Invited speakers

Energy balance and malnourishment in instutionalized elderly

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The worldwide raising number of people aged of 65 and over is well documented (1). Aging is known as ¨a process that converts healthy individuals into frail ones, with diminished reserves in most physical systems and with exponentially increasing vulnerability to most diseases and death¨ (2-4). This may negatively influence energy and nutrient use.

Further, in all aging populations, an adequate dietary intake has well been recognised as a necessary factor in improving longevity (5), maintaining good health (6) and quality of life (7).

Both European and American health surveys have shown that at the age of 65-70 y and beyond, body weight tends to decrease, even in healthy individuals (3, 8-12).

Involuntary unexplained weight loss in later life increases the risk of protein-energy malnutrition, micronutrient deficiencies and nutrition-related illnesses and is associated with frailty and increased morbidity (13).

This loss of body weight appears to go with a dysregulation in appetite control and energy intake which makes it difficult to compensate for the day to day fluctuation in dietary intake and subsequently may lead to malnutrition and progressive weight loss (14, 15).

Loss of appetite occurring with age or so-called anorexia of aging has been defined (16) as ¨the physiological decrease in food intake occurring to counterbalance reduced physical activity and lower metabolic rate, not compensated in the long term¨.

Unintentional weight loss has been found to occur in both institutionalised and non-institutionalised elderly people and is associated with physiological, psychological and immunologic consequences, regardless of the underlying causes (17-20).

Especially among nursing home residents weight loss has traditionally been made a matter of concern. Yet, also among free-living frail elders, weight loss has been shown to be a predictor of early morbidity and mortality. These findings confirm the important role of losing weight as a major risk factor for the downward spiral leading to frailty and mortality (21-26).

The etiology of weight loss occurring with old age is multifactorial and in this regard, anorexia of aging seems to be a key issue (27). Appetite and the extent to which food is enjoyed vary greatly between people. In the elderly, these differences may be explained by differences in the health characteristics and eating habits of the groups studied. Second, social and environmental factors remain important determinants of appetite, more especially in elderly with an unstable or poor health condition. Third, the incapacity to adjust energy intake in the elderly on both the short and long-term seems to be a non-reversible process. In daily practice, this lack of regulation suggests that the consumption of energy and nutrient dense supplements between meals could help to prevent weight loss in older adults.

From a public health perspective, the lack of regulation in appetite, dietary intake and energy balance asks for nutritional interventions in elderly people residing in nursing homes.

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Sarcopenia and Loss of Function in Aging

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Normal aging is accompanied by loss of muscle quantity and quality. This decline in muscle causes a decline in strength, and eventually in the ability to carry out activities required for independent daily living. There are many potential causes of this decline, which can be summarized as an overall withdrawal of anabolic stimuli present in youth, and of possibly an increase in catabolic stimuli as well. Among the potential mechanisms involved in sarcopenia are:

¥Loss of central nervous system motor unit input into muscle.

¥ Loss of growth hormone secretion.

¥Loss of androgen and estrogen secretion (menopause, andropause).

¥ Inadequate dietary protein and energy intake.

¥Increased production of catabolic cytokines (IL-6, IL-1, TNF).

¥ Reduced phisical activity.

¥Increased fat mass (leading to insulin resistance and more TNF).

More is known about how to treat sarcopenia than about what causes it. Many studies have shown that strength exercise training (progressive resistance training) can reverse sarcopenia. Pharmacological therapy is less well established, and at this time it is not clear if either growth homone or androgen therapy has a role to play in sarcopenia treatment. The role of macronutrient and micronutrient dietary manipulations also needs much more extensive evaluation.

Nevertheless, as the population ages, there is good reason to hope that an epidemic of frailty can be prevented by agressive application of public health programs that emphasize physical activity and a healthy diet.

Clinical aspects of malnutrition

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Several population studies demonstrate that some 5-10% of the home living elderly are malnourished. The prevalence of malnutrition increases to 26% in hospitalized patients and reach a maximum of 40-60% in institutionalized elderly patient.

The clinical approach to the elderly patients at risk of malnutrition Tab. 1 and 2 include:

1. An early diagnosis of malnutrition.
2. A screening of those individuals who need a nutritional support.
3. A clinical and biochemical definition of the type and severity of nutritional deficits.
4. A close control of the efficacy of the nutritional supplementation.

