

disease such as dental caries or gingival bleeding.

### **2.3 Xerostomic conditions**

Xerostomia is quite prevalent in older people, and roughly thirty percent of the elderly people are affected by dry mouth conditions (Schein et al., 1999; Närhi, 1994, Locker, 1993; Ship et al., 2002). Traditionally it was believed that salivary function decreased as a result of the ageing process (Bergdahl & Bergdahl, 2000), but, in healthy adults, age-associated changes in salivary composition and flow are minimal. Recent research demonstrates that xerostomia may be due to the effect of systemic diseases (such as diabetes, Sjögren's syndrome, AIDS) and their treatment, mental disorders, head and neck radiations, or multiple use of medications. One review listed more than 400 different medications implicated in xerostomic conditions, the most common being antidepressants, antipsychotics, anticholinergics and antihistamines (Screebny & Schwartz, 1997).

Further studies are needed in order to better explain the relationship between medications and dry mouth (Dawes 1987; Atkinson & Wu, 1994; Thomson, 2005); meanwhile, the high consumption of multiple medications remains an important etiological factor. The important issues of duration of exposure and the relationship of salivary hypofunction and medications in the unhealthy elderly are largely untested (Atkinson & Wu, 1994), as are the subjective complaints of dry mouth only being correlated with a 50% decrease in salivary flow (Dawes, 1987).

Elderly persons' quality of life can be compromised by dry mouth, as it affects mastication, swallowing and speech, and may increase the risk of microbial infection, root caries and candidosis (Slade et al., 1998). Reduced salivary flow may disturb the normal protective mechanisms for teeth and mucosa, therefore requiring more attention in the provision of adequate oral care.

### **2.4 Nutrition and oral health**

The relationships between oral health status, dietary practices, nutritional status and general health status are complex (Knapp, 1989, Walls et al., 2000). Inadequate nutrition affects oral health, and poor oral health conditions affect food choice. Diet and nutrition are related to oral health, and, more specifically, to oral cancer and dental diseases in older persons (Moynihan & Petersen, 2004). A diet deficient in vitamins, minerals, proteins and calories can impair the immune system and promote weakness (Pla, 1994). Lack of appetite among the elderly is common, especially in individuals suffering from anorexia, nausea, vomiting or xerostomia resulting from medication; food intake is reduced and even more among the chronically ill with diseases reducing the metabolic status. A Swiss study (Dormenval et al., 1995) confirmed the relationship between clinical parameters of malnutrition, serum albumin level and some indicators of oral health (dental status, oral hygiene, masticatory function and salivary secretion rate) among elderly hospitalised patients.

The Florida dental care study (Schoenberg & Gilbert, 1998) assessed the dietary implications of oral health decrements among Afro-American and white older adults, and provided evidence that oral health decrements and

the accompanying functional disability impacts on their day-to-day lives. Chewing, taste perception, swallowing, comfort with appliances must be considered to be among the leading causes of poor nutritional status in older persons. Poor general health status, dehydration, drugs and oral dryness directly influence the appetite, diet and nutrition status of older people (Dormenval et al., 1995). The importance of chewing capacity has been well established in relation to nutrition status as the number and distribution of teeth will influence the ease of chewing (Leake et al., 1994, Walls et al., 2000). More refined studies have further demonstrated that the number and distribution of teeth in opposing pairs were the most pertinent factors (Leake et al., 1994). The choice of foods becomes largely dependent on the ability to consume them with satisfaction (Carlos & Wolfe, 1989). Foods were rejected when too hard to chew, and some were discarded. The attitude of the elderly in selecting foods is therefore strongly influenced by the ability to chew rapidly and effectively (Sheiham et al., 1999). The status of the teeth and or prosthesis is an important determinant in food selection, dietary fibre consumption (Laurin et al., 1992) and gastro-intestinal disorders (Mumma & Quinton, 1970).

Chewing function in the elderly is often compromised as the loss of teeth and the dependence on dentures become more extensive with advancing age (Petersen et al., 2004). Individuals living in institutions are over-represented in this category and require considerably more supervision and help from personnel adequately trained in this area (Sheiham et al., 1999).

### ***2.5 Weight loss***

Studies of hospitalized and institutionalized older adults suggest a relationship between poor oral health and subsequent weight loss (Sullivan et al., 1993; Blaum et al., 1995). A recent one-year follow-up study (Ritchie et al., 2000) among adults 70 years or older identified edentulousness as an independent risk factor for weight loss. It has been shown that debilitating diseases influence the attitude of elderly persons in relation to the protection of oral health, when involuntarily, due to lack of alertness they neglect to apply preventive measures and let dental caries and periodontal problems arise in their mouth.

### ***2.6 Osteoporosis***

Osteoporosis is a degenerative chronic disease which affects the entire skeleton and is mainly prevalent in older women. Cross-sectional studies have demonstrated an association between osteoporosis and periodontal status (Mohammad et al., 1996; Wactawski-Wende et al., 1996; Persson et al., 2002). Other studies have suggested that periodontitis may be aggravated in people with osteoporosis, but those failed to detect such a relationship in the early stages of osteoporosis (Taguchi et al., 1995; Birkenfeld et al., 1999).

### ***2.7 Oro-facial pain***

Elderly people may be vulnerable to chronic pain because of the ageing process, and/or their general status. Self-report of chronic pain seems to increase up to but not beyond the seventh decade of life; chronic pain in

older people is more often experienced in major joints, the back, legs and feet (op.cit. Helme & Gibson, 2001). Chung et al. (2004), in a study among Korean elders, recognized that oro-facial pain is an important problem in geriatric health; older people reported a higher number of disability days because of their pain than the general population.

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### **3. Impact of dental diseases on general health**

#### **3.1 Dental disease and respiratory diseases**

Respiratory diseases are responsible for significant morbidity and mortality in human populations. The upper part of the respiratory tract is in close contact with the oral cavity through the oropharyngeal area. The oral cavity is constantly irrigated by the flow of saliva, a vehicle for many species of oral flora. Under normal conditions, the movement of saliva has a cleansing and protecting action on teeth and oral mucosa, and it helps to maintain a stable equilibrium between the diverse components of the oral flora. However, this equilibrium may be rapidly disturbed when conditions are favouring dental plaque accumulation and periodontal infections, both associated with poor oral hygiene. This situation occurs to a large extent among elderly persons in connection with the marked physiological changes they undergo, especially those depriving them of their mobility and independence (Limeback, 1988; Russell et al., 1999; Scannapieco & Mylotte, 1996).

Recent studies have suggested an association between poor oral hygiene and respiratory infection (Scannapieco, 1999; Hayes et al., 1998; Mojon et al., 1997). The relationship of poor dental health and respiratory diseases has been studied to a large extent on people living in nursing homes and chronic care-facility institutions; these individuals are generally more at risk of contracting respiratory infections. Severe respiratory diseases include chronic obstructive pulmonary disease (COPD), chronic bronchitis, emphysema and aspiration pneumonia. Lower respiratory infections may begin as a contamination of the lower airway epithelium by micro-organisms present in aerosolized droplets, or by aspiration of the bacteria from oral secretions. Oral bacteria are thought to play a role in the exacerbation of COPD, and in aspiration pneumonia (Scannapieco, 1999).

