

30 years of progress: Professor Daniel Buser

Implant Dentistry Today talks to **Daniel Buser** about how the techniques, concepts and understanding of implant dentistry have evolved over his career



You have been involved with dental implants for several decades – how has implant dentistry changed over that time?

I made the decision to follow an academic

Professor Daniel Buser is professor and chairman of the Department of Oral Surgery at the University of Bern in Switzerland. He has spent sabbaticals at Harvard University in Boston, at Baylor College of Dentistry in Dallas, and at the University of Melbourne. He has served as president of various academic associations including the European Association for Osseointegration (EAO) in 1996/97, the Swiss Society of Oral Implantology (SSOI) in 1999-2002, the Swiss Society of Oral Surgery and Stomatology (SSOS) in 2002-07. Most recently, he was president of the ITI (2009-13). His main research areas are in tissue regeneration around dental implants, surface technology and guided bone regeneration.

career after graduating, back in 1984 – that's 30 years, so I was lucky to be there at the beginning.

Not the absolute beginning, of course, but I was actually encouraged to stay in the field by Professor André Schroeder, who was another scientific pioneer, much like Brånemark. He told me that implants were the future of dentistry – that they would completely revolutionise how we practise – and he was right.

When I first got involved, most cases treated were mainly fully edentulous.

But in the mid 1980s, the focus started to turn towards partially edentulous patients: single tooth replacements, distal extensions situations, and extended edentulous spaces with multiple missing teeth.

In Switzerland at least, where prevention of caries and periodontal disease has come a long way, 95% of our patients are now partially

edentulous. The fully edentulous patient group is diminishing each year, so it's become a niche indication for implant dentistry – though of course, still very important.

But the number one indication for implant dentistry today, in Switzerland and many other countries, is the single tooth replacement.

That also shows a difference in the objective of implant therapy.

When we treat fully edentulous patients, the main objective is to improve masticatory function, by going from a full denture to an implant-supported full denture. When the mastic function is much better, quality of life also increases tremendously.

With a single tooth replacement, the goal of therapy is not to improve masticatory function, but to avoid the preparation of healthy teeth. This is a significant biologic advantage for the long-term prognosis of

neighbouring teeth.

That's a complete change from 1985 to 2015; today, the biologic objective dominates the field.

Something else to consider as a result of that is the timing: when is the best time to put the implant in?

Because we are seeing fewer edentulous patients, many of the cases today are post-extraction implant cases, and then timing becomes a crucial element for the treatment outcome.

Given that, how has the consensus regarding that timing changed over the years?

In the mid 80s, we were all taught that you had to wait six months after pulling the tooth to put the implant in. That meant implants were always placed in so-called healed sites, which, naturally, was not a very attractive option to patients.

Towards the end of the 80s, the concept of immediate placement came from the US, so the profession went from one extreme to the other, pulling teeth and immediately putting the implant in.

This wave of immediate placement cases culminated in a lot of aesthetic disasters in the late 90s – bad complications that were very painful for patients.

We realised then that immediate placement was tricky but we didn't know why. That's something we've learned in the past 10 years.

We have learned that significant ridge alterations take place after a tooth is extracted, and what drives this bone resorption. And we've learned that there is another option, between placing the implant immediately, or after six months. We actually helped develop the concept of early implant placement here at the University of Bern.

Nowadays the consensus is that all these different treatment options can be used depending on the clinical situation. But with all these options it can be very difficult to choose the right one, which underscores the importance of clinical experience.

You need to develop a gut feeling of when to do what, particularly when you want to treat patients in the aesthetic zone.

Do you also need to have the knowledge to be able to keep up with the evidence base?

Absolutely. The goal of treatment today, I think, is to provide long-term success. When we were treating patients 30 years ago, we had no idea how long these treatments would last. We said at the time: 'Let's hope these implants will be functional for the next five, or maybe even 10 years.'

But we have come so far since then – the biomedical industry produces much better products today. We have good implants, good grafting materials. Some products come with very good clinical evidence as well.

So when you apply these products with well-documented protocols, you can achieve very predictable treatment outcomes.

At the University of Bern, we have studies that tell us the early failure rate during healing is about 0.7% – it's impossible to hit 0% because we are treating Mother Nature, and not every healing reaction can be predicted. But we can tell patients that implants are a very predictable treatment.

The current implants and biomaterials only have 10-year studies though, because the treatment protocols from the mid 80s are outdated – the current techniques only go back so far, because things keep moving on. There simply aren't 30-year studies available.

Are techniques going to keep evolving at that rate in the future?