TABLE I. Assessment of the nutritional status

Clinical evaluation	*Laboratory*	*Antropometry and body composition*	*Calorie intake and expenditure*
Clinical history, Social condition, Environment	Hematology RBC	Weight, height Body mass index	24 hours recall 3 days record
Clinical examination	WBC	Plicometry	Diet hystory
Functional status	MCV	Circumpherences,	Indierct
Muscle strenght	Albumine	waist, hip, arms	calorimetry
ADL, IADL, MMSE	Transferrin	Bioimpedance Analysis (BIA)	
Geriatric depression scale	Prealbumin	Dual X Ray absorbtiometry	
	RBP	Water spaces	
	Vit. B12, Folate		
	Fe++		

TABLE II. Markers of malnutrition

Clinical	*Biochemical*	*Antropometry*
Weight loss	WBC counts < 1.200 mmc	Body Mass Index < 20
Pallor	RBC counts < 4.000.000 mmc	Fat Free Mass Index < 17
Dehydration	MCV < 80 or > 96	Weight loss > 10% in 6 months
Cutaneous dryness	Albumin < 3.5 g/dl	Tricipital ST < 3 cm
Sarcopenia	Prealbumin < 15 mg/dl	Arm circumf < 21 cm
Edema	Transferrin < 180 mg/dl	Popliteal circ. < 31 cm
Cognitive impairment	RBP < 2.6 mg/dl	

The clinical evaluation includes the signs and symptoms of malnutrition, i.e.: weight loss, associated diseases, drug assumptions, dietary habits variations, cutaneous and mucous lesions, pallor, edema.

The functional evaluation includes the muscular strenght and the cognitive functions. The laboratory investigation includes the measure of the visceral proteins (Serum albumin, pre-albumin, Retinol binding protein and transferrin) the iron status (red blood cell count, serum iron, transferrine and ferritine) the vitamin status (Folate, Vit. B12 and other).

The record of Anthropometric parameters (body weight, eight, body mass index, plicometry and arm circumferences) will provide useful information, namely in longitudinal population study.

The evaluation of body composition with simple and unexpensive methods (Bioelectrical impedance analysis) gives relevant information on body fat mass and lean body mass.

The loss of lean body mass (Sarcopenia) is a main sign of caloric-proteic malnutrition. The Fat Free Mass Index (FFMI) = Body fat mass/Squared height seems to be a reliable marker of malnutrition and sarcoopenia. More sophysticated techniques, i.e. DEXA, bromide space, deuterium or double labelled H20 allows accurate evaluation of body compartments and represent gold standards for the validation of other methods of measure. Finally, an estimate of the energy intake and expenditure is a nutrient and caloric intake can be evaluated trough the 24 hours recall, the 3 days diary the usual nutrient intake and the meals weight. The mini Nutritional Assessment seems to be a very useful and simple method to evaluate the individual nutritional status. The energy expenditure at rest and the substrate utilization can be evaluated by indirect calorimetry and respiratory quotient calculation.

Folate, vitamin B_{12} and Vitamin B_6 and One Carbon Metabolism

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Folate, vitamin B12 and vitamin B6 (and B2) are water-soluble vitamins that function as coenzymes in one carbon metabolism. This metabolism comprises of a network of interrelated biochemical reactions in which a one-carbon unit from a donor is transferred to tetrahydrofolate for subsequent reduction or oxidation and/or transfer of the one-carbon moiety for the synthesis of thymidylate, purine nucleotides, methionine or for serine-glycine interconversion. Thymidylate and purine nucleotides are used for DNA and RNA synthesis and repair. Methionine is used for protein synthesis and for the synthesis of S-adenosylmethionine (SAM), the universal methyl donor.

Vitamin B12, in the form of methyl B12, participates in the methylation of homocysteine to from methionine. FAC, the coenzyme form of riboflavin (B2), acts as a prosthetic group for methylenetetrahydrofolate reductase. Pyridoxal-5 -phosphate (PLP) is used for the serine-glycine interconversion as well as for the disposal of homocysteine through the transsulfuration pathway.

Interest in one-carbon metabolism, as a public health issue, has been growing since the demonstration that periconceptional intake of folic acid prevents the occurrence and recurrence of neural tube defects. This interest emanates from reports which link inadequate vitamin status or intake, or higher plasma total homocysteine (tHcy) levels, to increased risks of a variety of diseases that afflict the elderly, including occlusive vascular disease, cancers, cognitive dysfunction and others.

In 1992, we proposed a hypothesis to explain the biochemical regulation of plasma tHcy levels (Selhub and Miller, 1992). Our premise was that plasma tHcy concentration is a reflection of the intracellular metabolism of homocysteine. Furthermore, since tHcy metabolism is catalyzed by enzymes that employ folate, B12, B6 and B2 coenzymes for their activities, we postulated that the amount of homocysteine in plasma is determined by the status of these vitamins as well as by regulatory checkpoints in the metabolic scheme which are modulated by metabolic intermediaries such as SAM, the levels fo which are also in part determined by B-vitamin status.