#### **3.2 Aspiration pneumonia**

Pneumonia is a disease frequently contracted by elderly people, and it accounts for the majority of admissions to hospitals from nursing homes. Studies have shown that some of these patients were at high risk of lung infections due to the content of virulent organisms in their oral fluids when aspiration was done in the oropharynx (Scannapieco & Mylotte, 1996; Langmore et al., 1998; Russel et al., 1999). This is a common situation in chronic-care patients whose defence mechanisms (cough reflex mainly) are diminished. Although the respiratory tract infections are commonly linked to streptococcus pneumoniae, sources from the gastro-intestinal tract and the oral cavity have also been identified. Respiratory pathogens are commonly found among species of microbes present in dental plaque and periodontal pockets, and are thought to be responsible for lower lung infections (Sumi et al., 2002). Aspiration pneumonia—an infection caused by oropharyngeal secretions, food and/or gastric contents aspirated into the lungs—is common among debilitated older people and patients in intensive care units (Loesche & Lopatin, 2000). A relationship between aspiration pneumonia and periodontal disease has been reported in certain

studies (Schreiner, 1979; Donowitz & Mandell, 1990; Finegold, 1991; Scannapieco & Mylotte, 1996) where the responsible bacterial species usually found in periodontal pockets have been traced back to the lower respiratory tract. Although the list of those agents is getting longer, the identification of the critical species involved is still a matter of debate.

If *F. nucleatum* is considered an important aetiological factor, it implies that poor oral health status may be strongly related to aspiration pneumonia. Cases where swallowing difficulties (dysphagia) were present provided additional evidence highlighting the importance of oral sources of bacteria as a causative for aspiration pneumonia (Langmore et al., 1998). Researchers who followed residents living in nursing homes observed over one year that inadequate oral care and difficulty swallowing (when combined) were significant predictors of radiologically confirmed pneumonia (Quagliarello et al., 2005).

### **3.3 Oral health conditions, dental infections and cardiovascular diseases**

Data on oral health status in older people with cardiovascular diseases are scarce, as the research interest in this relationship has been directed more towards younger adults. Over twenty years ago, attention was drawn to a relationship of dental infections with coronary heart disease and cerebral infarction alongside other independent risk factors including age, hypertension, diabetes and smoking (Mattila et al., 1993). More recent studies have also pointed to an association between dental disease and cardiovascular diseases (Loesche & Lopatin, 2000; Beck et al., 1996; Beck et al., 2001).

#### **3.3.1 Poor oral health conditions**

A relationship between poor dental health and coronary heart disease was reported in a few studies (De Stefano et al., 1993; Joshipura et al., 1996; Beck & Offenbacher, 2001), in which tooth loss and moderate-to-severe periodontal disease were significantly associated with coronary heart disease (CHD). Joshipura et al. (2003) evaluated - in a six-year follow-up study of 51529 male health professionals - the relationship between tooth loss, periodontal disease and CHD, and suggested diet and infection as potential mediators of this association. Oral disease has been suggested an important factor in the pathogenesis of cardiovascular and cerebrovascular diseases, as oral infection was found to be a risk factor for atherogenesis and thromboembolic events (Beck et al., 1996). However, the mechanisms involved have not yet been clarified.

#### **3.3.2 Periodontal disease and cardiovascular disease**

A state-of-the-science review (Beck et al., 2001) indicated that nine studies suggest that the chronic infection inherent in periodontitis may be associated with cardiovascular events (Beck et al., 1996; Loesche et al., 1998; Mattila et al., 1989; Mattila et al., 1993; Grau et al., 1997; Kweider et al., 1993; Genco et al., 1999; De Stefano et al., 1993; Wu et al., 2000). In a cohort study (Beck et al., 1996), bone loss and pocket depth scores in periodontal disease appeared as a risk factor in coronary heart disease and stroke. Another survey (Beck & Offenbacher, 2001) established the

relationship of periodontitis with a non-invasive measure of atherosclerosis; it was observed that this association may indicate that periodontitis plays a role in the pathogenesis of atheroma formation (Beck et al., 2001). Periodontal conditions have also been related to carotid calcification in older persons (Persson et al., 2002). Three studies (Mattila et al., 2000; Hujoel et al., 2000; Howell et al., 2001), however, did not support the association between periodontal disease and CHD, and their authors concluded that there is not enough evidence to state that periodontal infection is directly related to cardiovascular disease. It was recommended that new biological studies be initiated, focusing on periodontal disease processes and infection mechanisms. Moreover, cardiovascular disease (such as coronary heart disease and ischemic stroke) should be evaluated separately, as the latter is more consistently associated with chronic infections (Grau et al., 1997; Mattila et al., 1989). Finally, because cardiovascular disease and dental disease share so many risk factors and/or indicators, these studies should be cautiously interpreted. Senescence of the immune system has been considered as an important parameter in periodontitis among older individuals, and in their concomitant increase in the prevalence of diseases of the immune system (Siskind & Weksler, 1982; Walford et al., 1981).

### **3.3.3 *Missing teeth and cardiovascular disease***

From a questionnaire sent to health professionals, Joshipura et al. (1996) reported a higher risk of coronary heart disease for people with 10 or fewer teeth than among those with 25 or more teeth. Similar evidence was also obtained in a Finnish clinical study (Paunio et al., 1993) based on a representative sample of males aged 45-64 years. In this national health survey, the number of missing teeth proved to be an additional significant risk factor for ischemic heart disease. In a recent study, Joshipura (2003) confirmed that periodontal disease and fewer teeth may be associated with a greater risk of ischemic stroke. Loesche and Lopatin (2000) have carefully assessed the interaction between oral health and medical diseases in older individuals. Missing teeth again seemed to be "uniquely associated with coronary heart disease". Edentulous individuals appear at greater risk for coronary heart disease and death (Loesche & Lopatin, 2000); the possible explanations for this are complex, as many related factors (such as inflammation and chronic infection) are present in the oral environment up to the time of tooth loss. In addition, these risk factors are invariably related to lifestyle and adverse health behaviours and beliefs. It could be expected that being edentulous should decrease the risk related to chronic dental infections and periodontal diseases, but the potential benefit from being edentulous is probably negated by changes in eating habits which may lead to poor nutrition (Hunter et al., 1981) or change in dietary preferences which would predispose an individual to a high-fat diet which predisposes to cardiovascular diseases (Loesche & Lopatin, 2000). Two cross-sectional studies (Mattila et al., 1989; Syrjänen et al., 1989) have suggested that dental disease may be an important risk indicator for both cardiovascular disease events and acute attacks of myocardial infarction, emphasizing the complex interrelationships existing between chronic dental infection, coronal and root caries, poor oral hygiene, periodontal disease and tooth loss. These researchers used pantomographic information and the Total Dental Index which takes into account the prevalence of decay, periodontal disease, missing teeth and infections (Mattila et al., 1989, Syrjänen et al., 1989). Their findings suggested that the latter index appeared more important than some classical risk factors such as diabetes, hypertension, smoking or

cholesterol levels.

### **3.4 Oral health condition and diabetes**

The relationship between diabetes and periodontal disease has been established in a meta-analysis of data from four studies demonstrating a significant association between diabetes mellitus (Type 1 and Type 2) and periodontal disease (Papapanou, 1996). L e (1993) even considered periodontal disease as the sixth complication of diabetes mellitus, and Grossi and Genco (1998) proposed the concept of a two-way relationship between periodontal disease and diabetes mellitus. Indeed, it has been shown that the risk and severity of periodontal disease is dependent upon diabetics' glycemic control. Thorstensson and Hugoson (1993) found that, among adults more than 40 years of age, long-duration insulin-dependent diabetics had severe periodontal disease which increased in severity with the duration of diabetes. The evidence available suggests that, because of the senescence of the immune system and the greater risk of poor oral hygiene, diabetes in old age may be a risk factor common to heart disease and periodontal disease (Dennison et al., 1996; Thorstensson et al., 1996).

