Faculty of Dentistry, Oral & Craniofacial Sciences:
Case study from Professor Nigel Pitts, Academic Lead for Impact

A partnership to find a new way of detecting tooth decay

In the world of impact, we tend to think on a big scale. News stories and articles often focus on our ambition to make a difference, or how we've made the world a better place. But behind all that, there's the hard work of dedicated PhD students, Post-docs, industry scientists and collaborators making these amazing things happen.

We rarely hear about the way projects come about or the process they've gone through. So I'd like to share the story of a project I'm involved in. The story is typical of many of our successes. It has a grand ambition, and I'm proud to say we're well on the way to achieving our goal, although it's a long journey.

The challenge of identifying caries early and safely

Managing tooth decay isn't just about filling cavities. We now need the technology to be able to detect the early stages of decay and monitor the caries process, ideally showing how we are controlling the problem and even reversing lesions.

At the moment, the standard process for monitoring uses X-rays. There's no doubt the technology has revolutionised dentistry over 100 years, but nowadays, we have to ask, at what cost?

Ionising radiation has the potential to cause damage. Thankfully patients are exposed to very small amounts, but the large numbers of scans taken mean that over time it can build up to have a big impact on people and the environment. X-rays are always about a trade-off between the benefit to a patient and the potential harm to the patient, the dental team and society.

But what if there were a way to detect caries early, in 3 Dimensions and with absolutely no side effects? A process like that could be used regularly without risking the health of individuals or society – patients could come back frequently as they and their dentist felt was needed.

Identifying caries lesions early and treating them preventively is a valuable goal, and something I'm passionate about finding a solution for.

How it all started

I've known Professor John Girkin from Durham University for a considerable number of years. Although we are in disparate fields, from time to time we went to the same research meetings and symposia and always found time to talk – me about what the dental patients and the dental industry needed, John about what was possible with the current science from bio-medical photonics.

It was a logical next step to turn these informal discussions into a productive partnership to work with colleagues to turn our ideas into a reality.

John is now the Director at Durham's Centre for Advanced Instrumentation, and an expert in photonics. Here at King's we have significant expertise in research, education and practice around dental caries. By

combining our efforts we've been able to come up with an innovative, yet practical, solution to the unmet problem of the safe early detection and monitoring of caries.

What we've done

Using shifting patterns of near infrared light, we've been able create a 3D map of tooth decay which can be used to assess caries over time. The light-sources aren't high-powered, they're of the same type as are used in digital projectors. Being completely non-invasive and harmless, this solution provides an ideal alternative to an X-ray and should be able to also provide more useful information.

Developing the light source delivery method was only one part of the project. Our researchers have also devised clever fibre optic bundles to transmit the information, and powerful software to interpret and display the results. Then came the legal bits – securing the intellectual property and patents along the way.

The future of the project

The prototypes have been a success. We're now in the early stages of commercialising our technology as a product.

We've formed a spin out company, NirVisio, with Durham and King's being formal partners. We seek, again in partnership, to make the technology economically viable in a commercial setting so that the benefits can be made available to dentists and their patients worldwide.

We're therefore raising the finance to take this product to market. Considering the need for a technology like this, I think it will be a great investment for our investors and for eventual commercial partners.

Replicating our success in other projects

A successful partnership is one formed out of mutual respect. In this project, the expertise at King's and Durham has complemented each other perfectly. And we have the history of long-term collaboration to make sure it continues to work as we bring in more collaborators to expand the project.

That friendly relationship and supportive network is vital. Students at King's can and are tapping into our Entrepreneurship and Commercialisation Institutes as great ways to get help with an idea. I always look forward to hearing about their latest projects – not just the later stage successes, but the inspiring stories of hard work making progress behind the scenes too.

For more information on the Faculty of Dentistry, Oral & Craniofacial Sciences or to republish this blog please contact Laura Shepherd, Communications at the Faculty on laura.2.shepherd@kcl.ac.uk