We used vitamin deficient rat models to support many aspects of this hypothesis (Miller et al, 1994). In the Framingham Study, we showed that plasma tHcy levels are strongly and inversely correlated with plasma folate levels (Selhub et al, 1993). Plasma tHcy levels were also inversely correlated with both plasma vitamin B12 and PLP levels, although to a lesser extent than the relationship with plasma folate. Similar data were obtained with the analysis of US representaive serum samples from NHANES III (Selhub et al, 1999).

The use of homocysteine and methylmalonic acid (MMA) as functional indicators of vitamin status has been useful in clarifying the diminishing vitamin status in the elderly. Thirty percent of the elderly in the Framingham Study original cohort had elevated tHcy plasma levels, and 2/3 of these elevations is attributable to inadequate vitamin states (Selhub et al, 1993). In NHANES III, the relationship between tHcy and serum vitamin B12 levels is most evident in those over the age of 60 years. Serum MMA levels in the Framingham Study has been valuable in estimating the proportion of the elderly with inadequate vitamin B12 status (Lindenbaum et al, 1994).

In cardiovascular disease, emphasis has been placed on the relationship with tHcy. Nearly all observational studies that have examined this issue have demonstrated a highly significant relationship. In the Framingham study, we showed a strong association between prevalence of carotid stenosis and tHcy levels, as well as with plasma folate and PLP levels (Slhub et al, 1995). There have been few other studies that showed similar relationships between disease and systemic vitamin levels or estimated intake (Robinson et al, 1998). The majority of the studies, however, either did not measure blood vitamins or found no significant relationships between blood vitamin levels and disease.

Neurodegenerative disease due to B12 deficiency has been recognized for years, whereas epidemiological evidence linking low folate and B6 status with a decline in neurocognitive function in the elderly was first described by Goodwin et al (1983). They demonstrated that healthy elderly subjects with low blood levels or lower intake of folate, vitamin B12, vitamin C and riboflavin scored more poorly on tests of memory and nonverbal abstract thinking. Other studies (reviewed by Selhub et al, 2000) have, for the most part, reiterated these epidemiological associations between vitamins and neuropsychological functions, while a few other studies reported improvement in mental health after vitamin supplementation (LIndenbaum et al, 1988; Martin et al, 1992). These observations argue that poor vitamin status is in part responsible for the cognitive decline seen in some elderly.

More recently, elevated plasma homocysteine levels have been related to cognitive dysfunction and subsequent studies suggest that the relationship of cognitive dysfunction and dementia to plasma tHcy is stronger than the relationship to plasma vitamin levels (reviewed in Selhub et al, 2000). Plasma tHcy was a far stronger predictor for spatial copying performance than either folate or vitamin B12 (Riggs et al, 1996). Plasma tHcy also exhibited a stronger correlation to dementia of Alzheimer s type (DAT) in 164 consecutive patients, including 76 patients with histologically confirmed diagnoses (Clarke et al 1998). Finally, Lehmann et al (1999) showed tHcy, but not vitamin levels, inversely correlated with the degree of memory loss.

Fassbender et al (1999 found that patients with small and subcortical vascular encephalopathy (SVE), a distinct type of vascular dementia which is characterized by progressive loss of memory, cognitive decline and other manifestations, have higher tHcy than both healthy controls and patients with large vessels cerebrovascular disease. Regression analysis revealed that tHcy is the strongest independent risk factor for SVE.

Low folate status, and more recently, low B12 and B6 status have been associated with increased rates of certain types of common cancers. Observational studies of a case-control as well as prospective cohort design have consistently demonstrated a 40-60% decline in the development of colorectal neoplasm when comparing populations consuming high versus low folate (reviewed in Kim, 1999). Diets containing low levels of methionine and excessive alcohol, each of which would be expected to further impair one carbon metabolism, contribute to the risk of low folate intakes in the prospective cohort studies (Giovannucci et al, 1993, 1995).

