## Guest Editorial *Honoring a Pioneer*

*Prof Brånemark poses with the statue honoring his achievements. (Photo courtesy of Nobel Biocare.)*

He stands in the entrance of the Wallenberg Institution, near the laboratory where it all began half a century ago. The bronze statue of Prof Per-Ingvar Brånemark was donated by Nobel Biocare and unveiled last fall. It honors a man with an unusual pioneering spirit and outstanding life achievements. As a young researcher at Lund University—and later at the Department of Anatomy and Cell Biology at Göteborg University, Sweden—Brånemark accidentally discovered that the titanium microscope he used to study blood flow in a rabbit had become firmly attached to the bone. The bone cells had integrated with a foreign material (pure titanium) so strongly that the device could not be removed. It was permanently attached, one with the body. A remarkable discovery, considering the history of implant detachment, that is, that the body was known to reject nonbiologic materials.

Now, making such a discovery is remarkable indeed, but more important was how the new information came to be applied clinically. This is where the greatness of Brånemark became evident—he decided to attempt to use the knowledge to anchor teeth in the population he referred to as the "orally handicapped." He recognized the agony of edentulism and the poor treatment alternatives available for such patients. He knew, of course, that unused body tissue tends to diminish with time—in this case that oral bone resorbs because of lack of bone cell activity—in the end leaving many patients without the possibility of even wearing a denture. Brånemark therefore began the work of developing an implant that could be placed in the bone via gentle, careful surgery.

It was a long road to travel from discovery to clinical application. Was it at all feasible to repeat the accidental discovery in a controlled environment? If so, how should the implant be designed? How should the surgery be performed? How long should the healing period be? How should the mechanics of the prostheses be constructed? Brånemark focused on answering these questions, and eventually his efforts resulted in the Brånemark system. But when he presented his ideas to the dental community, he was met by skepticism and disbelief. His concept was even ridiculed and viewed as clinically unworkable. Brånemark realized that only carefully controlled clinical studies would prove that his system worked. He therefore initiated detailed studies of this kind. In addition, every treated patient was overall monitored for several years. Finally, in Toronto in 1982, the Brånemark system was fully introduced to the dental community, this time without any questions remaining. By now, Brånemark had clinical results of significant age. In the process, he had coined the term "osseointegration" to describe what his implant system was all about—mother nature at work. And at that point, even his wildest critics were quieted; they could no longer deny that his treatment approach was successful over time. He could in fact heal orally handicapped patients, providing them with completely restored function.

You all know the story from there. Dental implants became a billion-dollar industry. The procedure became fully accepted throughout the dental community, and no one any longer questions that osseointegration is fully achievable and lasts a lifetime. Researchers keep developing the ideas. Treatment times have been shortened, prostheses have been esthetically perfected, and new surgical approaches are continuously developed. Brånemark has continued to be one of the pioneering researchers in these enhancements, among other things expanding the clinical indications to include orthopedic devices and bone-anchored hearing aids. He has developed procedures for treating those with no bone in which to place implants. He has introduced "Same-Day Teeth" (Brånemark Novum), in which the entire procedure is completed in a single day. He is continuously finding new frontiers for his discovery.

For these efforts, Prof Brånemark has been duly recognized as an honorary doctor at countless universities around the world, and now also with a bronze statue near the birthplace of osseointegration—a constant reminder of one man's true dedication to enhancing the lives of his fellow beings.

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