I don't think they are going to change so dramatically. I've been

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involved with research for the last 30 years, and I think the biggest developments were made in the 80s and 90s, and perhaps the early 2000s.

There is still progress; of course there is. But we're taking much smaller steps now, rather than the giant strides we made when dental implants were in their infancy.

Lots of these steps are coming in the field of biomaterials. I don't think we can achieve better long-term results – but it would be great to have less invasiveness, or shorter healing periods.

These are steps we can still achieve: there are small niches where changes can be made.

Take short implants, for example. When I started, Brånemark always said implants should be as long as possible. The longest Brånemark implant was 18mm, though here and in the International Team for Implantology (ITI) most people generally used implants between 8mm and 12mm.

But then the first 6mm implants came to the market, and now even 4mm implants are available. That doesn't mean we only use 4mm implants now but there are cases when they are appropriate – where there isn't much bone height, or where there is a nerve to avoid. It's progress, but perhaps only for 1% of patients. That's what I mean when I say there are small niches of application for growth.

So what is the next big challenge for the field of implant dentistry?

The challenge is no longer in the research; it's in the education.

There are well-documented procedures that are being safely applied for millions of patients. But for that to continue you need thousands of dentists, and you need them to be educated.

I know that in the UK there is a very good education system, and that there are a number of two-, three- or four-year courses available. A two-day programme offered by a company isn't education; it's product training.

If we have an expansion of implant patients without the numbers of dentists getting relevant training also expanding, then we will see a big increase in failures and disaster cases.

There was a big case in Japan a few years ago that made it into the media, and after that, the press would only report on implant failures or poor results, and the implant market there dropped 30% as a result.

It's a deadly risk for all of us. We're all in the same boat, so when there are people not working to the proper standards, these black sheep are dangerous for patients as well as the

market, and the field of implants in general. They can give the whole treatment modality a bad reputation, and it's really important that we all realise how crucial a serious approach to implants is. It's the biggest challenge we have right now.

With that in mind, what advice would you give to dentists looking to enter the field?

During undergraduate education, dentists get exposed to a lot of theoretical points of view. I teach undergraduates and postgraduates, and I tell them all that they need to find out whether they have the passion of the surgical procedures as well.



At the moment the biggest thing in implant dentistry, as it is in prosthodontics, is the growth of digital technology in the field

If you do have that passion then a post grad education in the field is essential. That can be in oral surgery, it can be in a periodontal programme – some courses are even implant programmes, which are often actually surgical and prosthetic programmes stuck together.

Then you have to make sure you're producing quality work, start to treat a few patients, and build up your experience. You will see your practice grow every year because word of mouth is the best marketing tool you can have.

I'm proof – I have had a knee problem for several years, and when I came to do something about it, I asked around to find out who the best expert in Bern was. I talked to everyone to find out who I should go and see – and I wasn't disappointed.

Where is the most interesting progress being made right now?

I don't think it's in the surgical field – the biggest problems there have already been tackled, with implant surface technology, grafting procedures, and so on.

At the moment the biggest thing in implant dentistry, as it is in prosthodontics, is the growth of digital technology in the field.

I think we all know it's going to completely change the field, but we don't know yet just how much and how fast.

Right now, most people are still using conventional impression techniques, but lots are planning on making the change in the next five years. When more people are taking digital

impressions and doing the planning on a computer, how will that influence the surgery?

It will definitely influence the restorative side, however. I would say that 80% of that progress is going to be made on the prosthetic side of things.

In five or 10 years' time, I think the whole field is going to look completely different.

Something else to consider is how this technology might impact on the expensiveness of these treatments.

There is a chance – and I hope it will come about – that it will bring costs down and make treatment more affordable, particularly on the prosthetics and technical side of things.

Perhaps not so much with the surgical side of things, however!

What have the biggest advances in implant dentistry over the last 30 years been, in your opinion?

While digital dentistry is the most striking field of research on the prosthetic side, I think there are others that have affected the surgical side more.

The major step forward in dental implants has been the development of microrough implant surfaces – improving implant surfaces has given us much more predictability, long-term stability, and much shorter healing periods.

The second field – also surgical – is absolutely the development of bone grafting procedures; the guided bone regeneration (GBR) and sinus floor elevation (SFE) techniques. These are very important in partially edentulous patients for overcoming local bone deficiencies and allowing implant placement in sites with local bone deficiencies.

Both of these developments were big drivers in expanding the numbers of potential implant patients, but remember that they happened more than 20 years ago.

Digital technology is going to be the third big revolution in implant dentistry.

Part of that is the growth of cone beam technology. The cone beam CT (CBCT) is much more precise, which means better image quality and less radiation exposure for the patient. **IDT**