There are three addtional observations that contribute evidence that low folate status actually contributes to the risk of developing the cancer. We have conducted two studies with animal models of colorectal cancer demonstrating an inverse dose-response effect between dietary folate intake and the development of both microscopic foci of cancer as well as macroscopic tumors (Cravo et al, 1992; Kim et al, 1996). in the Physician s Health Study we observed that homozygosity for the C677T mutation is associated with a 70% reduction in the relative risk of colorectal cancer (Ma et al 1997) in those with a normal folat status. Lastly, we and others have performed numerous studies in cell culture, animal models and in humans which provided several biologically plausible mechanisms by which folate status might modulate colorectal carcinogenesis. These mechanisms largely relate to tetrahydrofolate s prominent role in sustaining critical patterns of DNA and RNA methylation as well as its role in thymidylate and purine synthesis and thereby in sustaining normal DNA synthesis and repair. We have shown that folate deficiency in rats leads to hypomethylation of the critical regions of the p53 tumor suppressor gene as well as a concurrent excess of strand breaks in the same region (Kim et al, 1997) Recently, our group proposed a scheme that integrates the most likely mechanisms that are responsible for folate s modulation of carcinogenesis into a unified explanation for the effect (Choi & Mason, 2000).In addition, we have collaborated with the nutritional epidemiology group at the National Cancer Institute to begin to explore the relationship of B12 and B6 with cancer. Low plasma vitamin B12 is associated with a 2-fold increase in breast cancer risk (Wu et al, 1999); in male smokers, low PLP and folate levels are associated with increased pancreatic cancer risk (Stolzenberg-Solomon et al, 1999) and low PLP increases the risk of lung cancer (Hartman et al, 2000). In none of the cases does tHcy exhibit any significant relation with disease risk.

Minerals

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Ageing is characterised by an increase in the capacity to adjust to environmental and intrinsic changes finally affecting survival. Homeostatic mechanisms breakdown and nutrient bioavailability, including that of minerals, declines.

Poor intake of minerals and interactions between them and other components of the diet may lead to deficiencies. Imbalances between mineral intakes and recommended amounts have been observed in different groups of elderly. However, except perhaps for calcium and iron, assessment of mineral status is difficult, because they participate in many metabolic functions.

Among the major minerals, calcium absorption efficiency and its acreetion into the bone is known to be low during elderly. In contrast, metabolic processes that lead to bone resorption and body calcium losses are enhanced. Bioavailability of other minerals such as magnesium and that of trace elements, such as zinc, selenium, chromium, etc, may also change due to ageing. Old people do not need food to grow but to maintain body functions. The relationship diet-health is especially relevant at this stage. Age-dependent diseases in which minerals may play a role include: cardiovascular disease, osteoporosis, cancer, hypertensi n, anaemia, diabetes mellitus, and macu - lar degeneration.

Moreover, in the elderly interactions between nutrients may change and medication to treat chronic diseases may interfere with mineral utilisation. Therefore, formulation of mineral recommendation is complex and individual recommendations are sometimes needed.

Recommended iron intake is lower for older women compared to young, because menstruation ceases after menopause. In contrast, recommended calcium intakes are higher in order to protect from osteoporosis. Dietary recommendations for the rest of elements are similar to that of adults, although several suggestions on the quantities have been given. Electrolytes, particularly sodium and potassiums hould be considered, because the renal capacity to conserve and excrete water and electrolytes is usually altered compared to adults. Consequently, control of salt intake should be prometed in order to lower the hypertension risk, but al the same time preventing an excessive reduction of sodium intake that could produce hyponatremia.

This review examines various aspects of the changes on mineral bioavailability due to ageing, of data published on mineral intakes and status in the elderly, and finally the dietary recommendations for this vulnerable group of population.

Improving appetite in the elderly

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Background. More than 50% of elderly in Dutch nursing homes has a lower than recommended intake of at least one micronutrient. The high prevalences of low micronutrient intakes can be attributed to a low food intake, which may result from a low appetite. One possible cause of this so-called anorexia of aging may be of sensory origin, another cause may be of social origin.

Objective. To determine whether interventions in the social or sensory domain improve appetite, food intake and nutritional status.

Methods. In a 1 year intervention we improved the social ambiance at mealtime in two somatic wards (with n= 15 in each ward) of a nursing home, by a series of measures related to 1. the serving of the meal, 2. physical environment (making it more cosy), and 3. participation of nursing staff in the meal. In two control wards, there was no change from the original mealtime situation. Foods served in both conditions were identical, and the measures were carried without extra (labour) costs. Dependent variables in this study were body weight, food intake (3 d. observed), haematological parameters, and quality of life. In other studies, not reported in this abstract we did interventions within the sensory domain.

Results. The average weight in the intervention group (n=12) increased by 2.8 kg ($p<0.05$), whereas in the con-

trol group (n=10) there were no weight changes. There were no noticeable effects of measured food intake. Quality of life remained stable in the intervention group, while it declined in the control group. Some haematological parameters improced in the intervention group while they remained stable in the control group.

Discussion/conclusion. Improving the social ambiance at mealtime in nursing homes has positive effects on nutritional status and quality of life. The social ambiance at mealtime can play an important role in improving appetite in elderly. A similar conclusion can be drawn with respect to sensory factors.

