From Academia to a Research Institution

Looking back at my career in prosthodontics and dental biomaterials research, from student to professor, there is one achievement worth mentioning in capital letters: TITANIUM IMPLANTS. As a young student, I could not imagine what impact this treatment would have on me personally and on my patients. This extraordinary treatment has now been compellingly shown to be a most valuable complement to our patients' oral rehabilitation. Another achievement with a significant impact on prosthodontic treatment is adhesive bonding of ceramics to tooth structure—a method that contributes to improved esthetics and saves tooth substance. Besides clinical work and research in prosthodontics, these areas of dental biomaterials research have always been an interest of mine. Fifteen years ago, I visited scientists at the Nordic Institute of Dental Materials (NIOM), and I knew that the institute had been, and still was, a significant part of this development. Thus, when the position of director of NIOM was advertised I saw my chance to further develop biomaterials research on a full-time basis.

I was a member of the academic staff at the Faculty of Odontology at the University of Göteborg, Sweden, for more than 30 years. I had chaired the Department of Prosthodontics since 1995, and it was therefore quite a challenge at this stage of my career to change directions and move to another country. Mind you, my Norwegian venue is still in Scandinavia, so there are many aspects to daily life that are not too different. However, a new career in charge of a research institute offers exciting and provocative avenues for the future, as well as a scope for looking back and comparing career experiences.

NIOM was established in 1972 as a nonprofit institution under the auspices of the Nordic Council of Ministers, which was formalized in 1952 and is responsible for Nordic institutions within the various fields of Nordic cooperation, one of the oldest and most wide-ranging regional partnerships in the world. This cooperative undertaking includes Denmark, Finland, Iceland, Norway, Sweden, the Faroe Islands, Greenland, and Åland. The idea is a logical one, since the histories of the Nordic countries have been very much linked for centuries. Consequently, the role of the Council of Ministers is to encourage these countries to work together more closely, to reinforce their Nordic sense of identity, and to promote Nordic interests abroad.

NIOM's first CEO and long-standing director was Dr Ivar Mjör, who is still active at the University of Gainesville, Florida in the USA. The NIOM charter states: "NIOM shall work towards ensuring that medical devices used in dentistry in the Nordic countries fulfill the relevant requirements related to health and to technical aspects in relation to the development in the field." These objectives are reflected by our 4 priorities: *(1)* research and development, *(2)* evidence-based information, *(3)* testing of dental biomaterials, and *(4)* international standardization (ISO/CEN). NIOM's research activities are focused on dental biomaterials and biological-clinical related areas. We have an accredited laboratory and our activities are concentrated within 4 departments: *(1)* Biology and Toxicology, *(2)* Chemistry, *(3)* Physics and Metallurgy, and *(4)* Clinical Trials. Our scientists produce around 50 peer-reviewed scientific papers annually and present at several national and international meetings every year. Moreover, visits to NIOM by scientists from the Nordic countries have been a healthy and long-standing tradition since 1979. In addition, a total of 24 months of scholarship salary is available and NIOM hosts externally funded postgraduate students from countries outside Scandinavia.

Participation in international standardization protocols has always been an important activity at NIOM, with a major impact on development of new standards and the evaluation and revision of existing ones. Senior scientists at NIOM are officially appointed experts in approximately 30 international standardization groups and occupy the chair for 7 of those groups.

When I decided to accept the NIOM offer, I left a well-established and recognized position with only a vague idea of what to expect regarding general and specific challenges. However, a major factor in my decision was curiosity and a strong desire to make things happen faster, especially after the many years of inevitable

dental institutional inertia. I also strongly foresaw a great potential for the institute, specifically in dental biomaterials research. Nonetheless, prudence demanded that my introduction to an entirely new professional culture would also be accompanied by inevitable, even numerous, differences. I was quickly reassured, however, by the positive nature of these differences and how they served as an incentive to facilitate my career change. For example, NIOM's hosting of 4 PhD students was far from a deterrent to the pace and commitment of my job. In fact, it was a gratifying and dramatic departure from academia's daily demands of managing the clinical and pedagogic needs of undergraduate students. Of course, there were similarities to my past life, most notably the time spent seeking grant support, particularly when it comes to external funding. About half of the NIOM budget is currently financed by the Nordic Council, and the remainder comes from external funding. I had certainly enjoyed my many years as a clinical educator, and the opportunity to conduct research at an academic institution made for a stimulating period in my life. However, the demand of clinical academia, particularly during recent years, made for a lack of balance between the pursuits of research, education, and patient service, and it seemed that the time spent with students progressively increased—at the expense of a serious research commitment. This clinical academic predicament appears to be a universal one and invariably is a result of fiscal problems, which appear to prevail in most dental schools in both Scandinavia and abroad. I regret to say that I believe in the long run this will become an increasingly unsatisfactory modus operandi and an unsustainable situation.

In my present position, the trajectory from idea development to decision making and subsequent action has become much shorter and faster almost overnight, especially when compared to my past experiences in academia. This operational milieu stimulates individual initiative and provokes an incisive analytical approach. It also catalyzes a sense of urgency to know that new ideas and ensuing projects can be realized in the near future, without the delay of ineffectual discussions and ever-present bureaucracy. I have found my new role a stimulating and intellectually privileged one, thanks to the ease with which I can be engaged in so many new areas of dental research.

However, some problems do exist, albeit not major issues. For example, the majority of the NIOM faculty and staff have backgrounds in biology, chemistry, and physics. As a result, there exists a lack of researchers with a background in dentistry, which is a compelling concern for me. Of course, in the Nordic countries as a whole there is a major lack of researchers with a dental or medical background. Nonetheless, I hope that this concern will be addressed, indeed rectified, in the years ahead.

Today's focus on dental biomaterials research, including prosthodontics, is a stimulating challenge for me, and I expect NIOM to play an active part in future initiatives. My personal perception is that Nordic cooperation in dental biomaterials will increase, especially in fields where Scandinavian countries are already on the front line. The challenges ahead include the improvement of ceramics and implant materials, as well as finding equally good alternatives to amalgam alloy. In my opinion, however, the greatest challenge is stem cell research and a possible new paradigm in oral rehabilitation and prosthodontics—perhaps not a reality in my lifetime, but I am sure it will come! NIOM has a highly competitive cell laboratory, but cooperation is a must in this area of research. The inevitability of an increased critical mass of scholarship, which can be so readily achieved by crossing borders and networking, can only strengthen NIOM's global impact. I feel very privileged to have this opportunity to devote my career to an exciting milieu of research in collaboration with very capable colleagues.

As for the institute itself, I am confident that our versatile yet focused competence in biomaterials research, materials testing, and standardization will ensure a bright and successful future.

Stig Karlsson, Professor, Odont Dr, DDS
Managing Director
Nordic Institute of Dental Materials (www.niom.no)
PO Box 70
NO-1305 Haslum
Norway