生活、多忙不休による生活習慣の乱れであり、これらが引き金となる「生活習慣病」は今や名前を変えて「メタボリックシンドローム」と呼ばれ、特に中高年の男性に「ウエストが八五cm以上であることが大罪」であるかのような、後ろめたさを感じさせています。

政府は「病気になる人の絶対数を減らそう。特に長期療養、医療費高騰につながる高血圧症、糖尿病、高脂血症、虚血性心疾患、脳血管障害を予防しよう。そのためにはこれらの疾患の源流にある腹部肥満を減らそう」と、「健康日本21」などで国民一人一人が生活習慣を改善するように求めています。

しかし…、「メタボリックシンドロームだ」と責められ、健康診断での指導が強化され、「絶対痩せられる運動やダイエット食品」の通販や健康番組がこんなに盛んであっても、「健康日本21」の中間報告では、肥満者の割合も野菜の摂取量も日常生活の歩数も、目標値に達しないどころか、ベースラインから全く改善されていないのです。

なぜでしょうか？「目標」と「できること」とは違うのです。いくら、「しなければならない、した方がいい」と思っていても、したくないことは長続きしません。特に「食べる」ということは「食欲」という言葉でもわかるように、人間の基本的な欲望の上に成り立っています。「美味しい」と思うものでなければ長く食べ続けることはできません。

そういう、ごく当たり前のことが次第にわかってきたせいか、最近では「生活習慣はこうでなければならない」という、杓子定規な風潮も変りつつあります。この間ある学会のシンポジウムでお聞きした、高名な教授のお話でも「体に良い栄養素の報告はたくさんあるが、結局、一つの食品（群）に偏らず、できるだけ多くの種類の食品を美味しく、摂りやすい方法で摂るのが一番」とのことでした。当たり前の結論に回帰しつつあるわけです。

だから果物は「美味しい」ことをもっと威張ってもいいのだと思います。「野菜嫌い」「肉嫌い」という言葉はあっても「果物嫌い」という言葉は聞いたことがありません。昔から病人のお見舞いにも果物は選ばれてきました。病み上がりの食欲のない時でも、口に入れた瞬間に「ああ、美味しい、生き返る」と感じさせる、こんな食べ物は他にはありません。

もちろん、果物は脂肪やコレステロールを含まず、それ以外の栄養素のバランスが優れた食品でもあり、夏の暑い盛りにお年寄りや子供に水分を美味しく摂らせる方法としても最適です。なにより、「美味しい」のです。「美味しくて体にいい食生活」、これがきっと今後の食生活指針の方向となる、そう考えています。

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アルツハイマー病
—基礎研究から予防・治療の新しいパラダイム—

I. 総　　説

我が国におけるアルツハイマー病の疫学研究

下方浩史