Food likes and dislikes in elderly people

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Although most of the current studies have been focus to young and middle age population, elderly people are becoming a significant group in western countries, with political, social and economic importance. Therefore, an important issue in a market economy is to know the reasons why they likes or dislikes food, to understand the buying process.

On the other hand consumer behaviour is very complex due to the influence of many factors. Therefore the research focus to food likes and dislikes requires the knowledge of several sciences such as sociology, nutrition, physiology, sensory analysis, medicine, marketing and others.

The consumer decision process follow different steps that we may identify as need recognition, search for information, evaluation of alternatives and choice.

In need recognition, consumers may experience a need for stimulation. Through marketing activities enterprises inform the consumers about the attributes and advantages of their products. However we should keep in mind that old persons prefer the written information that may check, read carefully an understand better.

Search for information is the next step, and most of the elderly people have had previous opportunities for traditional food. However they face a barrier for new products, with no former experience been reluctant to them due to their special conditions of taste, smell, health and price.

In the evaluation of alternatives elderly people tend to think about food in relation to the function. There is a priority on the consequences on health while are secondary other elements such as label, preservation or color.

The geographic origin of the food may be an important factor in food choice. Elderly people have a long life and they have positive and negative experiences influencing food likes and dislikes.

In general consumer choice behavior may be influenced by socioeconomic environmental conditions and by psychological effects. Although it may be a diminished economic status in the elderly, specially those retired with lower income, several factors indicate the relative increase in food expenditures. Rising incomes on the elderly will lead to higher per capital food expenditures. We know that when low incomes rise, more food is usually consumed, and many elderly are in the lower income step. Old adults living alone spend more per person in food than larger households. Besides they demand smaller or single serving packages with higher cost per unit. Also demand for convenience and services may increase in several ways: food packaging, ready to eat, home delivered or eaten away from home.

As they have more spare time, food shopping is a major activity for many elderly people. There are opportunities for home-delivered food at a reasonable price, but the social function of shopping is very important for the elderly.

However they face some difficulties as a consequence of diminished physical strength necessary for lifting heavy loads, handling carts, walking long distances.

Physiological effects are significant. Ageing is usually accompanied by anorexia: a decline in appetite followed by weight loss. Appetite change greatly among people. In the elderly these differences may frequently explained by differences in health. We should consider that aging bodies need fewer calories, because physical activity slows, muscle mass is lost and often replaced by fat. Because fat tissue burns fewer calories than muscle, fewer calories are need to maintain body weight.

However we may get some solutions to balance the alternative food like or dislike. Thus, the consumption energy vitamin drink and nutrient dense supplements between meals may prevent their weight loss. Some other times adding ready to use flavor enhancers to the meals was an effective way to improve food likes.

One opportune question is how western society response to elderly people needs? A short discussion is showed about the action of public and private sector. How public institutions should adapt their programs to increase food intake and health in old population.

Commercial oriented to ˙third age¨ are related to insu - rance, retirement of recreation activities. However in food sector big changes are appreciated. Promotion is usually focus to young and dynamic persons.

Food producers and distributors should also adapt their marketing strategies looking at the potential of the new market segment. They should avoid common mistakes creating new products for ˙senior citizen¨. Quite often old people do not identify individually as member of the old age. After, in this paper there is a description of the food intake evolution of the Spanish old population, with a comparative analysis of the main basic products.

A decrease in the consumption of fresh fruit and vegetable and other typical Mediterranean products during last decades called the attention to some nutritionists that see a degradation of our healthy diet.

A serious analysis of the reasons should be done. Why fresh fruit are substituted by dairy products as dessert? It is the more variety on dairy that make them more atractive? Why do people like more the ˙imported¨ food habits? Why did not like some traditional, healthy and creap products (such as beans, lentiles, garbanzos)? Is it a consequence of globalization, promotion, price competition, or more dynamic distribution?

Those are some questions to be answered by producers, specialist, merchants, politicians or consumer associations. Something has to be done to maintain our traditional Mediterranean food habits.

Nutritional problems in nursing home

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More than 6 million people in Spain are over 65 years-old (16%). We will be over 20% before year 2020th. With 80 years or over are 1.350.000. Life spectancy at 65, is 20 years in women, and 16 in men. Health and related health problems are the main concerns for the elderly.

The nursing-home world is a very complex one. We could clasify nursing-homes according with different schedules. Mainly size and dependence, both with effect on the nutritional status and problems of residents. The number of nursing-homes beds in Spain were in 1998 of 188.862; a little more than two-thirds (130.369) are private.

