

Faculty of Dentistry, Oral & Craniofacial Sciences Blog:  
Professor Gordon Proctor, Head of the Centre for Host-Microbiome Interactions

### **The Perfect Match: Microbiology and Big Data**

All too often in scientific research the different disciplines operate in silos. Collaborations can be difficult to organise and maintain. But when they're done correctly, incredible things can be achieved.

The Centre for Host-Microbiome Interactions is proof of that. Within this research centre there are researchers from different disciplines conducting projects examining the relationships between humans and microorganisms in health and disease.

One very exciting project that's going to have a significant impact, marries microbiology with big data, involving data scientists working closely with microbiologists. It's a catalogue of all the microorganisms that are present in the mouth, as well as of all the genes that they express.

Why is this important? Because understanding how microorganisms interact to cause disease, and in some cases how they can alter the microbiome of the mouth, is the first step towards intervening and preventing these diseases. It is also essential for developing new treatments.

This new catalogue is all about knowledge sharing. There are hundreds of microorganisms present in the mouth. To understand how each of these is behaving you need to carry out a huge volume of DNA sequencing. This produces data about each microorganism, which can then be analysed.

All of this data will be included. Researchers from all over the world will be able to compare their data to what's in the catalogue and gain new insights into their findings. Professor Gordon Proctor, who heads up the Centre for Host-Microbiome Interactions, explains why this is such an important area of work.

*"Once this is in place, it'll be the most extensive catalogue of its type that has been produced to date. It will become a reference for virtually everyone else who works in the field," he enthuses. "There is something already in place, but this project will bring about real change because it contains so much more information."*

### **Global partnerships**

The researchers at King's are working closely with Institut National de la Recherche Agronomique (INRA), a French public research institute based near Paris. It's an example of scientific collaboration across geographical borders as well as disciplines.

One of the things that's made this cataloguing project possible is the decision within the centre to create data science roles and look for individuals with those skills.

*It's a decision that's created a unique environment at King's. "There's no other dental faculty that has a combination of microbiologists and data scientists who can actually investigate the microbiome," Professor Proctor says.*

*"To understand the microbiome, all the microorganisms and what they're doing, you need to be able to do huge amounts of sequencing of the DNA of those organisms. Then you need to be able to analyse that data to make sense of it and identify which organisms are doing what," he explains.*

This is where the data scientists come into their own. Their data analysis allows the microbiologists to refine their research and in some cases will identify new patterns that are worth investigating.

Once this catalogue of the microorganisms of the mouth is published, it will become a unique feature for the Faculty of Dentistry, Oral & Craniofacial Sciences.

Professor Proctor is expecting the dataset to be hosted at King's. It will be freely available to researchers from other organisations and universities, but they will have to come to London to access it.

This will put the Faculty at the forefront of global research into the microbiology of the mouth. World-leading academics and researchers are expected to come to the university to make use of this unique and comprehensive catalogue. Attracting them to King's could also lead to new research collaborations.

For those conducting research into the microbiome of the mouth, it will be a valuable resource. *"Researchers can compare their data to the data that exists in the catalogue. By doing so they'll be able to understand aspects of their data in a new light. These insights wouldn't be possible without the comparison to the data in the catalogue," he says.*

This important piece of work is due to be submitted for publication in 2019. When it's released, it's likely to make waves in the field of mouth microbiology.

*For more information on the Centre for Host Microbiome Interactions or to republish this blog please contact Laura Shepherd, Communications at the Faculty of Dentistry, Oral & Craniofacial Sciences on [laura.2.shepherd@kcl.ac.uk](mailto:laura.2.shepherd@kcl.ac.uk)*