

# A NEW FLEXIBLE CONFOCAL MICRO-ENDOSCOPIC TECHNOLOGY FOR *IN VIVO* DIAGNOSIS OF SOFT AND HARD TISSUE INTRA-ORAL LESIONS.

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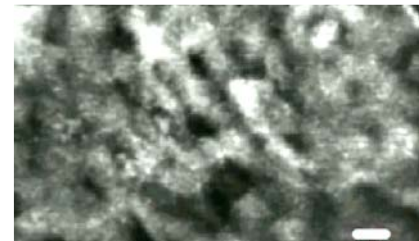
## 1. INTRODUCTION.

Confocal fluorescence micro-endoscopy imaging systems, based on vital staining, are being developed to provide non-invasive immediate *in vivo* soft and hard tissue diagnoses, accelerating and improving patient treatment [1]. Likewise, autofluorescence of decayed dentine may have a clinical diagnostic role, beyond its already well established use in laboratory assessment of caries removal techniques [2].

## 2. MATERIALS & METHODS.

Using topical fluorescein (0.5%) as a vital stain, oral soft tissues were examined *in vivo* in volunteers, to cellular resolution limits (5 $\mu$ m X-Y, 15 $\mu$ m Z), using the 650 $\mu$ m diameter contact "Surface" probe of a flexible fibre optic confocal micro-endoscope (F400 prototype, Mauna Kea Technologies, Paris). Soft tissue imaging was obtained from the lip, within parotid salivary ducts and gingival margin epithelia; all inaccessible to conventional instruments.

Decayed dentine autofluorescence [2] was examined in *ex vivo* tooth samples using the same system, applied directly to carious lesions. The process was similar to the clinical interrogation of remaining dentine by tactile sensation via a dental probe, during decay excavation procedures. Conventional microscopy images were obtained for comparison in all imaging scenarios



**Fig.1.** Real- time image of oral mucosa. 30 $\mu$ m bar.

## 3. RESULTS & DISCUSSION.

The instrument allowed direct cellular level resolution imaging from otherwise inaccessible mucosal surfaces within living volunteers, without prior biopsy. Tissue architectures were seen (Fig.1), and were congruent with Hopkins rod micro-endoscopic [1] and conventional confocal instrument (Yokagawa, Perkin Elmer, UK) images. More targeted vital fluorochromes will clearly facilitate *in situ* high resolution confocal soft tissue diagnostics, from previously inaccessible tissues e.g. intra-glandular structures. Decayed tooth interfaces and lesion margins were also clearly identified and demarcated using autofluorescence [2]. The potential diagnostic applications of such an instrument to dental hard tissues, used in a similar fashion to a dental probe, were similarly highlighted.

[1] Watson T, Neil M, Juskaitis R, Cook R, Wilson T, (2002) Video rate confocal Endoscopy *J. Microsc.* **207** 37 – 42 ,

[2] Banerjee A, Kidd EAM, Watson TF. (2003) In-vitro validation of carious dentin removed using different excavation criteria. *Am J Dent* **16** 228-230.