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**Oral cancer**  
**Breath of death**

Sir, yet another patient presented late to our outpatient service with a large oral growth. Questioning confirmed early self-detection several months previously. Late diagnosis of malignancies in developing nations is due to limited access in rural areas to biopsy services. Anecdotal discussion with colleagues confirms a ‘breath of death’, a peculiarly pungent halitosis noted in the breath of oral malignancy patients. Our hypothesis is that the genetic makeup of tumours and their distorted molecular pathways lead to synthesis of unique proteins that generate ‘signature odours’. If this were true, a paradigm shift in early detection of malignancies might rely not on visual detection but on analysis of patients’ volatile molecular samples. The keen sense of smell of dogs is already used for detection of narcotics and explosives; pattern analysis to detect malignancies in this manner has been demonstrated.<sup>1</sup>

Reverse engineering of biological olfactory mechanisms and pathways may improve

electronic olfaction to enable reliable diagnostics.<sup>2</sup> It is not impossible to imagine a future where a compact, affordable electronic olfaction module plugs into a clinician’s smartphone enabling odour analysis even at locations remote from healthcare facilities (Fig. 2). Algorithms comparing detected molecules with online databases of ‘olfactory signatures’ would suggest a mathematical probability of oral malignancy. Animals’ reliance on olfaction to detect prey, predators and mates hints at the potential sensitivity and specificity of electronic olfaction.

The non-invasive quality of odour analysis promises speed, painlessness and affordability. Apart from malignancies, odour analysis might help to detect even metabolic disorders in the doctor’s office. Even while writing this letter, news has emerged that malaria could be diagnosed by a breath test. We anticipate this to be a future path of research in computational biology. Odours have never been more exciting for life sciences; clinicians of yore would be surprised and pleased at such emerging new diagnostic tools.<sup>3</sup>

*N. Uppal, P. Singh, India*

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**Khat and cancer**

Sir, we read the letter *Oral health: The destructive effects of khat* by Dr Marway.<sup>1</sup>

Dr Marway has observed destructive effects of khat on oral health in habitual khat chewers but it can be attributed to consumption of high sugar drinks and sugar tablets to counteract the bitter taste. It was observed by W. Luqman and T. S. Danowski that dental cavities are rare in Yemen when khat chewing people are not consuming sugar sweetened beverages.<sup>2</sup> There is a correlation between habitual khat chewing and oral cancer.<sup>3</sup> Oesophageal and gastric carcinoma have been observed in khat chewers in both men and women in Yemen.<sup>4</sup> There is evidence connecting khat chewing to genetic damage of the oral mucosa and cancer.<sup>5</sup>

*Mahantayya V. Math,  
Yashoda R. Kattimani, India*

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**Dental education**  
**Mobilising resources**

Sir, I refer to the letter published in June<sup>1</sup> and the proceedings of the lower house of Indian Parliament on 19 July 2016 regarding the issue of unemployment among Indian dental graduates.

On 19 July 2016 Dr Retna De Nag, a member of the Indian Parliament (MP), a doctor by profession, raised the issue of acute unemployment among new Indian dentists in a speech in the lower house.<sup>2</sup> She spoke of the 309 dental colleges in India that produce about 36,000 dental graduates every year compared to 8,000 in 1970, pointing out that the real issue is due to this mushrooming of dental colleges about which the Dental Council of India (DCI) had done nothing. She accused the DCI of failing miserably in performing its primary function and said that the regulator should have acted in time to adjust the availability of dentists dependent on demand.

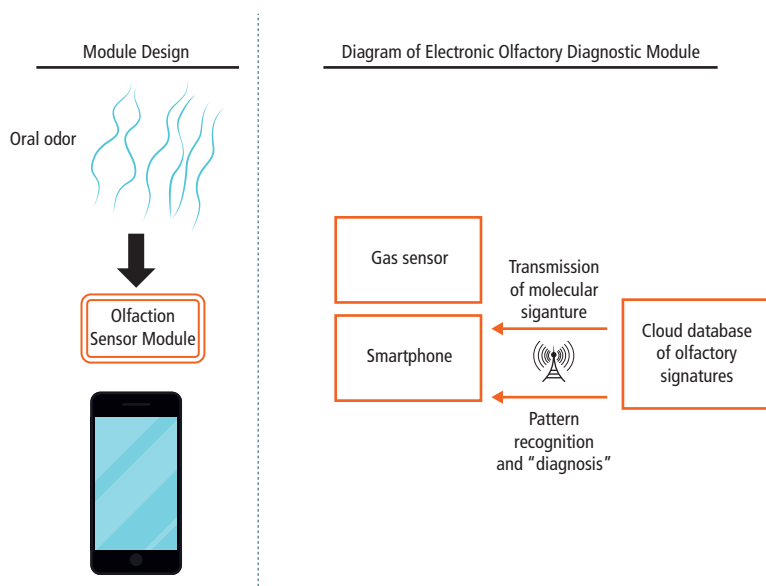


Fig. 2 Diagram of electronic olfactory diagnostic module

Now that the issue has reached parliament, the dental organisations and the professional community in India should use this as an opportunity and should mobilise all their resources to address it. The community should press for the creation of more job opportunities in the government sector, especially in rural areas, which can be done easily by starting dental units in the existing primary health centres. The Indian dentist community should also raise their voice for a moratorium against further opening of dental schools and places for undergraduate dental education.

*Haeigin Tom Varghese, Kottayam*

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## Dental research

### Quality of life

Sir, I enjoyed reading Stephen Hancocks' editorial *Asking the right questions* (2016;

2016; 221: 47), where he highlights a paper published in the *Journal of Dentistry*<sup>1</sup> showing that the majority of research has focused on technical aspects of dentistry. He then comments on the fact that 'quality of life' was rarely considered. In the context of societal change, including disease trends, he asks the question should we think differently about the research commissioned and undertaken?

As a retired clinician and visiting Professor of Community General Dental Practice I could not agree more with his sentiment. As far back as 1996 I and a colleague published a paper in *Primary Dental Care*<sup>2</sup> describing a cross sectional study utilising an oral health quality of life (OHQoL) measure to establish a general dental practice profile of OHQoL within my own dental practice. To this day the value of measuring OHQoL has not been truly recognised and integrated into general dental practice systems. The objective measurement of subjective OHQoL could be an invaluable tool to be established in general dental practice. It is my view that research should be undertaken to facilitate and

integrate OHQoL measurement into general dental practice.

What is important to patients are the three Ds – discomfort, disability and discontent. An OHQoL measure could establish this on a national and practice basis, from this one could establish benchmarks for practice. We would then not rely on experts to judge outcomes of clinical decision making but rather observe objective outcome profiles, which would be much more evidence based.

To quote Stephen Hancocks: 'If we are going to continue to provide good patient care we need to start asking more of the right questions', clearly research is needed into the 'fluffier side of patient care' to answer important questions regarding the use of OHQoL measures in general dental practice. In my view this is long overdue.

*W. Richards, by email*

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