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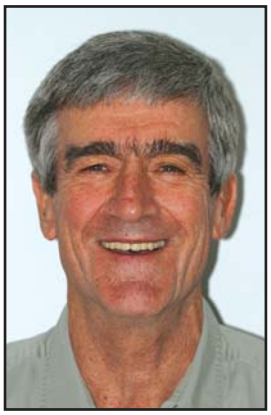

Let's begin with an overview of your familial and educational background, as well as the events, people, and experiences that proved fortunate or opportune in your career path.

I was the eldest of 5 children in a family with a working-class background. My father was a bricklayer, and he convinced me to take up a bricklayer's apprenticeship at the age of 14, thus fulfilling his ambitions for his first-born. However, after 1 week, I was totally disillusioned because all I was allowed to do on the building site was cleanup, with no short-term prospects for laying bricks. My mother realized that I was unhappy and convinced me to return to school. Subsequently, I was attracted to both veterinary science and medicine, but unfortunately the State of Western Australia had neither of those schools at that time. The school that I attended had an excellent vocational guidance program, whereby old boys of the college would come and discuss their various occupations. As a result of these visits, I planned to be a geologist. Then fate stepped in, because one of my classmates had enrolled in the vocational guidance program for dentistry, in which I had zero interest. My classmate and I routinely traveled home together, and as the dentistry program was scheduled after school hours, he implored me to accompany him because no one else in our school was interested. Accordingly, but under sufferance, I agreed to get a later bus home with him on the appointed day. Seven great men have been instrumental in shaping my career, and the oral surgeon Gilbert Henderson, who conducted this vocational guidance at his clinic, was the first of my magnificent 7. His description and illustrations of dentistry did nothing for me; however, as an afterthought he produced a skull plate and an artificial arm from his laboratory. He had been involved in rehabilitation of World War II returned servicemen and constructed the artificial arm for a crippled soldier. The hand had 3 positions—clasped, open, and cupped—controlled by 3 switches on the wrist, which worked when pressed by the opposite hand. This simply blew my mind away. No one at the program asked any questions other than the one question I asked, which was, "how come an oral surgeon learns about prosthetic limbs, because that has nothing to do with dentistry?" The reply was that in dental school, students learn how to handle different materials, and material science is a major area of dental study. This background, together with his ingenuity and his empathy for the plight of disabled war veterans, explained his involvement. On my way home, my classmate thanked me for accompanying him on what was a waste of his time, because he saw no attraction in dentistry. In return, I thanked him: I was going to be a dentist, because the prosthetic arm was the greatest thing I had ever seen. Fact is stranger than fiction.

So I graduated from the University of Western Australia with First Class Honors in Dental Science, won a travel and study scholarship, and went to Indiana University on the suggestion of my teacher in prosthetic dentistry, Ross L. Taylor, the second of my magnificent 7. He inspired me in prosthetics, became my mentor, and subsequently moved to Northwestern University, where he spent the remainder of his academic career. The chairman of prosthodontics at IU was John F. Johnston—number 3 of 7. He treated graduate students like members of his extended family, and together with his wife Lavonne, ensured that the large numbers of foreign students in the program greatly enjoyed their academic and social lives at IU. Dr Johnston was a unique individual: strong, resolute, and unflinching. The only time I ever saw him explode was when I informed him that I wanted to make oral pathology my minor area of study, instead of dental materials.

When he asked how I could hope to graduate in prosthodontics without dental materials, my reply was that I would absolutely fulfill all the dental materials courses, because I liked materials science, but that I wanted to do oral pathology as well, because I thought a biological approach to clinical dentistry was important. On the condition that I would be out of the program if I didn't meet these targets despite my greater than average workload, he reluctantly agreed. Many years later, he confided in me that retrospectively he considered that decision to be one of his best. Consequently, I came under the influence of Dr W.G. Schafer, professor of oral pathology and one of the best teachers I have seen. His graduate course, "Special Pathology of Bone," was singularly the most significant course in my entire

career and influenced me greatly in my later understanding of the fundamentals of implant dentistry. The director of the graduate clinical program at IU was Roland Dykema, who was similar to John Johnston in terms of individual determination and conviction. He gave me technical and clinical expertise in fixed prosthodontics and the further honor of selecting me as the first foreign member of the American Academy of Crown and Bridge Prosthodontics, when he became president of that hallmark organization.

I can say with certainty that the US system of graduate dental education was unsurpassed in the world at that time, and I have forever been indebted to my teachers at IU.