### **3.5 Root surface caries and general health**

The prevalence of root surface caries is high in older populations. Few studies have examined the possibility of a relationship between oral health (Scheinin et al., 1994) or general health risk predictors (Takano et al., 2003; Lawrence et al., 1995) and the presence of root caries. As suggested by Loesche & Lopatin (2000), root caries is considered part of the Total Dental Index being a good risk predictor of cardiovascular disease, but it is presently difficult to establish a strong relationship between root caries and specific chronic disease associated with old age.

### **3.6 Oral cancer and precancer lesions**

Cancers of the oral cavity and pharynx show significantly high rates of morbidity and mortality as compared to other types of cancers. Mortality rates from oro-pharyngeal cancers remain high, with an overall 5-year survival rate of only about 53% (Greenlee et al., 2000). Older people have the greatest risk for the development of oral cancer and premalignant lesions, and most cases occur in the age group above 60 years. The major risk factors are smoking and alcohol consumption (Silverman & Gorsky, 1990; Silverman, 1992; Lewin et al., 1998; Pajukoski et al., 1999; Thomas et al., 2003; Epstein et al., 2005).

Decline in various defence mechanisms, the presence of common risk factors (smoking, alcohol) related to oral and general health, and limited psychological and socioeconomic support have a significant impact on the cancer survival rate of elderly people (Kowalski et al., 1994; Epstein et al., 2005). Precancerous lesions such as leukoplakia and lichen planus are frequent in older people (1-7%), and associated with low socio-economic status (Reichart, 2000).

#### **4. Oral health, general health and quality of life (QOL) of older adults**

As indicated in the preceding sections, the increased life expectancy is unfortunately associated with multiple oral and systemic diseases and, ultimately, impairment of older adults' quality of life (QOL). The concept of quality of life in health recognizes the value of an individual's health with the broader psychological and social aspects of his life (Sarment & Antonucci, 2002). This model requires that health care providers must shift from a narrow disease focus to a broad psychosocial approach.

Conceptualizing quality of life requires assessing not only factors such as discomfort or pain and oral health functions (mastication and speech), but also emotional and social functions (appearance, self-esteem) and perceived needs with regard to general and or oral health.

QOL is particularly affected by dentate status, including the use of partial and complete dentures. In recent years, much research has demonstrated the impact of oral and general health on the quality of life in older populations (Petersen & Nörtov, 1989; Slade et al., 1996; Sarment & Antonucci, 2002; McGrath & Bedi, 2004; Petersen et al., 2004).

Pain, discomfort, mucosal infections, xerostomic conditions related to multi-medications and toothloss can deteriorate QOL, as the problems will impair self-esteem, daily life and well-being. Chronic dry mouth has a profound impact on essential aspects of life such as speaking, ingestion of foods and the wearing of dental prostheses (Cassolato & Turnbull, 2003). As demonstrated in the preceding sections, poor oral health is frequently related to systemic diseases in a two-way relationship, and compromised chewing and eating abilities will impact on nutritional status (Walls et al., 2000). Social relationships also play an important role, as they optimize the well-being of older adults. Slade et al. (1998) defined a model of social relations which helps to understand the individual's personality, behaviour and social network, and their influence on oral-health-related quality of life (OHRQOL). Petersen et al. (1989) established an index of lifestyle activity in old age pensioners of a Danish community; they found a significant relationship between poor dental health conditions and low lifestyle activity. In addition, indices for the measurement of health support related to involvement of social networks (such as family, friends or neighbours) were constructed, and the study showed that isolated older people have the poorest dental health status, and low use of health services (Petersen et al., 1989).

Over the past decades, a variety of QOL instruments have been introduced for use in health care (Kane & Kane, 1994; Bowling, 1995). Such instruments appear to be more useful for assessment of impact of use of health services and for quantifying the effects from a patient perspective rather than in biological or physiological terms. Assessing oral-health-related quality of life in medically compromised elderly people, Locker et al. (2002) found that selected health indicators were significantly associated with those measures, suggesting that oral disorders have significant effect on the well-being and life satisfaction of the individuals. Findings from an Ontario study of the oral health of older adults suggested that self perceived poor oral health and poor quality of life co-exist in the same subgroup (Locker et al., 2000). Gift et al. (1998) found that the perception of general health and epidemiological indicators of oral health status are significant factors in understanding oral health behaviours and oral-health-related quality of life. MacEntee et al. (1997) observed that three factors are usually most important for an older adult's oral health related quality of life assessment: lack of pain, ability to maintain proper hygiene and a disease free mouth.

A variety of OHRQOL measures have been proposed in the literature (Jones, 1998). Their potential uses in geriatric dentistry (Jones, *op. cit.*) include population applications and uses with individuals for political, theoretical and practical reasons. Existing instruments have been mainly designed for cross-sectional rather than for longitudinal studies (Slade et al., 1998). White (1998) suggests that currently available OHRQOL instruments have limited applicability in dental clinical care settings.

A state-of-the science conference on assessing oral health outcomes through measuring health status and quality of life emphasized the need to include quality-of-life assessments of oral health outcomes (Slade et al., 1998). The available quality-of-life instruments are multi-dimensional, and have been found to be very useful, particularly in geriatric dentistry. However, there is a need for further research in defining the categories of OHRQOL because: (a) little experience is available from their use in long-term studies; and (b) adaptation of the instruments to the specific objectives of the surveys is needed (i.e. social impact of oral health conditions, perceived objective needs of the individual, improvement of dental care services).

Many studies have demonstrated the important impact of oral and general health conditions on older adults' quality of life. The assessment remains complex because of the multiplicity of factors influencing OHRQOL. Most recently, WHO emphasized the need for incorporating quality-of-life measures in evaluation of community-based oral health promotion (Petersen & Kwan, 2004).

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## **5. Impact of demographical, social and cultural factors on dental health and on seeking dental care**

Although data on oral health status are scarce, particularly in the developing countries of Africa, Asia and Latin America, the available evidence shows profound oral health disparities among older people across and within countries (Petersen & Yamamoto, 2005 *op.cit.*). These disparities mainly relate to living conditions and the availability of services for seniors, and differences between rural and urban areas.

As early as two decades ago, Canadian surveys (Leake, 1972; Martinello, 1976; Kandelman et al., 1982) reported differences in dental needs and oral health conditions of the home-bound, nursing home or institutionalized older adults. At about the same time, a review of the Swedish literature (Nordenram & Bohlin, 1981) on older people's dental health demonstrated a higher frequency of edentulousness among institutionalized elderly people than among those living at home. Slade et al. (1990) observed that institutionalized older persons were more than twice as likely to be edentulous than non-institutionalized persons.

Socioeconomic and education level constitute important determinants of oral and general health conditions (Petersen, 1990). The World Health Organization International Collaborative Studies ICSII (Chen et al., 1997; Petersen, 2005b) has underlined the importance of social inequality in oral health across and within countries. Epidemiological studies conducted over the past 20 years or so show that inequalities in oral health are even more pronounced among older adults. Surveys carried out in the United Kingdom (Walker & Cooper, 2000) in Quebec, Canada (Brodeur et al., 1982) and in Denmark (Petersen et al., 2004) demonstrated that the social gradient in tooth loss and dentate status remained stable over time, and



similar gradients by income, education or social class were also observed with respect to the utilization of professional dental services. In older populations, an association between dental health behaviour and dental health status has also been documented (Petersen, 1983; Ambjørnsen, 1986; Petersen, 1990; Österberg et al., 1990; Walker & Cooper, 2000). On the other hand, a Japanese survey (Ikebe et al., 2004) used the oral health impact profile (OHIP-14) to evaluate the impact of oral disease on oral-health-related quality of life in a group of independently-living elderly persons in an urban area of Japan, and no significant relation between the measures of oral and general health and socio demographic variables was found.

