fluorescence technology can detect even radiographically and bronchoscopically occult early-stage cancers.\textsuperscript{6,7} Use of this capability in combination with a local treatment such as PDT could enhance both the detection rate and the “curability” of early-stage lung cancer. This, of course, requires the type of prospective trial suggested by Edell and Cortese.

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**The Prognostic Value of Sputum Cytology**

The sputum cytology test has contrasting prognostic significance for squamous cell carcinoma and adenocarcinoma. Squamous cell carcinoma presenting with cancer cells in sputum is often roentgenographically occult, early stage, and surgically resectable. Adenocarcinoma presenting with diagnostic sputum cytology tends to be larger and more advanced due to nodal involvement and, therefore, has a correspondingly poor prognosis.

The role of sputum cytology in screening for lung cancer was evaluated during the Early Lung Cancer Cooperative Study from 1970 to 1980. The collaborating institutions included Johns Hopkins, Mayo Clinic, and Memorial Sloan-Kettering Cancer Center, and the University of Cincinnati was the statistical center. They worked under the auspices of the National Institutes of Health.\textsuperscript{1,5}

During the prevalence screening phase of this study, 81 patients with squamous cell carcinoma were identified. Thirty-one of these patients (38 percent) presented with an abnormal chest roentgenogram and normal sputum cytology. Thirty-five patients (43 percent) presented with abnormal sputum cytology and a normal chest roentgenogram. The remaining 51 patients (19 percent) presented with both abnormal cytology and abnormal roentgenogram. Overall, 50 (62 percent) of the 81 patients with squamous cell carcinoma had cancer cells in the sputum. Importantly, of these 50 patients with abnormal sputum cytology, 35 (70 percent) had roentgenographically occult squamous cell carcinoma.\textsuperscript{5}

A series of 54 patients with a total of 58 roentgenographically occult cancers who underwent complete resection has been reported.\textsuperscript{6} Fifty-six of these cancers were squamous cell, while two had both squamous and large cell components. No adenocarcinomas were identified in these patients with roentgenographically occult lung cancer. Patients were staged by the TNM classification according to their most advanced cancer: 19 of the 54 patients (35 percent) had *in situ* carcinoma, Tis, N0, M0; 25 patients (46 percent) were T1N0M0; five patients (9 percent) were T1, N1, M0; four patients (7 percent) were T2, N1, M0; one patient (2 percent) was T3, N0, M0. In total, 45 of the 54 patients (83 percent) were free of nodal involvement. The five-year survival of the overall group was 90 percent. The five-year survival for the 44 patients who were Tis, N0 or T1, N0 was 91 percent.

Adenocarcinoma is a different disease. During the Early Lung Cancer Cooperative Study, 43 patients with adenocarcinoma were identified. Thirty-five patients (81 percent) had an abnormal chest roentgenogram and normal cytologic findings, while eight (19 percent) had both abnormal sputum cytology and an abnormal roentgenogram. No patient had abnormal sputum cytology as the only abnormal test; therefore, only 19 percent of the patients had a diagnostic sputum cytology test, and none was roentgenographically negative.\textsuperscript{5} In the Mayo patients, nine of 19 patients (47 percent) with adenocarcinoma were stage I. Only one of these patients had a positive sputum cytology test. Ten of 19 patients (53 percent) were stage III, but only two of these had positive sputum cytologic findings.\textsuperscript{7}

During the incidence screening portion of the study, the Memorial Sloan-Kettering group found 18 patients with roentgenographically occult lung cancer; five lesions were adenocarcinomas (28 percent), while 13 were squamous cell carcinomas.\textsuperscript{8} In this series, a total of 59 adenocarcinomas were identified, only five (8 percent) of which were roentgenographically occult.

The article by Miura et al in this issue (see page 1328) is a detailed description of 114 patients with adenocarcinoma who had sputum cytology testing prior to bronchoscopy and surgical resection. The
relationship of sputum cytology to the bronchoscopic findings, the anatomic stage, and the prognosis of these patients is of significant interest. The presence of adenocarcinoma cells in the sputum is a poor prognostic sign regardless of the bronchoscopic findings. Adenocarcinoma cells were in the sputum of 29 of the 114 patients (25 percent). A similar but slightly lower rate of 19 percent was reported during the prevalence screen of the early lung cancer detection study. Of these 29 patients, only 14 percent were categorized as either stage I (one patient) or stage II (three patients). Furthermore, three of the 29 patients (10 percent) were N0, five (17 percent) were N1, and 17 (59 percent) were N2. Overall, 76 percent of the patients with adenocarcinoma in the sputum proved to have N1 or N2 nodal involvement. The size of the cancers was greater than 3 cm in 86 percent of these patients. No patient with adenocarcinoma in the sputum survived five years.

When both sputum cytology and the bronchoscopic examination were normal and yet adenocarcinoma was proven at resection, there was a much better prognosis. Fortunately, this was the most common presentation, occurring in 69 of the 114 patients (61 percent). The cancers were usually peripheral in location; 48 percent were stage I, and 12 percent were stage II. Nodal involvement was documented to be N0 in 51 percent, while N1 and N2 nodes were involved in fewer than half of the patients (46 percent). Also, the lesions were less than or equal to 3 cm in size in 46 percent of the patients and actually were less than 2 cm in size in 16 percent of the patients. The five-year survival when the sputum cytology was normal and the bronchoscopic visual examination was unremarkable was 55 percent.

An abnormal bronchoscopic examination is also a poor prognostic sign in adenocarcinoma regardless of the sputum cytology test result. Eighty-nine percent of these cancers were stage IIIA, IIIB, or IV. The poor survival of this group was similar to that of patients who presented with adenocarcinoma cells in the sputum.

For survival comparisons, Williams et al reported a five-year survival in stage I nonsmall cell carcinoma for all causes of death of 55 percent, and a five-year survival from lung cancer of 65 percent. Rossing and Rossing reported a five-year cancer survival for patients with adenocarcinoma of 48 percent; for unresectable adenocarcinoma, the five-year survival was 25 percent.

With all of this in mind, it appears that the presence of cancer cells in cytology has different prognostic implications for squamous cell carcinoma and adenocarcinoma of the lung. For squamous cell carcinoma, the abnormal cytology may indicate the presence of a cancer that is resectable, has a low rate of nodal involvement, and has a good five-year survival rate. When adenocarcinoma cells are in the sputum, patients have a poor five-year survival due to a high rate of nodal involvement.

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References

Management of Acute Empyema

Pleural empyema is the accumulation of pus within the pleural space. Empyema may be acute or chronic and may be localized or diffuse. The development of empyema has been described as triphasic. Empyema begins with an exudate as the pleura secretes protein-rich fluid in response to contamination. During this phase, the lung remains mobile within the fluid. The second phase, known as the fibrinopurulent phase, is characterized by the accumulation of large quantities of frank pus and fibrin. Fibrin deposition produces a thick pleural peel, which...