The fourth of my magnificent 7 was Dr Ted Adler, an oral surgeon in Perth. After I settled in to practice as the first prosthodontist registered in Western Australia, Ted convinced me that I had a community responsibility, and that the biggest thing in life was not a long-span fixed partial denture. He urged me to accept hospital appointments to provide specialist services in cleft palate prosthodontics and maxillofacial prosthetics. My interest, however, was in fixed prosthodontics, and I resisted these overtures until his silver tongue forced me to consider that I was in fact failing in my community commitment, and reminded me that life was not meant to be easy. Thus, I became the first prosthodontist appointed to a public hospital in Western Australia, at the Princess Margaret Hospital for Children in the Department of Cleft Lip and Palate Rehabilitation, and at Royal Perth Hospital, where we established a maxillofacial prosthetic clinic within the Department of Plastic Surgery. At this time, I became involved with the Chief of Plastic Surgery at both of these hospitals, my number 5, Harold McComb. He was instrumental in giving me total support to establish both the training programs and clinical facilities required. Harold was a giant among men, and was responsible for the transformation of my mindset to an absolute conviction that dentistry is only part of the big picture and should be organized accordingly. I will never forget the first time I gave a lecture to the visiting medical staff on the subject of occlusal interference and TMJ dysfunction. The date was 1973, and I had just returned from a year at the University of Michigan, where my interest had been in gnathologic rehabilitation and occlusal dysfunction. During the question and answer period, a neurosurgeon thanked me for my diatribe on dental dogma. He respectfully pointed out that nowhere else in the body, and in no medical discipline, could a biomechanical anomaly of magnitude 15 to 50 microns create such havoc in a biological system. This was a most salutary moment in my ongoing development and finally convinced me to never underestimate the ramifications of the big picture. Henceforth, my perspective on all issues has been a global one.

In 1980, I became involved with George Zarb after he suggested that I should become interested in osseointegration. George is of course one of my magnificent 7, and this interview was conducted on the condition that this paragraph would not be edited. Not only did George redirect my thinking, he opened up other doors of consideration. Besides his outstanding accomplishments as an educator, editor, erudite gentleman, and visionary, his most significant accomplishment has been with respect to international prosthodontic collaboration and understanding. He alone convinced Professor Per-Ingvar Brånemark that implants ad modum Brånemark should move beyond Sweden. Accordingly, in 1981, we participated in a replication study on rehabilitation of the edentulous mandible.

And so it was that I met the final member of my magnificent 7, P-I Brånemark. When he came to Perth to view our facilities, he developed an instant rapport with Harold McComb. In my assessment, this was based on their similar medical backgrounds, particularly their interest in treating persons with disability, and their capacity to extract 36 hours out of every 24. Consequently, we became involved early on with the craniofacial application of osseointegration at the Brånemark Center in Perth, thus developing a close liaison and mentorship relationship with P-I Brånemark. The last 25 years of my career have been intimately involved with implant dentistry at all levels of teaching and education. I have also had significant involvement in research and development activities pertinent to osseointegration and related issues.

In retrospect, I was fortunate to have been in the right place at the right time. What made the place and the time right, however, were the people who have so unselfishly encouraged me to become involved.

Describe your ongoing education and research interests and their impact upon your career development.

I commenced prosthodontic teaching at the University of Western Australia following my return from IU. My teaching commitments have always been part-time to half-time, culminating in directing the graduate program from 1985 to 1995. My research interests have been in biologically related areas. My involvement with P-I Brånemark introduced me to internationally based, prospective, long-term multicenter clinical trials with dental implants. More recently, we have been involved with the development of enhanced implant surface

technology, together with a special interest in the immune response. These latter areas of interest have focused both on animal experiments and human research. These developments were exciting, because my graduate research work at IU also involved a mix of animal and human research, and over the years this interrelationship has been fundamental to my interpretation of what dental research is all about.

