Mesoscopic imaging of paediatric palatine tonsil infection

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Recurring paediatric tonsilitis is one of the most common problems presented to GPs in the UK, with an annual reported incidence of 37 per 1000 population [1]. Recurring tonsillitis has detrimental effects on children's quality of life. Often, antibiotic treatment of the infection does not suffice and if a patient has seven or more cases of tonsillitis per year the complete removal of the tonsils is recommended [2]. Studies of tonsillitis infections have been performed previously by Chloe and Faddis, showing the presence of gram-positive and gram-negative bacteria within the tonsil crypts, presenting the ultrastructural appearance of a biofilm matrix [3]. We report the first demonstration of mesoscopic imaging of bacterial infection of the palatine tonsil using the Mesolens. The Mesolens, developed at the University of Strathclyde, offers the unique combination of a low magnification (4x) and high numerical aperture (0.47) lens which has an imaging area of 6 mm x 6 mm. The Mesolens can resolve features as small as 700nm laterally and 7um axially [4], this field of view means that the probability of detecting a few bacteria in the specimen is high. Samples were collected via a swab from the surface of unfixed palatine tonsil tissue acquired via tonsillectomy at the NHS Royal Hospital for Children, Glasgow, which had been transported and stored in PBS for 2 hours before processing. Specimens were prepared using a standard Gram stain protocol. Figure 1 shows a colour brightfield Mesolens image a swab from the tonsil surface. Using the Mesolens to study infection offers an advantage over conventional objective lenses. The large field of view and sub-cellular resolution throughout unlocks the possibility to understand the prevalence of bacteria in larger specimens than can normally be studied with a light microscope, and any infection has a greater chance of being detected.

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