Previous studies have confirmed that dental caries experience in older adults varies by socio-economic status (Walker & Cooper, 2000; Krstrup & Petersen, 2006a), whereas the social gradient in periodontal health status is somewhat weaker (Shah & Sundaram, 2003; Krstrup & Petersen, 2006b). Poor periodontal status in disadvantaged population groups is compounded by tooth loss, wearing of removable dentures, experience of chronic diseases and high tobacco consumption.

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## **6. Concluding remarks on the interrelationships between oral health and general health**

Over recent years, epidemiologic and clinical studies have been undertaken to understand the association between oral and systemic disease (Genco et al., 1999; Hujoel et al., 2002; Tuominen, 2003). Several biological mechanisms have been suggested, including that whereby inflammatory mediators from oral inflammatory conditions (such as gingivitis and periodontitis) can enter the circulation and contribute to the burden of systemic inflammation (which in turn has been associated with systemic disease). The present paper has attempted to outline the current evidence on oral health/general health associations. However, causal inference is a major concern in reviewing that evidence. The criteria to be applied for evaluating the strength of evidence comprise: (1) specificity (i.e. a specific agent is found to produce a specific effect); (2) strength of the association; (3) dose-response relationship; (4) time sequence; (5) biologic plausibility; (6) consistency in results, and (7) independence from confounding factors. The evidence for oral health/general health relationships is particularly strong for the two-way association between diabetes and periodontal disease (Taylor, 2001), while that for other relationships is more circumstantial, being based on cross-sectional rather than more appropriate longitudinal study designs.

The common risk factor approach to the understanding of associations between chronic disease and oral disease has gained much research attention in recent years. Several chronic diseases and oral diseases relate to common risk factors such as use of tobacco, excessive consumption of alcohol, poor diet and nutrition status. Reports are available showing that bivariate associations between certain chronic diseases and oral disease may be ascribed to the effect of confounding factors (Hujoel et al., 2002; Tuominen et al., 2003). Appropriate analyses with adequate statistical adjustment for age and tobacco use suggest that the observed associations between periodontitis and systemic disease (such as cardiovascular disease) could be coincidental rather than causal (Hujoel et al., 2002).

## 7. Translating knowledge into solutions

The growing numbers of elderly people represent a great challenge to health authorities in most countries. First, the demand for expensive dental care will increase for active older persons; second, public health authorities will have to face the growing burden of oral disease associated with the new chronic disease profile of ageing societies. In addition, the state of general and associated oral health conditions have a direct influence on older people's quality of life and lifestyle (Petersen & Nörtov, 1989; Sarment & Antonucci, 2002).

WHO goals for better oral health of older people have not yet been addressed by countries worldwide, and reducing social inequalities in oral and general health as well as improving accessibility to oral health services remain key issues (Petersen, 2005a; Petersen & Yamamoto, 2005).

The ageing of the population will undoubtedly require multiple actions by public health authorities, and decisions must be based on an understanding of how the determinants of active ageing influence the way that individuals and populations age (WHO, 2002). As the risk factors responsible for chronic systemic diseases are common to most oral diseases, the common risk factor approach may therefore be instrumental in the planning and surveillance of oral health promotion and oral disease intervention programme (Petersen, 2003; Petersen & Yamamoto, 2005). Health and oral health policies will also have to consider the life-course perspective in order to preserve good oral and general health and maintain quality of life.

The negative impact of poor oral health conditions on the general health and quality of life of older adults is an important public health issue; WHO recommends that countries develop national public health programmes, based on integrated prevention and health promotion, and establish measurable goals for improving the oral health for the elderly (Petersen, 2003).

The recommendations for action are based on the following premises:

- Changing demographic structures
- Changing oral health needs, accessibility and demand for oral health services
- New understanding on general - oral health interrelationships and their impact on quality of life
- Growing economic burden to countries due to cost of treatment, care and intervention programmes.

Actions must be taken at several levels:

- Strengthening health promotion and integrated disease prevention
- Oral health education to caregivers, older adults and their families
- Education to older adults and creation of healthy environments
- Operational research in public health and epidemiological research on oral health - general health links and common risk factors
- Oral health systems capacity building, based on age-friendly primary health care
- Improvement of social security and health insurance coverage for older adults.

Greater attention to the oral health status of elderly people (and particularly those who are institutionalized) may reduce the prevalence of oral cancer

in the older adult population. Early detection and referral of oral cancer are critical steps as they will affect success of treatment and survival rates.

Developing comprehensive policies on ageing in order to improve health and oral health of the older adults will constitute a real challenge to oral health care providers and particularly to the dental profession (Kandelman, 2001; Petersen & Yamamoto, 2005). Failure to deal with this important demographic imperative and rapid changes in disease patterns and inter-relations would have behavioural, socio-economic and political consequences everywhere (WHO, 1998; WHO, 2002).

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## References

- Ambjørnsen E** (1986). Remaining teeth, periodontal condition, oral hygiene and tooth cleaning habits in dentate old-age subjects. *Journal of Clinical Periodontology*, 13:583-589.
- Atkinson JC, Wu AJ** (1994). Salivary gland dysfunction: causes, symptoms, treatment. *Journal of the American Dental Association*, 125:409-416.
- Avlund K, Holm-Pedersen P, Schroll M** (2001). Functional ability and oral health among older people: A longitudinal study from age 70 to 80. *Journal of the American Geriatric Society*, 49:954-962.
- Axtelius B, Söderfeldt B, Nilsson A, Edwardsson S, Attström R** (1998). Therapy resistant periodontitis. Psychosocial characteristics. *Journal of Clinical Periodontology*, 25:482-491.
- Beck JD, Offenbacher S** (2001). The association between periodontal diseases and cardiovascular diseases: a state-of the-science review. *Annals of Periodontology*, 6(1):9-15.
- Beck J, Garcia R, Heiss G, Vokonas PS, Offenbacher S** (1996). Periodontal disease and cardiovascular disease. *Journal of Periodontology*, 67(Supplement):1123-1137.
- Beck JD, Elter JR, Heiss G, Couper D, Mauriello SM, Offenbacher S** (2001). Relationship of periodontal disease to carotid artery intima-media wall thickness: the atherosclerosis risk in communities (ARIC) study. *Arteriosclerosis, Thrombosis & Vascular Biology*, 21(11):1816-1822.
- Bergdahl M, Bergdahl J** (2000). Low unstimulated salivary flow and subjective oral dryness: association with medication, anxiety, depression, and stress. *Journal of Dental Research*, 79:1652-1658.
- Birkenfeld L, Yemini M, Kase NG, Birkenfeld A** (1999). Menopause-related oral alveolar bone resorption: a review of relatively unexplored consequences of estrogen deficiency. *Menopause*, 6:129-133.
- Blaum CS, Fries BE, Fiatorone MA** (1995). Factors associated with low body mass index and weight loss in nursing home residents. *International Journal of Medical Sciences*, 50:162-168.
- Bowling A** (1995). *Measuring health: A review of quality of life measurement scales*. Buckingham: Open University Press.
- Brodeur JM, Simard P, Kandelman D** (1982). Étude sur la santé bucco-dentaire des personnes de 65 ans et plus, Final Report. Grant from National Program for Research and Development. *Health & Welfare Canada*.
- Carlos JP, Wolfe MD** (1989). Methodological and nutritional issues in assessing the oral health of aged subjects. *The American Journal of Clinical Nutrition*, 50(Suppl. 5):1210-1218.
- Cassolato SF, Turnbull RS** (2003). Xerostomia: clinical aspects and treatment. *Gerodontology*, 20(2):64-77.
- Chalmers JM** (2003). Oral health promotion for our ageing Australian population. *Australian Dental Journal*, 48(1):2-9.
- Chen M, Andersen RM, Barmes DE, Leclercq MH, Lyttle SC** (1997).