The USA, Scandinavia, and the UK were the regions associated with the academic framework of my early dental development in Australia. Because I recognized that I knew less about fixed prosthodontics than other disciplines, I decided that this would be my immediate direction. My mentor Ross Taylor advised me to choose between Sweden and the USA. I selected the USA because of the similarity in lifestyle and cultural background. This is a decision that I have never regretted. However, life has many interesting twists and turns, and 20 years after leaving Australia for Indiana, I met Drs Zarb and Brånemark, and thus commenced my Swedish connection. A comparison of the science of clinical dentistry in these 2 countries revealed a stark contrast. During my 20 or so consecutive attendances at the Chicago Dental Society's Midwinter Meeting, I was exposed to the leading clinicians of the day. On many occasions, I heard dogma and technique espoused only to see it all fall into disrepute and replaced in subsequent years by new developments, with the explanation that, "although we were wrong last year, we are right this year." My admiration for and acceptance of such a philosophy of freedom of speech disappeared when I became exposed to the Swedish method. In Scandinavia, if a clinician publicly advocated a philosophy or practice that subsequently fell short of what had been envisaged, that clinician, irrespective of reputation or rank, was academically crucified, never to recover. In Australia, I have tried to develop a midpoint on this spectrum.

Subsequently, I have learned that the best minds in prosthodontics are found in many different countries and cultures. However, I do believe that the foundation upon which international prosthodontics has been built was and continues to be the US educational system.

You clearly chose to participate and play a leading role in the early but seminal effort to both introduce and raise the bar in implant prosthodontics. How did your aspirations at the time come to match subsequent developments in the field?

As implant prosthodontics developed and spread globally, I was determined to foster the changing paradigms in Australia and to promote Australian expertise internationally. We recognized that the philosophy of having a learning curve in implant prosthodontics, starting with the edentulous arch and progressing to single-tooth applications, was questionable. While it was appropriate in the research and development phase, it was not applicable to everyday clinical practice. We realized that many dentists had practices in which they never saw edentulous patients, and furthermore, philosophically didn't *want* to treat edentulous patients. Therefore, early on in our training programs, we reversed the historical perspective. We suggested that if clinicians didn't have patients with a single missing tooth, they really didn't have a practice at all. On this basis, our startup course in implant dentistry specifically covered the single-tooth implant in the esthetic zone. Subsequent courses progressed step-wise through the partially edentulous application to the edentulous arch, with the final course covering oral rehabilitation with implant prosthodontics. Furthermore, the courses were targeted toward restoring dentists and general practitioners, not specialists.

These aspirations proved positive and have been realized. We have seen implants become part of everyday dentistry, accepted by all levels of the dental establishment and bureaucracy. It was also salutary that the single-tooth implant was accepted as the standard of care in selected situations for the replacement of a missing tooth.[1] Subsequently, the 2-implant overdenture was advocated as the standard of care and the first choice of treatment for the edentulous mandible.[2] Long-term data on the partially edentulous application is now at least comparable in terms of success rate to traditional fixed prosthodontics. The scientific impact of implant prosthodontics has also been beneficial, raising the standards of conventional prosthodontic care in terms of assessment and outcome.

What are the best and worst changes of treatment direction catalyzed by the Brånemark applied research?

The best change of treatment direction catalyzed by the advent of osseointegration has been the renewed emphasis on quality of life, especially for dental patients with disabilities. The epitome of this concept is rehabilitation of edentulism with fixed implant prosthodontics. Conversely, the positive dentition with a single lost or missing tooth can be restored with a minimal cost to the adjacent teeth. These situations provide a totally different perspective on that which was hitherto possible. These new paradigms forced reconsideration

of traditional philosophy and practice, so that prosthodontics as a specialty has been transformed with respect to potential and clinical reality. The relatively recent increase in interest at the graduate and postgraduate level of prosthodontic education can be related directly to the impact of implant dentistry.

With every upside there is a downside. One of the worst changes in treatment direction is an increasing tendency to place greater emphasis on the value of implants compared to teeth in many situations. Competent treatment planning is dependent on the formalization of treatment options with an emphasis on the most appropriate treatment as the treatment of choice. Whether implants or teeth are best is dependent on proper evaluation, not on philosophy or enthusiasm. Another downside is when restoring dentists develop their surgical expertise as a consequence of their interest in implant dentistry, but fail to concomitantly develop their prosthodontic expertise. This has emerged as a major issue in the area of implant rehabilitation by general practitioners, whereby surgical protocols are followed to integrate implants, but the resultant occlusion and functional result is catastrophic. Perhaps the worst aspect of all is the promotion of implant-oriented treatment plans based on relatively high profitability, resulting in overprescription and poor-quality healthcare.

