Little evidence for the effectiveness of chemiluminescence and autofluorescent imaging devices as oral cancer screening adjuncts

Question: Do chemiluminescence and autofluorescent imaging devices aid the detection of oral squamous cell carcinoma (OSCC) and oral potentially malignant disorders (OPMD)?

Data sources   Medline/PubMed

Study selection   Primary studies where an optical device was used for investigation, screening or as a diagnostic tool for OSCC or OPMD were considered.

Data extraction and synthesis   Data were abstracted by two reviewers independently and the biological plausibility, technical feasibility and diagnostic performance assessed.

Results   Twenty-five studies were included, 13 involving the use of chemiluminescence and 12 using autofluorescence with some using both. Chemiluminescence showed sensitivity at detecting any OPMDs and oral cancer, but preferentially detects leukoplakia and may fail to spot red patches. The additive use of toluidine blue may improve specificity. Tissue autofluorescence is sensitive at detecting white, red and white and red patches, and the area of fluorescence visualisation loss often extends beyond the clinically visible lesion. However, in addition to OPMDs, it may detect erythematous lesions of benign inflammation resulting in false-positive test results.

Conclusions   In agreement with previous reviews, there is inadequate evidence to draw valid conclusions on the effectiveness of chemiluminescence and autofluorescent imaging devices as screening adjuncts. There is limited evidence for their use in primary care, and these tools are better suited to specialist clinics in which there is a higher prevalence of disease and where experienced clinicians may better discriminate between benign and malignant lesions.

Commentary

This systematic review was designed to evaluate the effectiveness of chemiluminescence and autofluorescence devices as adjuncts in the detection of oral cancer and potentially malignant disorders.

The review addresses a very time-sensitive topic because of many reasons but especially since visual examination, although the accepted practice for oral cancer screening, may have limitations in a changing landscape of healthcare providers.

The authors searched two databases, did some handsearching and searched some 'relevant' online sources. They included only English original studies with no restriction on date of publication. The two authors independently extracted the data, and discrepancies were resolved over discussion. It is not clear if the same criterion was used for inclusion or exclusion.

Studies using an optical device for screening or as a diagnostic tool for assessing the risk of a lesion were included if they reported frequency of positive or negative results.

To assess risk of bias the authors attempted to use a standardised tool for quality assessment of observational studies but did not succeed. There is no information if a manufacturer sponsored any of the studies.

The authors followed the paradigm to assess medical technology proposed by Littenberg, by evaluating biological plausibility, technical feasibility, impact on the disease process and individual and social outcomes for the two included technologies: ViziLite® and VELscope™.

Thirteen studies using ViziLite® and twelve using VELscope™ were summarised on a table using sensitivity as the common outcome. The included studies were very different from each other.

Reported sensitivity for ViziLite® and ViziLite® Plus, with the addition of toluidine blue for detecting oral cancer and potentially malignant lesions ranged from 0 to 100% while the specificity ranged from 0 to 77%. Half of the included studies did not report biopsy results.

The reported sensitivity for VELscope™ ranged from 30 to 100%.

Because of the specific characteristics of the individuals included in the studies and the degree of expertise of the clinicians these findings cannot be generalised to the general population and do not apply to community settings.

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