Changes associated to the human aging process are clasified as physiological, pathological and related to enviromental and risk factors. Nutritional changes arrive by any of these ways. In a nursing-homes we must add as specially critical situations: acute intercurent processes, use and abuse of drugs, and several diseases like tumors or dementia.

There are not many nursing-homes dietetic-nutritional studies carried out in our country. Among them, along the last ten years, I will refer:

a) ˙Estudio Canarias¨ (Morales et al. 1991).

— 130 nursing-home residents (71 years old).

— Nutritional status was worse in those with:

¥ cognitive impairment.

¥ deambulatory dificulties.

¥ need of help to eat.

—Mortality at 20 month was close related with a worse basal nutritional status.

b) ˙Catalu a¨ (Salv et al. 1996).

— Nutritional assessment in Catalonia nursing-homes.

— Instrument: Mini-Nutritional-Assessment.

— Undernourished residents: 5.7%.

— In risk: 47%.

c) ˙Sociedad Espa ola de Geriatr a-IMSERSO Study¨ (1998).

—1152 residentes, living in 35 nursing-homes all around the country.

— BMI > 20: 4%.

d) ˙Nutricia Study in Nursing-Homes¨ (1998).

— 582 healthy residents (81 years old).

—Public nursing-homes (Andaluc a, Catalu a and Ga - licia).

¥ 30% needed some special diet.

¥ Nutritional status were good.

¥ 14% drunk alcohol daily (mean: 16 gr/day).

e) ˙Demenu-Study¨. Madrid (2000).

— 99 demented patients (86 ¥) living in nursing-homes.

— Daily nutritional suplements with one year follow-up.

— No changes in the evolution of dementia.

— Less morbi-mortality

Main concerns related to nutrition in the elderly at nursing-home are: a) losses of weight and malnutrition, b) dehidrataci n, c) hyponatremic status, d) comorbidity , e) demented patients, f) special diets, and g) patients with parenteral nutrition or with gastrostomy.

Nursing-home policy must include: a) assessment of nutritional status at arriving and periodically, b) to provide healthy foods and a well balanced diet, and c) to respond in every case to the nutritional needs of the resident.

Some general suggestion related to the diet are:

—To avoid an uniform diet or forbidden foods in an age-based policy.

—To prepare menus according with the cultural habits of the residents.

—An atractive presentation of the foods.

—To divide the diet in 4 or 5 daily meals schedule.

—Residents must eat the liquid component of the meals, in order to get profit from there minerals and vitamins. To avoid (or to reduce) frites. To consume fuits and fresh vegetables.

—A minimum of 1,5-2 of liquids each day (water, milk, juice, infussions, etc.).

In case of malnutrition the protocol will include:

—To look for and to treat the eventual precipitating disease.

—To assess the efects on the different systems: weight, blood determinations (haemoglobin, albumine, cholesterol,...).

—To start an incentivated and supervised open dietetic program adding, allowing a free diet, with, if necessary, oral nutritional supplements.

—If after one month BMI shows not response or albumine level are below < 2.8 gr/dl we can start with enteral nutrition (nasogastric tube).

Micronutrient status and mental health

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Mental health partly reflects the functional and structural condition of the brain, which in turn is dependent on its supply of nutrients and oxygen. Vitamins play a direct role in the synthesis of the major neurotransmitters such as acetylcholine, dopamine, noradrenaline, serotonin and GABA. Acetylcholine is involved in the mechanisms of attention and memory, noradrenaline and serotonin are involved in controlling mood and GABA is involved in modulating anxiety. The vitamins with antioxidative properties such as ascorbic acid and α-tocopherol aid the endogenous mechanisms in combating lipid peroxidation and oxidation of neurotransmitters. Animal studies have shown that vitamin E reduces the neurotoxicity of β-amyloid and in one human intervention study the progress of Alzheimer s disease could be slowed by treatment with vitamin E. The brain s function also reflects the performance of the cardiovascular system, as it receives 19% of the body s blood supply and 20% of the oxygen supply. Epidemiological studies have shown that there is an inverse relationship between the plasma levels of homocysteine and carotid artery stenosis and between the former and the levels of vitamins B-6, B-12 and folic acid. Intervention studies have shown that these vitamins lower the blood levels of homocysteine and methylmalonate and reduce the progression of atherosclerosis in the carotid arteries. Epidemiological studies suggest that populations with higher plasma levels or higher dietary intake of folate and vitamin B-6 have a lower risk of carotid artery stenosis and coronary heart disease. The B-vitamins therefore play an important role in maintaining an optimal blood supply to the brain throughout life. In many epidemiological studies correlations have been found between vitamin intake or vitamin plasma levels and various markers of mental health.