- Comparing oral health systems. A second international collaborative study.* Geneva, World Health Organization.
- Chung JW, Kim JH, Kim HD, Kho HS, Kim YK, Chung SG** (2004). Chronic orofacial pain among Korean elders: prevalence, and impact using the graded chronic pain scale. *Pain*, 112:164-170.
- Dawes C** (1987). Physiological factors affecting salivary flow rate, oral sugar clearance and the sensation of dry mouth in man. *Journal of Dental Research*, 66(Special Issue):648-653.
- De Biase CB, Austin SL** (2003). Oral health and older adults. *Journal of Dental Hygiene*, 77(11):125-145.
- Dennison D, Gottsegen R, Rose L** (1996). Diabetes and periodontal disease. Position paper. *Journal of Periodontology*, 67:166-176.
- De Stefano F, Anda RF, Kahn HS, Williamson DF, Russel CM** (1993). Dental disease and risk of coronary heart disease and mortality. *British Medical Journal*, 306:668-691.
- Donowitz GR, Mandell GL** (1990). Acute pneumonia. In: Mandell GL, Douglas RG, Bennett JE, eds. *Principles and practice of Infectious Diseases*. New York: Churchill Livingstone: 540-555.
- Dormenval V, Budtz-Jorgensen E, Mojon P, Bruyère A, Rapin C-H** (1995). Nutrition, general health status and oral health in hospitalised elders. *Gerontology*, 12(2):73-80.
- Epstein JB, Lunn R, Le ND, Stevenson-Moore P, Gorsky M** (2005). Patients with oropharyngeal cancer: a comparison of adults living independently and patients living in long term facilities. *Special Care in Dentistry*, 25(2):124-130.
- Finegold SM** (1991). Aspiration pneumonia. *Reviews of infectious diseases*, 13:S737-S742.
- Genco RJ, Ho AW, Grossi SD, Dunford RG, Tedesco L** (1999). Relationship of stress, distress and inadequate coping behavior for periodontal disease. *Journal of Periodontology*, 70:711-723.
- Genco RJ, Wu TJ, Grossi S, Falkner K, Zambon JJ, Trevisan M** (1999). Periodontal micro flora related to the risk for myocardial infarction: A case control study. *Journal of Dental Research*, 78(Special Issue):457(Abstract 2811).
- Gift HC, Atchison KA, Dayton CM** (1997). Conceptualizing oral health and oral health-related quality of life. *Social Science & Medicine*, 44:601-608.
- Gift HC, Atchison KA, Drury TF** (1998). Perceptions of the natural dentition in the context of multiple variables. *Journal of Dental Research*, 77(7):1529-1538.
- Grau AJ, Buggle F, Ziegler C, Schwarz W, Meuser J, Tasman AJ, Buhler A, Benesch C, Becher H, Hacke W** (1997). Association between acute cerebrovascular ischemia and chronic and recurrent infection. *Stroke*, 28:1724-1729.
- Greenlee RT, Murray T, Bolden S, Wingo PA** (2000). Cancer Statistics, CA. *A Cancer Journal for Clinicians*, 50:7-33.
- Grossi SG, Genco RJ** (1998). Periodontal disease and Diabetes Mellitus: A two-way relationship. *Annals of Periodontology*, 3(1):51-61.
- Hayes C** (1998). The use of patient based outcome measures in clinical decision-making. *Community Dental Health*, 15:19-21.
- Hayes C, Sparrow D, Cohen M, Vokonas P, Garcia RI** (1998). Periodontal disease and pulmonary function: The VA longitudinal study. *Annals of Periodontology*, 3:257-261.
- Hede B, Petersen PE** (1992). Self-assessment of dental health among Danish mental patients. *Special Care in Dentistry*, 12:33-36.
- Helme RD, Gibson SJ** (2001). The epidemiology of pain in elderly people. *Clinics in Geriatric Medicine*, 17(3):417-431.
- Henry R, Smith B** (2005). Treating patients with Alzheimer's and other

- late-life dementias. A guide for dental professionals. *Oral Health* (February):10-26.
- Heyden G** (1998). Health profile of the ageing population: the Swedish experience. *International Dental Journal*, 43:348-354.
- Howell TH, Ridker PM, Ajani UA, Hennekens CH, Christe WG** (2001). Periodontal disease and risk of subsequent cardiovascular disease in U.S. male physicians. *Journal of the American College of Cardiology*, 37:445-450.
- Hujoel PP, Drangsholt M, Spiekerman C, DeRouen TA** (2000). Periodontal disease and coronary heart disease risk. *Journal of the American Medical Association*, 284:1406-1410.
- Hujoel PP, Drangsholt M, Spiekerman C, DeRouen TA** (2002). Periodontitis - systemic disease associations in the presence of smoking causal or coincidental? *Periodontology* 2000, 30:51-60.
- Hunter AM, Carey MA, Larsh HW** (1981). The nutritional status of patients with chronic obstructive pulmonary disease. *The American Review of Respiratory Disease*, 124:L376-L381.
- Ikebe K, Watkins CA, Ettinger RL, Sajima H, Nokubit T** (2004). Application of short-form oral health impact profile on elderly Japanese. *Gerodontology*; 21:167-176.
- International conference on rural ageing - oral health** (2001). *International Dental Journal*, 51: (3 Suppl.):181-182.
- Johnston BT, Li Q, Castell JA, Castell DO** (1995). Swallowing and oesophageal function in Parkinson's disease. *American Journal of Gastroenterology*, 90:1741-1746.
- Jones JA** (1998). Using oral quality of life measures in geriatric dentistry. *Community Dental Health*, 15:13-18.
- Joshiyura KJ, Rimm EB, Douglass CW, Trichopoulos D, Ascherio A, Willett WC** (1996). Poor oral health and coronary heart disease. *Journal of Dental Research*, 75(9):1631-1636.
- Joshiyura KJ, Hung HC, Rimm EB, Willett WC, Ascherio A** (2003). Periodontal disease, tooth loss, and incidence of ischemic stroke. *Stroke*, 34:47-52.
- Kandelman D, Lepage Y** (1982). Demographic, social and cultural factors influencing the elderly to seek dental treatment. *International Dental Journal*, 32:360-368.
- Kandelman D, Brodeur JM, Simard P, Lepage Y** (1986). Dental needs of the elderly: A comparison between some European and North American surveys. *Community Dental Health*, 3:19-39.
- Kandelman D** (2001). Le vieillissement de la population: un défi majeur pour les chirurgiens-dentistes. *Information dentaire*, 21:1547-1551.
- Kane RA, Kane RL** (1994). *Assessing the Elderly*. London: Lexington Books.
- Katona K, Robertson M** (1995). *Psychiatry at a glance*. London: Blackwell Science.
- Knapp A** (1989). Nutrition and oral health in the elderly. *Dental Clinics of North America*, 33:109-125.
- Krustrup U, Petersen PE** (2006a). Dental caries prevalence among adults in Denmark - the impact of socio-demographic factors and use of oral health services. *Community Dental Health*, 22 (in press).
- Krustrup U, Petersen PE** (2006b). Periodontal conditions in 35-44 and 65-74 year old adults in Denmark. *Acta Odontologica Scandinavica*; 64: 65-73.
- Kowalski LP, Franco EL, Torloni H, Fava AS, de Andrade Sobrinho J, Ramos G, Oliveira BV, Curado MP** (1994). Lateness of diagnosis of oral and oropharyngeal carcinoma: factors related to the tumour, the patient and health professionals. Oral Oncology Part B. *European Journal of Cancer*, 30B(3):167-173.