There are other challenging and perplexing aspects of such a best-and-worst scenario. For example, the debate on enhanced efficiency of improved implant surfaces can lead to articles of faith as opposed to demonstrations of scientific merit. With the passage of time, it appears that many of these changes do not have the same scientific depth we became accustomed to in the early days of the Brånemark era. Philosophically, it is often easier to keep an object moving than it is to get it moving, and so it is with osseointegration. Much pseudoscientific development is based on extrapolation to justify its promotion. It was claimed 20 years ago that many implant companies would fold up. Some certainly did, but more emerged. Today, we are still in a situation where multifold commodity development interests successfully do business. There is a diverse choice of philosophy, product, and concept, all offering alternative levels of science, facilitation, and profitability. The dental research community must exert its influence at all levels of interest in the implant field, and insist that the highest standards of scientific evaluation be applied. The dental research community also has a responsibility to ensure that financial resources available from commodity development interests are controlled and utilized in the best interests of science itself and the long-term health and welfare of the community.

Arguments can be made about altruistic ideals in today's world. The reality is that ultimate responsibility for patient care rests with the doctor. We have a democratic ability to vote to control the future of implant development. We vote with our dollar.

Then there is the issue of site development, regarding which site is appropriate in which cases versus the quasi-blind belief in the perfectibility of any selected host implant placement site. Clinical practice is a spectrum, and all zones of the spectrum need development, but only in light of global considerations. Site enhancement is critically important in the state of the art, high-end esthetic challenge, but of little relevance in functional rehabilitation and public health issues related to the provision of adequate dental services to disabled and elderly patients. What must be kept in mind is that people sell and promote what they have to sell and promote, and this is true with plumbers, professionals, and even prosthodontists. Barrow pushing and professional agendas are part of human nature, and the area of implant dentistry is no exception.

Perhaps the worst aspect of the implant bandwagon is the clinician and/or pseudo-scientist desperate for podium exposure, and thus vulnerable to the overtures of commodity development interests to participate in corporate programs and company-sponsored educational junkets. Too often the veracity and accountability of such individuals are suspect, and their presentations are often justifiably viewed with skepticism.

The question can be asked if we have reached an "open-season" stage and risk throwing out the baby with the bathwater. Certainly there is great risk in some areas, such as the promotion of dubious implant design modifications in terms of macro- and microsurface alteration, or the use of bone augmentation products of less-than-certain safety and efficacy. I believe that fortunately there are enough concerned, committed, and rational individuals who are well motivated to monitor the situation. However, they will have their work cut out for them.

Is there anything about your career canon that you would have done differently? What is your advice to young prosthodontists?

In principle, I wouldn't change anything in hindsight. However, I recognize that my life outside of dentistry has been compromised because of the combined load of clinical practice, academia, and involvement at different levels of dental bureaucracy. While life must be balanced, I have no regrets.

My advice to young prosthodontists is to get involved in surgical aspects of implant dentistry. Fortunately, many graduate programs now advocate this philosophy. This is not to suggest that prosthodontists should do all their own surgery, but rather to allow for less complicated and more cost-effective treatment for patients. At the same time, the team approach should be fostered in cases where prosthodontic surgical expertise is limited. In these circumstances, close collaboration with surgical colleagues is mandatory, and when possible, prosthodontists should be encouraged to surgically assist during complex cases.

Prosthodontists are well suited for a coordinating role in complex interdisciplinary treatment planning. However, time must be spent on expanding the interdisciplinary and multidisciplinary knowledge base, over and beyond what is learned in a graduate program. If the prosthodontic leadership role is to be accepted by colleagues in other disciplines, it is fundamental that the prosthodontist has respect and recognition based on performance and experience. Such involvement opens the mind and broadens the outlook and is an excellent career development strategy.

Finally, learn to agree to disagree. Beware of dogma, but respect the opinion of others. Assess all things with a global perspective and never let enthusiasm cloud better judgment. My final word for young, would-be prosthodontists is never forget that the patient comes first.

Where do we go from here?

Prosthodontics has been my life, and the professional rewards have been greater than I ever envisaged. However, on occasions I have been at personal risk, undergoing resection surgery and spending time in intensive care. At these times, my thoughts have never been on prosthodontics, but with my family. I have been fortunate that I am still with my wife, and my children have far exceeded my expectations. None of them developed an interest in dentistry, because they thought I worked too long and too hard. Nevertheless, they realize I love it, and furthermore appreciate that their own opportunities in life were made fiscally possible by my efforts in prosthodontics. What we get out is a reflection of what we put in.

References

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2. Feine JS, Carlsson GE, Awad MA, et al. The McGill consensus statement on overdentures. Mandibular two-implant overdentures as first choice standard of care for edentulous patients. Montreal, Quebec, May 24–25, 2002. Int J Oral Maxillofac Implants 2002;17:601–602.