30 years of osseointegration

Dental Tribune looks back at the recent Nobel-Biocare symposium celebrating 30 years of osseointegration in the UK and Ireland

W ho could believe in just 50 years ago marked the beginning of developments into osseointegration in the UK? It was only a short 58 years ago that Per-Ingvar Brånemark conducted an experiment where he used a titanium implant chamber to study blood flow in rabbit bone. When it became time to remove the titanium chambers from the bone, he discovered that the bone had integrated so completely with the implant that the chamber could not be removed. Brånemark called the discovery ‘osseointegration’. Not until years later, when using a similar titanium chamber in the upper forearms of volunteers did the realisation that this could be of benefit to humans occur to Brånemark.

In dental medicine, the implementation of osseointegration started in the mid-1960s as a result of the work of Prof Brånemark. In 1983 Brånemark, who was at the time Professor of Anatomy at the University of Gothenburg, placed dental implants into the first human patient – Gosta Larsson. This patient had a cleft palate defect and required dental implants to support an obturator. Gosta Larsson died in 2003, with the original implants still in place after 40 years of function.

In the mid-1970s Brånemark entered into a commercial partnership with the Swedish defense company Bofors, Nobel Pharma, to manufacture dental implants and the instrumentation required for their placement. Eventually an offshoot of Bofors, Nobel Pharma, was created to concentrate on this product line. Nobel Pharma subsequently became Nobel Biocare.

Brånemark spent almost 50 years fighting the scientific community for acceptance of osseointegration as a viable treatment. In Sweden he was often openly ridiculed at scientific conferences. His university stopped funding for his research, forcing him to open a private clinic to continue the treatment of patients. It took until 1985 before the worldwide scientific community started to readily accept Brånemark’s work. Today osseointegration is a highly predictable and commonplace treatment modality.

Symposium

To mark 30 years of osseointegration in the UK and Ireland, Nobel Biocare organised a two-day symposium at the Royal Institute of British Architects in London, with an international list of renowned speakers. The main topics covered at the invitation only event included The Compromised Patient, Immediate Loading, Implant Surfaces and Aesthetics. Each day started with a keynote speaker who set the tone for the day’s sessions. Friday’s keynote speech was entitled Prosthodontics at a Crossroads and was presented by Dr George Zarb, recently retired as Professor and Head of Prosthodontics at the Faculty of Dentistry, University of Toronto following a distinguished 40-year academic career.

Dr Zarb discussed the drive to be more adventurous with implants and what they can do for patients and the need to temper that drive to ensure that cases are chosen appropriately. He also looked at the development of materials and techniques and how the concerns of patients are driving the refinements to the implant techniques.

The first session, chaired by Dr Nana Wilson, was devoted to The Compromised Patient. First to speak was Prof Ashraf Ayoub, Head of the Biotechnology & Craniofacial Sciences Section of the Dental School and Director of Dental Research at the University of Glasgow. His presentation, The application of dental implants in compromised bone foundation, looked at bone grafting methods using both autologous and substitute materials. His presentation included very visual illustrations of some case examples of bone grafting and implant placement.

Bioglass

Prof Robert Hill was next to speak on Bone substitutes and their application to implant dentistry with a special emphasis on Bioactive Glass. Prof Hill, Chair of Physical Sciences in Relation to Dentistry at Barts and the London Medical School, discussed various bone substitute materials including phosphates, hydroxyapatites (natural and synthetic), biophysics and bioactive glasses. With autologous bone being the gold standard, substitute materials were rated by cost effectiveness, ease of use and similarity to own bone. He then looked in depth at Bioglass and the benefits and challenges created by it.

The session ended with a presentation from Prof Mark McGurk on The Rehabilitation of patients with oral cancer. Head of Department of oral & maxillofacial surgery at GKT Dental Institute, Prof McGurk discussed some of the complex issues surrounding the use of implants in people recovering from oral cancer. He emphasised the need to identify patients where rehab will make a difference and looked at modern trends in cancer therapy. He pointed out that surprisingly few patients are suited to implant therapy and looked at cases where it had been successful.

Albrektsson

Session two was chaired by Dr Edwin Scher and looked at Implant Surfaces and Biological Responses. Prof Tomas Albrektsson...
marginal bone loss. The main issues discussed were the implant physics and the nanoroughness of implants and the successful integration of bone and implant.

Next to present was Dr Lucy Di Silvio, senior lecturer at Kings College London. With her expertise lying in cell biology and cell material interaction, *The Biology of implant surfaces – new and improved*, Dr Di Silvio’s presentation took a close look at biocompatibility and the effects of surface modification. She also discussed stem cell technology, and its possible use in tissue regeneration.

The final session of the day looked at immediate loading and was chaired by Dr David Harris. The first speaker, Dr Marco Esposito (Senior lecturer in oral & maxillofacial surgery, Editor of the Cochrane Oral Health Group and Director of Postgraduate courses in Dental Implantology at The University of Manchester), discussed Immediate and early loading: the scientific evidence. He looked at the concepts behind evidence-based practice, randomised clinical trials and systematic reviews, leading up to a presentation of data from an updated Cochrane review.

It was then the turn of Dr Alon Preiskel (Clinical professor of dental surgery and emergency dental care, Involved with the Brånemark Dental Clinic in Gateshead, Sweden, Dr Friberg discussed Clinical Considerations and Current Concepts in Osseointegration. This presentation covered developments over the last 25 years in treatment techniques and oral implant components.

With sessions covering CAD/CAM Dentistry and Aesthetics, culminating in a post-symposium meeting with the developer of the NobelActive Implant, Dr Ophir Fromovich, the speakers included:
- Dr Andrew Dawood: CAD/CAM technology for the success of surgical and prosthetic reconstructions
- Prof Michael Fenlon: The rehabilitation of the compromised patient: The role of implant prosthetics
- Dr Tito Mankoo: Anterior implant aesthetics: The keys to success

This symposium was a very fascinating look into the past, present and future of osseointegration and implantology. May the next 50 years of osseointegration be just as interesting!