Phisical performance and quality of life

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Objective: To describe the predictive power of ADL, age 76-80, for Quality of Life, live years later.

Design: ADL measured at SENECA survey 2, 1993 was related to Quality of Life measured in SENECA survey 3, 1999 in 532 men and women from 8 European countries. 310 persons from SENECA 2 had died 1993 - 1999, and 249 did not participate in 1999.

Methods: For Activities of daily living (ADL) 16 items the level of competence was measured on a 4-point scale and combined ability scores calculated.

Different dimensions of Quality of Life questions (QoL) pain, sleep, energy, emotions, social network, physical performance have been formed as sum scores of answers (yes/no) to ingoing questions.

Results: For each gender and in almost every country ability to perform ADL (1993) was almost doubling the chance to omit pain, slee-plessness, loss of energy, depresion, loneliness and impaired mobility ($p< 0.05$).

Discussion: Participants in SENECA survey 3 were the most healthy and well functioning of the survivors in 1999 born 1913-18. Even in this group of healthy survivors a gradient in QoL could be detected, associated with former ADL performance. If mortality and nonparticipation had been less, 1993-1999, the predictive power of ADL for QoL could have been even greater.

Type 2 Diabetes Mellitus and Cognitive Dysfunction

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Type 2 Diabetes mellitus and cognitive dysfunction appear to be related although other factors such as hypertension, depression, and dyslipidaemia may play a role. Whilst the complications of diabetes mellitus have been extensively studied in the micro- and macrovascular systems, relatively little is known about the effect of this metabolic disorder on longer term cerebral and cognitive function. This dysfunction is likely to result from several factors, for example, the presence of co-existing cerebrovascular disease, metabolic decompensation, hypoglycaemia, or even the effect of persistent hyperglycaemia.

This lecture will provide a summary of the literature in this area, discuss several underlying mechanisms which may operate to produce cognitive impairment and dementia, and look at possible ways of gaining greater insight into this probable complication of diabetes. The implications of having this complication will be discussed briefly in terms of management strategies. A brief account of the Welsh Community Diabetes Study (the AWARE Study) will be given with data presented relating cognitive function and its impact on use of healthcare services and self-care behaviour.

SENECA's FINALE: Dietary quality, lifestyle factors, nutritional status and survival in old age

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The SENECA study is a Europe-wide study among mostly free living elderly people who have been followed for a period of ten years. The aim of this study was ¨to explore dietary patterns in the elderly living in different European communities in relation to both social and economic conditions and to health and performance¨. In this paper we present the first results of SENECAs FINALE focussing on dietary quality, lifestyle factors, and nutritional status and their relationship with survival. The SENECA study started in 1989, included an intermediate measurement schedule in 1993 and the FINALE data collection was conducted in 1999.

At baseline, participants were a randomised stratified sample from 19 centres stratified for age and sex. About 2600 elderly people, with an equal number of men and women participated. At that time they were 70-74 years old. For this presentation we use data of about 50% of the original participants, including those with full longitudinal data sets.

The following measurements were included in the core protocol at baseline:

—General questionnaire. Including questions on social demographic data, health, medicine use, supplement use, physical activity and performance.

—Dietary intake. Validated modified diet history, including a 3-day diet record.

—Anthropometry. Body height and weight, other measurements.

—Biochemistry. Several vitamins, lipids, albumin and haematology.

—Non response. Questionnaire.

In SENECAs FINALE we added questions on mental health (also included in the follow-up study in 1993), vital status and quality of life.

So far, we only explored diet, physical activity, body mass index (Kg/m^2) and smoking in relation to survival.

Examining diet two macronutrient profiles emerged: a northern profile with comparable contributions of carbohydrate and total fat to total daily energy intake and a southern profile with a larger share of carbohydrates to total energy intake. We decided to use for exploring the relationship between diet and survival the Mediterranean diet score as developed by Trichopoulou et al and only made small adaptations in the cut-off values. The following items were included in the score:

—monounsaturated/saturated fat ratio;

—grains;

—fruits and products, vegetables;

—alcoholic beverages;

—meat and poultry;

—milk and milk products.

Por physical activity we used tertiles of the Voorrips-score.

Smokers were categorised in current- ex- and no smokers.

During the lecture we will discuss the results of our explorative analysis. Preliminary analyses indicate that a healthy lifestyle still matters: even at ae 70-75 years.