- Kweider M, Lowe G, Murray G, Kinane D, McGowan D** (1993). Dental disease, fibrinogen and white cell count: Links with myocardial infarction? *Scottish Medical Journal*; 38: 73-74.
- Langmore SE, Terpenning MS, Schork A, Chen Y, Murray JT, Lopatin DE, Loesche WJ** (1998). Predictors of Aspiration Pneumonia: How important is dysphagia? *Dysphagia*, 13:69-81.
- Laurin D, Brodeur JM, Leduc N, Bourdages J, Lachapelle D, Vallée R** (1992). Nutritional deficiencies and gastro-intestinal disorders in the edentulous elderly: A literature review. *Canadian Dental Association Journal*, 58(9):738-740.
- Lawrence HP, Hunt RJ, Beck JD** (1995). Three year root caries incidence and risk modeling in older adults in North Carolina. *Journal of Public Health Dentistry*, 55:69-78.
- Leake JL, Martinello BP** (1972). Oral health status of independent elderly persons in London, Ontario. *Canadian Dental Association Journal*, 38:31-34.
- Leake JL, Hawkins R, Locker D** (1994). Social and functional impact of reduced posterior dental units in older adults. *Journal of Oral Rehabilitation*, 21:1-10.
- Lewin F, Norell SE, Johansson H, Gustavsson P, Wennerberg J, Biorklund A, Rutqvist LE** (1998). Smoking tobacco, oral snuff, and alcohol in the etiology of squamous cell carcinoma of the head and neck: A population-based case-referent study in Sweden. *Cancer*, 82:1367-1375.
- Lewis S, Jagger RG, Treasure E** (2001). The oral health of psychiatric patients in South Wales. *Special Care in Dentistry*, 21(5):182-186.
- Limeback H** (1988). The relationship between oral health and systemic infections among residents of chronic care facilities: a Review. *Gerodontology*, 7(4):132-137.
- Locker D** (1993). Subjective reports of oral dryness in an older adult population. *Community Dentistry and Oral Epidemiology*, 21:165-168.
- Locker D** (1998). Issues in measuring change in self perceived oral health status. *Community Dentistry and Oral Epidemiology*, 26:52-61.
- Locker D, Clarke M, Payne B** (2000). Self-perceived oral health status, psychological well-being, and life satisfaction in an older adult population. *Journal of Dental Research*, 79(4):970-975.
- Locker D, Matear D, Stephens M, Jokovic A** (2002). Oral health-related quality of life of a population of medically compromised elderly people. *Community Dental Health*, 19:90-97.
- Löe H** (1993). Periodontal disease. The sixth complication of Diabetes Mellitus. *Diabetes Care*, 16:329-334.
- Loesche WJ, Lopatin DE** (2000). Interactions between periodontal disease, medical diseases and immunity in the older individual. *Periodontology*, 16:80-105.
- Loesche WJ, Schork A, Terpenning MS, Chen Y-M, Kerr C, Dominguez BL** (1998). The relationship between dental disease and cerebrovascular accident in elderly United States veterans. *Annals of Periodontology*, 3:161-174.
- MacEntee ML, Hole R, Stolar E** (1997). The significance of the mouth in old age. *Social Science & Medicine*, 45:1449-1458.
- Martinello BP** (1976). Oral health assessment of residents of a Chatam, Ontario home for the aged. *Canadian Dental Association*, 42:405-408.
- Mattila KJ, Nieminen MS, Valtonen VV, Rasi VP, Kesaniemi YA, Syrjälä SL, Jungell PS, Isoluoma M, Hietaniemi K, Jokinen MJ** (1989). Association between dental health and acute myocardial infarction. *British Medical Journal*, 298:779-781.
- Mattila KJ, Valle MS, Nieminen MS, Valtonen VV, Hietaniemi KL** (1993). Dental infections and coronary atherosclerosis. *Atherosclerosis*, 103:205-211.

- Mattila KJ, Asikainen S, Wolf J, Jousimies-Somer H, Valtonen V, Nieminen M** (2000). Age, dental infections, and coronary heart disease. *Journal of Dental Research*, 79:756-760.
- McGrath C, Bedi R** (2004). A national study of the importance of oral health to life quality to inform scales of oral health related quality of life. *Quality of Life Research*, 13:813-818.
- Mohammad AR, Brunsvold M, Bauer R** (1996). The strength of association between systemic postmenopausal osteoporosis and periodontal disease. *International Journal of Prosthodontics*, 9:479-483.
- Mojon P, Budtz-Jørgensen E, Michel JP, Limeback H** (1997). Oral health and history of respiratory tract infection in frail institutionalised elders. *Gerodontology*, 14:9-16.
- Moynihan P, Petersen PE** (2004). Diet, nutrition and the prevention of dental diseases. *Public Health Nutrition*, 7(1A):201-226.
- Mumma RD, Quinton K** (1970). Effect of masticatory efficiency on the occurrence of gastric distress. *Journal of Dental Research*, 49:69-74.
- Nakayama Y, Washio M, Mori M** (2004). Oral health conditions in patients with Parkinson's disease. *Journal of Epidemiology*, 14(5):143-150.
- Närhi TO** (1994). Prevalence of subjective feelings of dry mouth in the elderly. *Journal of Dental Research*, 73:20-25.
- Nordenram G, Bohlin E** (1981). Dental status in the elderly: A review of the Swedish literature. *The National Board of Health and Welfare Senior Citizens Welfare Programme Report No 9, March*.
- Norlén P, Östberg H, Björn AL** (1991). Relationship between general health, social factors and oral health in women at the age of retirement. *Community Dentistry and Oral Epidemiology*, 19:296-301.
- Österberg T, Hedegard B, Säter G** (1983). Variations in dental health in 70-year-old men and women in Gothenburg, Sweden. A cross sectional epidemiological study including longitudinal and cohort effects. *Swedish Dental Journal*, 7:29-48.
- Österberg T, Mellström D, Sundh V** (1990). Dental health and functional ageing. A study of 70-year-old people. *Community Dentistry and Oral Epidemiology*, 18:313-318.
- Pajukoski H, Meurman JH, Snellman-Grohn S, Sulkava R** (1999). Oral health in hospitalized and nonhospitalized community-dwelling elderly patients. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontics*, 88(4):437-443.
- Palmkvist S, Österberg T, Mellström D** (1986). Oral health and socioeconomic factors in a Swedish county population aged 65 and over. *Gerodontology*, 2:138-142.
- Papapanou PN** (1996). Periodontal diseases: epidemiology. *Annals of Periodontology*, 1:1-36.
- Paunio K, Impivaara O, Tiekso J, Maki J** (1993). Missing teeth and ischaemic heart disease in men aged 45-64 years. *European Heart Journal*, 14(Suppl. K): 54-56.
- Persson RE, Hollender LG, Powell LV, MacEntee MI, Wyatt CCL, Kiyak HA, Persson GR** (2002). Assessment of periodontal conditions and systemic disease in older subjects. *Journal of Clinical Periodontology*, 29:796-802.
- Persson GR, Persson RE, MacEntee CI, Wyatt CCJI, Hollender LG, Kiyak HA** (2003). Periodontitis and perceived risk for periodontitis in elders with evidence of depression. *Journal of Clinical Periodontology*, 30:691-696.
- Petersen PE** (1983). Dental visits and self-assessment of dental health status in the adult Danish population. *Community Dentistry and Oral Epidemiology*, 11:162-168.
- Petersen PE, Nörtov B** (1989). General and dental health in relation to lifestyle and social network activity among 67-year-old Danes.

