A comparison of autofluorescence bronchoscopy and white light bronchoscopy in detection of lung cancer and preneoplastic lesions: a meta-analysis

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CRD summary
This review found that autofluorescence bronchoscopy was superior to conventional white light bronchoscopy for detecting lung cancer. This was generally a well conducted review but the possibility of missing studies, lack of details on included studies and remaining heterogeneity across studies mean that these conclusions should be interpreted with caution.

Authors' objectives
To assess the diagnostic efficiency of autofluorescence bronchoscopy compared with white light bronchoscopy for the detection of lung cancer and preneoplastic lesions.

Searching
MEDLINE and EMBASE were searched to June 2009. Search terms were reported. Reference lists of retrieved studies were screened for additional articles. The review was restricted to published studies in English.

Study selection
Eligible studies assessed an autofluorescence bronchoscopy system (index test) compared with a white light bronchoscopy system (comparator test) against histological result (reference standard) for the diagnosis of lung cancer and preneoplastic lesions (target condition). Patients had clinically or roentgenly suspected lung cancer or had atypical cells in their sputum. Studies had to report sufficient data to construct a 2x2 table of test performance and the definition of a positive reference standard result had to include "moderate dysplasia or worse" or "mild dysplasia or worse".

Mean age, where reported, ranged from 60 to 69 years. The autofluorescence bronchoscopy system used was the PDS-2000, AFI, SAFE3000, SAFE1000, LIFE or D-light.

The authors did not state how studies were selected for inclusion.

Assessment of study quality
Two reviewers independently assessed study quality using the 14-item QUADAS tool.

Data extraction
Data were extracted to populate 2x2 tables of test performance for autofluorescence bronchoscopy and white light bronchoscopy. These data were used to calculate sensitivity and specificity with 95% confidence intervals (CIs). Data were extracted with biopsy as the unit of analysis.

Two reviewers independently extracted data; disagreements were resolved through discussion or referral to a third reviewer, where necessary.

Methods of synthesis
Summary estimates of sensitivity and specificity with 95% confidence intervals were calculated using the bivariate random-effects model. Heterogeneity was assessed using I² and investigated by extending the bivariate model to include the following covariates: whether laser was employed as excitation light source, whether control biopsy was performed and threshold used to define a positive reference standard result. Other measures of accuracy were also reported and calculated in the paper.

Results of the review
Fourteen studies reported fifteen sets of data (1,358 patients, 3,612 biopsied samples) were included in the review. All studies were prospective, patient enrolment and index test and reference standard methodologies were poorly reported.
Sensitivity of autofluorescence bronchoscopy ranged from 67% to 100% with a summary estimate of 90% (95% CI 84 to 93; I²=83%). Specificity ranged from 25% to 84% with a summary estimate of 56% (95% CI 45 to 66; I²=96%). For white light bronchoscopy, the sensitivity ranged from 28% to 76% with a summary estimate of 66% (95% CI 58 to 73) and specificity ranged from 33% to 94% with a summary estimate of 69% (95% CI 57 to 79). None of the variables investigated in the meta-regression analysis showed a significant association with sensitivity or specificity.

Authors' conclusions
autofluorescence bronchoscopy was superior to conventional white light bronchoscopy in detecting lung cancer and preneoplastic lesions.

CRD commentary
The review addressed a focused question supported by clearly defined inclusion criteria. The literature search was limited to two electronic databases which were searched to June 2009; the search was one year out of date when the paper was submitted. The review was restricted to studies published in English and so there was a possibility of language and publication bias. Appropriate steps were taken to minimise bias and errors when extracting data and assessing study quality but it was unclear whether such steps were also taken when selecting studies.

Study quality was assessed using appropriate criteria but the results of the assessment were not reported in detail. Details on included studies were limited making it difficult to determine the generalisability of the review findings. Statistically robust models were used to pool data and heterogeneity was assessed and investigated. The authors' conclusions were supported by the results of the review but should be interpreted with caution due to the possibility of missing studies, lack of details on the results of the quality assessment, and remaining heterogeneity across studies.

Implications of the review for practice and research
Practice: The authors stated that the combined application of autofluorescence bronchoscopy and white light bronchoscopy was recommended.

Research: The authors stated that carefully designed studies using strict bronchospasm criteria, with special focus on the combined utility of autofluorescence bronchoscopy and white light bronchoscopy in detection of preinvasive lesions were needed.

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