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Micronutrients and drug interactions in elderly

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A variety of physiological, economic, psychological and social changes can compromise the nutritional status in elderly. Regarding micronutrients, the functional decline of gastrointestinal, renal, and endocrine functions result in a reduction of their bioavailability and in a modified metabolism. Parallely, the needs are increased to restore immunity (Zn, Se, Cu, Vitamin E, C), to improve glucose tolerance and lean body mass (Cr), to maintain cognitive function (Se, βcarotenes, vitamin E, folates), to prevent bone density loss (Ca, Cu, Zn), and to protect against oxidative stress (Zn, Se, Cu, vitamin E, C, carotenes). In free living people, alterations of micronutrient status are reported to be at moderate incidence. However, in SENECA study, we observed inadequate intake of one or more nutrients in 23.9% of men and 46.8% of women 74-79 years old living at home. In hospitalized or institutionalized elderly patients, several recent surveys have reported a high incidence of combined vitamin and trace element deficiencies due both to acute (e.g. cancers, CVD) or chronic diseases (e.g. inflammatory chronic disorders) that generally increase the needs and to medications that modify the absorption and metabolism of micronutrients.

MODIFICATIONS OF MICRONUTRIENT ABSORPTION AND METABOLISM

One mode of action of dietary enhancers and inhibitors is to elicit a change of absorption through the formation of complexes with the trace element in the GI tract. I f the binding of the trace element within the complex is very tight, then the trace element may not be released to the transport protein associated with the enterocytes; the substance is then an inhibitor e.g. phytate with iron and zinc. Conversely, if the binding of the compound is lower that of the transport protein, then the trace element will be released from the complex and the result will be an enhanced absorption. Substances classed as enhancers include ascorbic acid with iron, amino acids with Cr, Cu, Zn, Fe. The formation of these complex is highly dependant of the gastric pH. In aged patients, the decreased acid gastric secretion, associated to a lowered acid lipase secretion leads to a lower iron absorption. Zinc and selenium seem less influenced by gastric pH.

INTERACTIONS BETWEEN NUTRIENTS

Competitive or synergistic interactions also occurs between micronutrients. Hundreds of interactions among mineral elements and/or vitamins and between those and other nutrients are known but have not been quantified. The quantitative description of all these interactions is probably the treatest challenge for assessment of the efficienty of a supplementation. For trace elements, the antagonism is significant when the intake of one metal is particularly high. The interactions occur mostly between zinc and copper, zinc and iron, zinc and folates, iron and copper. Calcium reduce magnesium, iron and zinc absorption and balance. In post menopausal women, lactose may interfere with copper metabolism and be, surprisingly, an aggravating factor of osteoporosis. For vitamin E, synergistic effects of selenium, vitamin C or sulfur containing amino acids are well documented, with high intakes of vitamin A may decrease vitamin E absorption. Conversely, high levels of vitamin E reduce intestinal absorption of vitamin K.

MICRONUTRIENT AND DRUG INTERACTIONS

Older subjects frequently receive several combined treatments which can interfere with micronutrient metabolism and status. It is well documented that a polymedication induces inappetence and results in low nutritional intakes, which lead to an inadequate intake of micronutriments. Moreover, specific mineral traces such as potassium, magnesium and zinc appear to be important for optimal IGF1 synthesis and anabolic effects on animal models. Drugs and micronutrient interactions in elderly are not well documented although they frequently occur. Vitamins taken in large dosages should be considered as drugs. High doses of vitamin C aggravate the decline of renal clearance of acidic drugs such as acetylsalicylic acid. Vitamin B6 reduces the therapeutic effect of L-Dopa. Vitamin E interacts with numerous medications as clofibrate, isoniazid, cholestyramine, adriamycin, warfarin, phenothiazines. Conversely, drugs can modify vitamin metabolism. Anticonvulsives that induce hepatic microsomal enzymes accelerate vitamin D metabolism and aggravate post-menopausal osteoporosis. Antiacids and hydrogen pump blocking agent develop bacterial overgrowth of the small intestine and decrease the absorption of folates, calcium, vitamin B12 and vitamin K. But this overgrowth produces also menaquinones which contribute to vitamin K nutriture. Some drugs are well known to interfere with minerals. Diuretics usually decrease potassium, magnesium, zinc and long term diuretic therapy, which is the most widely used in cardiac failure, increases urinary excretion of water soluble vitamins, particulary B1.

Antidepressant treatmment can alter zinc status. Antiinflammatory drugs interact with zinc and copper. Recently interactions between chromium and corticosteroids have been reported. Atherogenicity of homocysteine may be related to copper-dependent interactions. Antioxydant balance can also be modified by some drugs. In women with breast cancer, tamoxifen resulta in an increase of antioxidant status as vitamins E, C, and selenium, whereas the effect is not found with cisplatin which acts conversely as prooxydant.

In conclusion, regarding the importance of these interactions, the data are still scarce, and further studies are needed for a better knowledge and an optimal effficiency of treatments.