*Scandinavian Journal of Primary Health Care*, 7:225-230.

**Petersen PE** (1990). Social inequalities in dental health-towards a theoretical explanation. *Community Dentistry and Oral Epidemiology*, 18:153-158.

**Petersen PE, Nörtov B** (1994). Evaluation of a dental health program for old age pensioners in Denmark. *Journal of Public Health Dentistry*, 54:73-79.

**Petersen PE** (2003). The World Oral Health Report 2003: continuous improvement of oral health in the 21st century - the approach of the WHO Global Oral Health Programme. *Community Dentistry and Oral Epidemiology*, 31(Suppl.1):3-24.

**Petersen PE, Kjölller M, Christensen LB, Krustrup U** (2004). Changing dentate status of adults, use of dental health services, and achievement of national dental health goals in Denmark by the year 2000. *Journal of Public Health Dentistry*, 64:127-135.

**Petersen PE, Kwan S** (2004). Evaluation of community based oral health promotion and oral disease prevention - WHO recommendations for improved evidence in public health service. *Community Dental Health*; 21(Suppl. 1):319-321.

**Petersen PE** (2005a). Inequalities in oral health: the social context. In: Harris R, Pine C, eds. *Community oral health*. London: Quintessence (In press).

**Petersen PE** (2005b). Sociobehavioural risk factors in dental caries-international perspectives. *Community Dentistry and Oral Epidemiology*, 33:274-279.

**Petersen PE, Yamamoto T** (2005). Improving the oral health of older people: the approach of the WHO Global Oral Health Programme. *Community Dentistry and Oral Epidemiology*, 33:81-92.

**Pla GW** (1994). Oral Health and Nutrition. *Primary Care*, 21(1):121-133.

**Pyle MA** (2002). Changing perceptions of oral health and its importance to general: health: provider perceptions, public perceptions, policy-maker perceptions. *Special Care in Dentistry*, 22(1):8-15.

**Quagliarello V, Ginter S, Han L, Van Ness P, Allore H, Tinetti M** (2005). Modifiable risk factors for nursing home-acquired pneumonia. *Clinical Infectious Diseases*, (40):1-6.

**Reichart PA** (2000). Oral mucosal lesions in a representative cross-sectional study of aging Germans. *Community Dentistry and Oral Epidemiology*, 28:390-398.

**Ritchie CS, Joshipura K, Silliman RA, Miller B, Douglas CW** (2000). Oral health problems and significant weight loss among community-dwelling older adults. *Journal of Gerodontology Biological Sciences and Medical Sciences*, 55:M366-M371.

**Russell SL, Boylan RJ, Kaslick RS, Scannapieco FA, Katz RV** (1999). Respiratory pathogen colonization of the dental plaque of institutionalized elders. *Special Care in Dentistry*, 19(3):128-134.

**Sarment DP, Antonucci TC** (2002). Oral health-related quality of life and older adults. In Inglehart M, Bagramian R, eds. *Oral health-Related Quality of Life*. Chicago, Quintessence books: 99-109.

**Scannapieco FA, Mylotte JM** (1996). Relationships between periodontal disease and pneumonia. *Journal of Periodontology*, 67:1114-1122.

**Scannapieco FA** (1999). Role of bacteria in respiratory infection. *Journal of Periodontology*, 70(7):793-802.

**Schein OD, Hochberg MC, Munoz B** (1999). Dry eye and dry mouth in the elderly: A population-based assessment. *Archives of Internal Medicine*, 159:1359-1363.

**Scheinin A, Pienihakkinen K, Tiekso J, Holmberg S, Fukuda M, Suzuki A** (1994). Multifactorial modeling for root caries prediction: 3-year follow-up results. *Community Dentistry and Oral Epidemiology*, 22:126-129.



- Schembri A, Fiske J** (2001). The implications of visual impairment population in recognizing oral disease and maintaining oral health. *Special Care in Dentistry*, 21(6):222-226.
- Schoenberg NE, Gilbert G** (1998). Dietary implications of oral health decrements among Afro-American and white older adults. *Ethnicity & Health*, 3(1-2):59-70.
- Schreiner A** (1979). Anaerobic pulmonary infections. *Scandinavian Journal of Infectious Diseases*, 19(Suppl.):77-79.
- Seeman TE** (1993). Social ties and health: the benefits of social integration. *Annals of Epidemiology*, 3:325-335.
- Shah N, Sundaram KR** (2003). Impact of socio demographic variables, oral hygiene practices and oral habits on periodontal health status of Indian elderly: a community-based study. *Indian Journal of Dental Research*, 14(4):289-297.
- Sheiham A, Steele JG, Marcenes W, Finch S, Walls WG** (1999). The impact of oral health on stated ability to eat certain foods. Findings from the National Diet and Nutrition Survey of Older People in Great Britain. *Gerodontology*, 16(1):17-20.
- Shimazaki Y, Soh I, Koga T, Miyazaki H, Takehara T** (2003). Risk factors for tooth loss in the institutionalised elderly; a six-year cohort study. *Community Dental Health*, 20:123-127.
- Ship JA, Pillemer SR, Baum BJ** (2002). Xerostomia and the geriatric patient. *Journal of the American Geriatrics Society*, 50(3):535-543.
- Silverman S, Gorsky M** (1990). Epidemiologic and demographic update in oral cancer: California and national data 1973 to 1985. *Journal of the American Dental Association*, 120(5):495-499.
- Silverman S** (1992). Precancerous lesions and oral cancer in the elderly. *Clinics in Geriatric Medicine*, 8(3):529-541.
- Siskind GW, Weksler ME** (1982). The effect of aging in the immune response. *Annual Review of Gerontology and Geriatrics*, 3:3-26.
- Slade GD, Locker D, Leake JL, Price SA, Chao I** (1990). Differences in oral health status between institutionalized and non institutionalized older adults. *Community Dentistry and Oral Epidemiology*, 18(5):272-276.
- Slade GD, Strauss RP, Atchison KA, Kressin NR, Locker D, Reisine ST** (1998). Conference summary: assessing oral health outcomes measuring health status and quality of life. *Community Dental Health*, 15:37.
- Sreebny LM, Schwartz SS** (1997). A reference guide to drugs and dry mouth – 2nd edition. *Gerodontology*, 14:33-47.
- Sullivan DH, Martin W, Flaxman N, Hagen J** (1993). Oral health problems and involuntary weight loss in a population of frail elderly. *Journal of American Geriatric Society*, 41:725-731.
- Sumi Y, Miura H, Sunakawa M, Michiwaki Y, Sakagami N** (2002). Colonization of denture plaque by respiratory pathogens in dependent elderly. *Gerodontology*, 19(1):25-29.
- Syrjänen J, Peltola J, Valtonen V, Iivanainen M, Kaste M, Huttunen JK** (1989). Dental infections in association with cerebral infarction in young and middle-aged men. *Journal of Internal Medicine*, 225:179-184.
- Taguchi A, Tanimoto K, Sueti Y, Otani K, Wada T** (1995). Oral signs as indicators of possible osteoporosis in elderly women. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics*, 80:612-616.
- Takano N, Ando Y, Yoshihara A, Miyazaki H** (2003). Factors associated with root caries incidence in an elderly population. *Community Dental Health*, 20:217-222.
- Taylor CM, King JM, Sheiham A** (1986). A comparison of the dental needs of physically handicapped and non handicapped elderly people living at home in Grimsby. England. *Gerodontology*, 2:80-82.
- Taylor GW** (2001). Bidirectional interrelationships between diabetes and

