To achieve greater recognition for prosthodontics in academia and among the general public as a vital health science specialty for the 21st century, and to advance this specialty’s contributions to society, the Japan Prosthodontic Society has become a corporate juridical person. Today, our organization stands ready to accept the responsibility for leadership in developing initiatives to improve prosthodontic education, research, and treatment. This article examines the future prospects for our discipline in the context of current trends and prospects.

Today’s trends
Today in Japan we face unprecedented developments. These trends include: the rapid aging of the population together with a declining birth rate and a resulting overall population decrease (Fig.1 and 2); the advance of globalization; and the development of a knowledge-based society grounded in the continuing rapid advancement of information technology. Remarkable progress in the natural sciences, including brain research, regenerative medicine/regenerative therapy, genome/post genome science and nanotechnology is taking place in the fields associated with medicine and dentistry. At the same time, dental schools are downsizing due to the overproduction of dentists. As members of the scientific community, we must recognize our responsibility to address the problems that our prospective future holds.1

Recently, the Japanese government has developed a vision of the future, projecting to the year 2030 and titled “Japan’s 21st Century Vision”.2 This vision involves (1) establishment of free flow of people, goods, and information, (2) encouraging development of a society in which individuals enjoy good health and an average life expectancy of 80 years, and (3) organization of a small but effective government. For our part, to help achieve this vision we, as prosthodontists, must clarify our responsibilities as a discipline as we redefine the broad value of prosthodontics to our society. In previous years, the goal of prosthodontic care has been defined as the improvement of oral function and the resolution of aesthetic problems. Today, that goal has been defined more explicitly. The goal of prosthodontic care that we
seek today is to enrich the quality of life of each patient by solving problems caused by disturbances of occlusion, chewing, swallowing and appearance. To ensure that goal is to enhance the value of prosthodontics. In other words, our discipline seeks to maintain proper dentition in children and adults, to restore dentition in edentulous adults of all ages, and to enrich and/or improve the quality of life of a population with an average life expectancy of 80 years. A timely report from the Science Council of Japan (National Committee for Sciences of Oral Function) has provided a report entitled “Healthy long life expectancy created by sound occlusion and mastication” and this report has been summarized by the Union Council of Japan Dental Societies. The report seeks to promote a better understanding of the importance of adequate mastication based on sound occlusion to a healthy long life expectancy.

Future prospective on the need for prosthodontic care

Changes in the number of residual teeth among populations are shown in Figure 3. The average number of residual teeth has increased at each of the survey times from 1987 to 1993 and 1999. On the other hand, many people over 65 years old still have fewer than 20 teeth. Prosthodontic care can offer more assistance to these individuals. In other words, existing dentition must be maintained in individuals who are less than 65 years and lost dentition must be restored in more elderly populations. Projections of future prosthodontic needs show that the number of bridges needed by the elderly will increase 2.0 times (2.2~1.1 times, with 95% confidence) and the number of dentures needed by 1.5 times (1.8~1.0 times) over the next 20 years, then reach a plateau in the subsequent 10 years. Higher rates will prevail among elderly with disabilities, with bridges increasing 2.7 times (3.2~1.0 times) and dentures 1.8 times (2.2~1.0 times), over the next 25 years.

Prosthodontic patients can be categorized into 2 groups, those who are independent and those with disabilities. The prosthodontic care provided to these different groups can be quite different. Currently prosthodontic care has been offered primarily to the independent elderly, but in the near future, such care must also be offered to disabled elderly to reduce the cost of nursing care. One of the great values of prosthodontics lies in the extension of such care to the disabled elderly.

