

SPECIAL FEATURE

Why periodontitis may be the missing link in understanding the severity of SARS-CoV-2

By Caroline Holland, freelance journalist, London, UK



Dr Graham Lloyd-Jones

Society has moved on rapidly since we were all confined to our homes during lockdowns, waiting to resume dental treatments while worrying about vulnerable friends or relatives and hoping for effective vaccination to end it all. But there are still important lessons to learn, according to Dr Graham Lloyd-Jones, Consultant Radiologist, who has investigated the development of the lung disease in COVID-19 and attempted to answer why some people are so much more badly affected than others.

Early in the pandemic, he began to study how SARS-CoV-2 damages the lungs and saw that the airways of affected patients were not inflamed, as they would be in conventional respiratory viral pneumonia, such as influenza. Instead, he saw a pattern of lung damage which would be expected in the context of blood clots forming in the small blood vessels at the edges of the lungs. He says the term ‘pulmonary vasculopathy’ (disease of the lung blood vessels) is a better description than ‘respiratory pneumonia’. He then hypothesised that SARS-CoV-2 could be passing into the lungs via an oral-vascular-pulmonary route – from the viral reservoir of the mouth, passing across damaged gums, into the blood and directly

to the lung blood vessels. Outstandingly, Dr Lloyd-Jones was the first to question whether poor oral health could be instrumental to the development of severe COVID-19 via this anatomical pathway.

After teaming up with Iain Chapple, Professor of Periodontology and Consultant in Restorative Dentistry, with whom he published his hypothesis and with whom he now regularly collaborates, Dr Lloyd-Jones began to champion an oral health quality improvement project in his hospital, Salisbury, to offer advice on best oral care for those with acute COVID-19.

It is no coincidence, in his view, that severe COVID-19 shares the same risk factors as periodontal disease, such as patient age, sex, diabetes, heart disease, obesity, kidney disease, ethnicity and even blood group. ‘Understanding how poor oral health is mechanistically related to development of the lung disease in COVID-19,’ he says, ‘could help us

encourage oral care for improving your smile or maintaining teeth for chewing later in life. Their advice on prevention could be elaborated on, especially in view of the wealth of evidence that now exists that poor oral health is clearly implicated mechanistically in the development of important systemic diseases, including type 2 diabetes, cardiovascular disease, Alzheimer’s disease, and rheumatoid arthritis. And I believe the list could be much longer – poor oral health is potentially implicated in the development of many diseases, including many we currently consider of unknown origin.’

A tweet from Dr Lloyd-Jones in November 2022 challenged his medical colleagues to participate in a poll to determine how much time they spent studying the mouth.

‘Time for honesty #Medtwitter, how much time did you spend during your degree learning about oral health?’ He

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understand the connections between poor oral health and many other diseases of the body.’

Dentists undertake much more study of systemic diseases during their training than doctors do of dentistry. Unfortunately, this does not translate into a greater focus on whole body health among dentists. ‘My dentist has never told me I should look after my mouth to benefit my long-term overall body health,’ says Dr Lloyd-Jones. ‘In my experience, dentists tend only to

found that 92% of respondents spent less than a day’s training on dentistry and oral health throughout all their years of medical training. It did not surprise him. He vividly recalls the dissection classes he attended as a medical student. Close attention was dedicated to the brain, neck, chest, abdomen, and limbs, while the mouth was left pristine and untouched.

It was an interest in human anatomy which originally inspired Dr Lloyd-Jones to train as a doctor. He had an

« unusual passage into medicine, his first degree having been in graphic design. He recalls the day he picked up a copy of *Gray's Anatomy* and was inspired to change career. This involved going back to evening college to add science A-levels before applying to St Mary's, Imperial College, to study medicine. 'During my medical degree, I recall wondering several times when we were going to learn about dentistry and the mouth. Traditional medical education teaches us that the mouth is not important, and that poor oral health is merely coincidental to poor general health. This is evidently not the case.'

Radiology was the obvious specialism for him because it requires a detailed knowledge of anatomy. As part of his medical elective, he studied radiology educational websites. Later he wondered if he could use his design skills to improve on the resources already available. He decided to try and, having taught himself web coding, in 2007 he founded Radiology Masterclass¹ which has become a leading online resource in medical imaging education, visited by millions of medical students and healthcare professionals globally.

'I feel I have come full circle, combining my training in design, my interest in education and my expertise in radiology.'

His role as a medical imaging educator and his drive to understand the mechanisms of disease means he is constantly looking for answers, as if his students are sitting on his shoulder asking: why does COVID-19 cause this distinct pattern of disease?

In February 2021, he first published his hypothesis about the potential for passage of SARS-CoV-2 from the mouth to the lungs via the blood on Radiology Masterclass. This hypothesis was further developed in collaboration with Professor Chapple and formally published in the *Journal of Oral Medicine and Dental Research*.²

In his work as a radiologist, he routinely works in a collaborative way, consulting with specialists from multiple disciplines to assist with diagnosis and treatment planning for patients with a wide range of conditions. He experiences a sense of frustration that information about the conditions of the mouth is separate from a holistic anatomical view of the body. 'It is strange that I can view the previous X-rays and scans of any part of a patient's body, but I do not have access to their dental X-rays. It as if the mouth has been amputated from the body. The disciplines of dentistry and medicine have been historically divorced from one another, both in terms of training and healthcare provision. This has to change if we are to further our understanding of the connections that clearly exist between poor oral health and development of systemic diseases.'

His work on COVID-19 inspired his hospital, Salisbury, to introduce guidance relating to mouthcare specifically for patients with acute COVID-19. Dr Lloyd-Jones is also leading a hospital-wide quality improvement project to improve mouthcare for all patients.

'To this day,' he says, 'poor oral health and the oral systemic link are

overlooked as potential mechanisms in the development of multiple systemic diseases. Important messages need to be learned by medical students, doctors of all specialities, health policy makers, and by those determining public health messages or patient-facing medical communications. We need to learn that gum disease and oral dysbiosis are killing us.'

Dr Lloyd-Jones calls for medical researchers to ensure that poor oral health becomes a consideration in understanding the development of systemic diseases and encourages doctors to seek education from experts in oral medicine.

He has called for collaboration at the highest level to gain an interdisciplinary understanding of how diseases develop, especially new diseases like COVID-19.

'Nowhere in the world is there a formal organisation or a system for building an understanding of new diseases. This is something the whole of humanity is lacking. It is massively frustrating as it means that important messages are hidden in siloes of medical research and have been ignored by many investigating COVID-19. The most disconnected branch of medicine is dentistry, and, in my view, the mouth is where many of the answers about COVID-19 are to be found.' ■

References

1. Radiology Masterclass. COVID-19 discussion pages: COVID-19 resources page. Available at: <https://www.radiologymasterclass.co.uk/tutorials/covid-19/covid-19-resources> (accessed January 2023).
2. Lloyd-Jones G, Molayem S, Pontes C C, Chapple I. The COVID-19 Pathway: A proposed oral-vascular-pulmonary route of SARS-CoV-2 infection and the importance of oral healthcare measures. *J Oral Med Dent Res* 2021; 2: 1–25



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