- periodontal diseases. An epidemiological perspective. *Annals of Periodontology*, 6:99-112.
- Thomas G, Hashibe M, Jacob BJ, Ramadas K, Mathew B, Sankaranarayanan R, Zhang ZF** (2003). Risk factor for multiple oral premalignant lesions. *International Journal of Cancer*, 107:285-291.
- Thomson WM** (2005). Issues in the epidemiological investigation of dry mouth. *Gerodontology*, 22:65-76.
- Thorstensson H, Hugoson A** (1993). Periodontal disease experience in adult long-duration insulin dependent diabetics. *Journal of Clinical Periodontology*, 20:352-358.
- Thorstenson H, Huylensstierna J, Hugoson A** (1996). Medical status and complications in relation to periodontal disease experience in insulin-dependent diabetics. *Journal of Clinical Periodontology*, 23:194-202.
- Todd JE, Walker AM** (1980). *Adult Dental Health, Vol. 1: England and Wales, 1968-1978*. London, Her Majesty's Stationery Office, Office of Population Censuses and Surveys Social Survey Division.
- Tuominen R, Reunanen A, Paunio M, Paunio I, Aromaa A** (2003). Oral health indicators poorly predict coronary heart disease deaths. *Journal of Dental Research*; 82 (9): 713-718.
- UN** (2002). *World Population Ageing 1950-2050*. New York: United Nations.
- UNDP** (2003). *World Population Prospects: The 2002 Revision*. New York: United Nations.
- Wactawski-Wende J, Grossi SG, Trevisan M, Genco RJ, Tezal M, Dunford RG, Ho AW, Hausmann E, Hreshchyshyn MM** (1996). The role of osteopenia in oral bone loss and periodontal disease. *Journal of Periodontology*, 67(Suppl.):1076-1084.
- Walford RL, Gottwsman SRS, Weindruch RA, Tam CF** (1981). Immunopathology of aging. *Annual Review of Gerontology and Geriatrics*, 2:3-48.
- Walker A, Cooper A** (eds) (2000). *Adult dental health survey. Oral health in the United Kingdom 1998*. London: The Stationery Office, Office for National Statistics.
- Walls A, Steele JG, Sheiham A, Marcenes W, Moynihan J** (2000). Oral health and nutrition in older people. *Journal of Public Health Dentistry*, 60(4):304-307.
- White BA** (1998). Use of oral health related quality of life measures in managed dental care organisations. *Community Dental Health*, 15:27-31.
- WHO** (1998). *Ageing and Health Programme. The challenge for WHO*. New York. World Health Organization: 25-26.
- WHO** (2002). *Active Ageing: a policy framework*. Geneva: World Health Organization.
- WHO** (2003). *World Health Report, 2003. Shaping the future*. Geneva, World Health Organization.
- WHO** (2005). Resolution 58.22. Cancer prevention and control. In: *Fifty-eighth World health Assembl*. Geneva, World Health Organization.
- Wu T, Trevisan M, Genco RJ, Dorn JP, Falkner KL, Tempos CT** (2000). Periodontal disease and risk of cerebrovascular disease. The first nation health and nutrition examination survey and its follow-up study. *Archives of Internal Medicine*, 160:2749-2755.

**ORAL HEALTH IN AGEING SOCIETIES:  
INTEGRATION OF ORAL HEALTH AND GENERAL HEALTH**

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## 摂食・嚥下リハビリテーションの考え方

馬場 尊\* 才藤 栄一\*\*  
 ばば みこと さいとう えいいち

- 原則 1：栄養摂取経路の不適合を是正する。  
 栄養摂取経路の不適合の結果は低栄養、脱水、肺炎などである。まずこれらを是正する。
- 原則 2：口腔衛生を適正化する。  
 障害者の口腔内は不衛生である。絶食はそれを助長する。急性期からの口腔ケアが大切である。
- 原則 3：基礎訓練を計画する。  
 基礎訓練は、筋力、可動域、呼吸などである。すべての症例に適用する。
- 原則 4：可能な経口摂取方法を模索し、適応する。  
 嚥下造影による的確な評価に基づき計画する。
- 原則 5：段階的に難易度を増す。  
 過負荷の原理を摂食・嚥下訓練に導入する。
- 原則 6：リハビリテーションで改善しなければ、観血的治療を検討する。

**Key Words**

摂食・嚥下リハビリテーション、口腔ケア、間接訓練、直接訓練、経管栄養

### はじめに

摂食・嚥下リハビリテーションにはエビデンスが乏しいと言われている<sup>1)</sup>。たしかに臓器レベルの訓練効果としてそれを否定することはできない。しかし、摂食・嚥下障害にリハビリテーションが介入すると、肺炎が減少し、栄養状態が改善<sup>2)</sup>し、経口摂食<sup>3)</sup>が可能になる。その過程の考え方を原則として紹介させていただく。

#### □ 原則 1：栄養摂取経路の不適合を是正する

栄養摂取経路の不適合とは、患者の栄養摂取能力と、栄養摂取方法が合致していないことを指す。栄養摂取能力には、①摂食、②嚥下、③消化・吸収が含まれ、栄養摂取方法には、①経口、②経消化管（経管）、③経脈管（経静脈）が考えられる。この両者が不適合となった結果が低栄養や脱水、肺炎であろう。栄養摂取能力に比し、難易度の高い摂取方法を行った場合である。これらが遷延する患者をみた場合にはこのことを念頭において対策を講じるべきである。逆に能力があるのに難易度の低い方法を選択していることもある。リハビリテーション中にも起こりうることであるが、この場合は廃用の誘因となろう。

一例を挙げてみる。「患者は咽頭期障害があり、水分の誤嚥をしやすい状態である。不顕性誤嚥のため、食事中にむせることはない。そのため食事を変更あるいは中止することなく継続させる。そして肺炎を併発する。その治療のために一次的に絶食する。末梢静脈栄養で管理する。低栄養になる。廃用も加わる。肺炎が治る。経口摂食を開始する。しかし、廃用のため以前よりも咽頭期障害が悪化し、口腔期の問題が加わる。しかし、医師は患者に中枢神経障害がないはずと思い、嚥下障害を否認する。経口摂食が継続される。肺炎を再発する。絶食になる。……」このような劣悪な物語はそれほどまれなこととは思えない。

この例のポイントは2つある。まずは、不顕性誤嚥を見逃し、不適切な経口摂食を継続したこと。もうひとつは肺炎中の栄養対策で、経消化管栄養あるいは中心静脈栄養を検討すべきではなかったかということである。後者はもちろん治療期間に左右されるであろうが、低栄養を可能な限り予防する対策が必要である。

脳卒中などで急性に摂食・嚥下障害に罹患したときも同様のことが起こりうる。栄養摂取能力を

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