Evidence of the value of prosthodontics

Evidence-based clinical care has recently been widely discussed in the contexts of both medicine and dentistry. Evidence-based care is defined as the provision of treatment based on a combination of the highest quality relevant research findings, the clinician’s skills, and the patient’s particular needs. The quality and quantity of relevant research are not always sufficient however. For example, a review of the literature regarding comparative evaluations of implant therapy and removable partial denture treatment for the 25 years between 1980 and 2005 shows few articles on this topic. Thus, we lack evidence supporting the theory and treatment modalities of
pressed its concerns relating to the heavy burden of nursing assistance. The incidence of such pneumonia, caused by inadvertent swallowing of oral microorganisms, can be decreased by improving oral care among nursing home residents. Loss of occlusion contributes to dysfunctional swallowing. In fact, the incidence of penetration of pharynges is significantly higher when the edentulous elderly person removes his or her dentures (Fig. 5). Moreover, good occlusion contributes to enhancement of quality of life (QOL) and may affect other activities of daily living. Good QOL is highly related to the enjoyment of eating, and elderly with well-fitting dentures have been shown to have higher QOL than those whose dentures are ill-fitting or who are edentulous but do not wear dentures. A significant relationship has been found between good occlusal support and physical balance/muscle strength in the lower extremities.}

prosthodontic care (Table 1). Not only the impact of prosthodontic care on physical well being but also on the psychological, economic and social aspects of life must be further elucidated. Because of the lack of such evidence, the success or failure of prosthodontic care has never been well defined. The criteria for success are normally understood in terms of biological effects, prostheses survival rates, and patient satisfaction. However, Carlsson reported at the International Symposium Osaka 2000 that the success of complete denture treatment depends primarily on psychosocial factors in the patient and the patient-dentist relationship rather than on the treatment techniques themselves.

This interpretation has caused us to change our attitude toward prosthesis-oriented prosthodontic care. In this regard, the relationship between effective prosthodontic treatment and a healthy life expectancy is gradually coming into clear view. For example, research has shown that independent elderly with more than 16/20 teeth live significantly longer. Those elderly whose lost teeth and impaired occlusion have not been restored with dentures have a significantly lower rate of survival than those whose lost teeth and occlusion have been restored (Fig. 4).

Recently, the Japanese government has expressed its concerns relating to the heavy burden of nursing home costs and to the need to promote better health among the elderly. Pneumonia associated with dysfunctional swallowing is a primary cause of death among the elderly receiving nursing assistance. The incidence of such pneumonia is significantly higher when the edentulous elderly person removes his or her dentures (Yoshikawa et al). 8020 dentate: The elderly of 80 years with more than 20 teeth.
legs. Frequent falls (more than twice in one year) among elderly with dementia has been shown to be associated with a lack of occlusal support (Fig. 6). Although firm evidence is still lacking as to the possible contributions of good prosthodontic care to the reduction of nursing expenses, clearly such care contributes to maintaining a good quality of life for our elderly citizens.

**Osseointegrated implants**

The introduction of osseointegrated implants by Brånemark in 1965 marked a new era in prosthodontic care. Today, implants are placed in the jaws of many partially or totally edentulous patients. The market for implant products in Japan has expanded in the past few years and expansion is expected to continue in the near future with an increase of a billion Japanese YEN per year.

Well-designed studies on implant surface modification, guided bone regeneration, and immediate/early loading must be performed to obtain further evidence to enhance clinical applications. However, it must be acknowledged that implant therapy is not yet recognized as a top priority treatment modality for partially/totally edentulous patients. Even in Sweden where osseointegrated implants were born, less than 10% of potential patients receive the benefit of implant therapy. In fact, most of our patients prefer conventional bridge/denture works. Although it seems advisable to extend the application of implant therapy to more patients to enrich their QOL, more evidence is also needed comparing the effectiveness and efficacy of implants to conventional prosthodontic treatment to ensure that the best and most appropriate prosthetic care is provided.

**Strategy to increase the value of prosthodontics**

Strategic planning is taking place, including sharing the mission of our society among members, structuring the new prosthodontics through the reform of scientific meetings of our society, ensuring the quality of prosthodontic care by accrediting specialist prosthodontists, promoting globalization to contribute to the solution of Asian problems, and participating in society through disclosure of information. Such strategic planning will create additional value in prosthodontics.

To more fully share the mission of our society among members will help us to clarify the role of prosthodontics care. In this effort, we need to change our way of thinking about and acting on the future. We must structure the new prosthodontics not only by improving traditional prosthodontic treatment including the development of new materials and clinical techniques, but also through the evolution of a creative prosthodontics associated with the advancement of such related areas as brain science, regenerative medicine, nanotechnology, bioinformatics, sleep science and nutrition science. Further, we must have strong leadership in this organization to enhance evidence-based approaches to prosthodontic care especially through epidemiological studies.

For example, bioinformatics is a breakthrough area that has emerged with the completion of the Human Genome Project. Our individual differences are explained by just 0.1% of the total sequence of nucleotides, called single nucleotide polymorphisms (SNPs). It has been suggested that genetic diagnosis using SNPs may provide a novel opportunity for differentiating among edentulous patients, allowing development of an even more personalized prosthodontic care. Recommendation of the prosthodontic treatment option with the greatest potential benefit based on such genetic diagnosis is a possible way to increase the value of prosthodontics.

Development of such a CAD/CAM system is another way to increase the value of prosthodontics.

**New prosthodontics from the global viewpoint**

Creative prosthodontics must be continuously developed in Japan. From a global viewpoint, our direction should be evaluated in the context of related activities in other industrialized countries. Articles published during the last 40 years in the Journal of Japan Prosthodontic Society (JJP) were classified into categories by Kobayashi, with the consequent classification of articles published between 1958 and 2004 shown in Figure 8. Articles on occlusion and jaw function are predominant. It is quite proper in the evaluation of research trends to compare the subject matter of these articles to that of articles published in leading international journals, such as the Journal of Prosthetic Dentistry (JPD), Journal of Prosthodontics (JP) and the International Journal of Prosthodontics (IJP). Articles in these journals were classified into categories such as crown/bridge, dentures, implant, jaw bone/mucosa, jaw function/occlusion, and epidemiology (Fig. 9, 10). These journals all publish quite similar numbers of articles in the various categories, except for articles on implants. An increase in articles on implants is seen in the three English language journals, with no clear comparable in-

Fig. 8 Articles published in the Journal of Japan Prosthodontic Society (JJP) over 46 years. Many articles in the last 46 years were on occlusion and function.

Fig. 9 Classification of articles published in major international prosthodontic journals during the last 5 years. Increase is seen in number of articles on implants in the three major journals. JPD: The Journal of Prosthetic Dentistry; JP: Journal of Prosthodontics; IJP: The International Journal of Prosthodontics; JJP: The Journal of Japan Prosthodontic Society.

Fig. 10 Classification of articles published in major international prosthodontic journals during the last 5 years. In JJP, the number of articles on jaw function/occlusion is remarkable compared with articles in the three major journals. JPD: The Journal of Prosthetic Dentistry; JP: Journal of Prosthodontics; IJP: The International Journal of Prosthodontics; JJP: The Journal of Japan Prosthodontic Society.

CAD/CAM for crown/bridge work offers another example. CAD/CAM processing with the light impression technique can dramatically reduce several routine procedures, enhancing effective work methods, reducing the prevent consumption of impression, modeling, investing and casting materials. The use of titanium may prevent risks associated with rare metals used in gold-silver palladium alloys, which have been most common in Japan. Thus, CAD/CAM technology may induce a significant paradigm shift. Prosthetic care procedures can be shifted to diagnosis, treatment planning and maintenance routines as treatment time is reduced (Fig. 7).
is insufficient. In addition, the biological, psychological, economic, and social impacts of prosthodontic care on patients have yet to be fully clarified. Therefore, the Japan Prosthodontic Society (JPS) must take the initiative in encouraging and developing related research projects. Several years ago, JPS began two research projects on denture treatment outcomes. These multi-center studies involved several prosthodontic departments nationwide, and the findings thus far indicate the need to encourage and continue such projects. Moreover, JPS has recently made the decision to publish our journal in English. Prosthodontic Research and Practice appears in four volumes, beginning in January 2006. Members and foreign colleagues are encouraged to submit manuscripts on their research or clinical products. This new policy will definitely support our application for inclusion in the MEDLINE database and our efforts to achieve strong impact factors.

International exchanges between foreign prosthodontic societies and JPS should be actively pursued. JPS has already begun scientific exchanges with the Korean Academy of Prosthodontics and the Asian Academy of Prosthodontics. The second joint meeting with the Greater New York Academy of Prosthodontics is scheduled for Tokyo in 2007. In the near future, close communication with prosthodontic specialist organizations in Europe and the USA, as well as prosthodontic societies in China and India are expected to develop. In particular, JPS should direct more attention toward solving prosthodontic problems in Asia, and cooperation with Asian organizations will make Japanese prosthodontics a conspicuous presence throughout the Asian region.

**Newly restructured scientific meetings to activate prosthodontic research and practice**

In 2006, we abandoned our policy of two annual meetings; only one national scientific meeting will be held each year with nine simultaneous branch meetings nationwide. It is imperative to share the inherent functions of scientific meetings with the branch meetings. We hope that scientific and clinical papers based on our daily activities will be discussed at the annual meeting, along with research and education programs, such as table clinics and small group workshops to foster the next generations of prosthodontic researchers and clinicians. Such efforts will be focused on the development of a new creative...
prosthodontics. Clinical discussions on updated materials and technologies provided to general practitioners will help them to provide the best prosthodontic care in their daily practice.

**JPS policy to respond to community needs more closely**

JPS has a responsibility to conduct nonprofitable public benefit activities. These activities involve science-transfer programs and proposed solutions to community problems, to be provided in the form of citizen forums, leaflets, homepages and other media exposure. We expect that conducting these activities steadily will help our society grow to be more public policy-oriented with a closer and higher-profile relationship to the local community.

**Offering best quality prosthodontic care; developing specialist programs**

To assure high quality prosthodontic care is one of the top priorities of JPS. To do so, strong specialist prosthodontist training programs must be developed. Specialist Prosthodontist must be defined as “performing prosthodontic care based on evidence-based treatment planning and most appropriate techniques to restore function and appearance in difficult cases and to maintain long-term care for the enrichment of quality of life for all patients.” To pursue these objectives, we must: 1. Share fully information relating to solutions to difficult prosthodontic problems. 2. Screen prosthodontists referred for difficult prosthodontic care. Through these procedures, it is expected that the quality of prosthodontic care will be much improved. Today the classification of clinical cases based on degree of difficulty has been developed into 4 categories; Level 1: cases suitable for care in undergraduate clinics, Level 2: cases for residents and general practitioners, Levels 3: and 4: cases for specialized prosthodontist clinics.

To provide greater benefit to more people, the creation of clinical treatment guidelines for prosthodontic care is an urgently necessary task. These guidelines should be discussed from the viewpoint of justice and safe care. Guidelines will be of great help in standardizing the quality of prosthodontic care for all patients. Initiatives to reform the social insurance system for dental care should be undertaken by the leadership of dental academic societies. The scientific community is duty-bound to provide maximum benefit to the public based on scientific results. Our program of science transfers to disseminate clinical technologies is a must for the public.

**Closing**

The future value of prosthodontics has been discussed in relation to strategic planning. These planning sessions must be held regularly. Only through the dedicated efforts of all JPS members will we accomplish our plans and create new values for society and the public in the 21st century. Based on these activities, the contribution of prosthodontics to extended healthy life expectancy under optimal conditions will be clearly demonstrated.

The Japan Prosthodontic Society must recognize this huge responsibility, and make even more dedicated efforts to serve society and the public. The discipline of prosthodontics can look forward to an exciting future with continued improvement in the performance of our daily activities and recognition of our significant role in improving dental health.

**References**