Airflow Obstruction and Roadside Breath Alcohol Testing

To the Editor:

We have frequently been asked to give a medicolegal opinion regarding claims of inability to provide an adequate breath sample to activate a portable roadside breath alcohol testing device because of asthma or chronic obstructive pulmonary disease (COPD). We examined the physical characteristics of a commonly used hand-held breath alcohol screening device (A.L.E.R.T., model J3A; Alcohol Countermeasures, Mississauga, Ont) and evaluated the ability of patients with asthma or COPD to perform an acceptable test.

The roadside testing device we used measures ethanol in exhaled gas; this reflects the blood alcohol level. It uses a disposable mouthpiece with orifice diameters of approximately 3.3 mm, and it has an outflow orifice of approximately 1.2 mm. It has a series of colored lights on the upper surface. The operational light indicates that the machine is ready to receive the exhaled sample. If an adequate flow of exhaled air passes across the inflow orifice over an adequate length of time, the operational light is replaced by a red, amber, or green light, indicating "fail," "warn," or "pass," respectively, regarding alcohol level. If critical flow is not maintained for the full time, no result is given. If a subject cannot provide an adequate sample in several attempts, he may be charged with "failure to provide a sample." We connected the testing device through a pressure transducer and flowmeter to a source of air. We found that at ambient room air temperature and pressure a critical flow of 6.6 L/min (110 ml/s) sustained for a period of 5.5 s at a critical pressure of 15 to 17 cm H₂O was required for the machine to obtain an adequate sample of air for analysis.

We studied 102 patients with obstructive airways disease (68 with asthma and 34 with COPD) at the time of pulmonary function testing in the Royal University Hospital Pulmonary Function Lab, Saskatoon. Verbal consent was obtained. Patients were allowed up to three attempts at blowing into the testing device with instructions typical of those given by a police officer at the roadside. The patient was considered to have failed if he or she did not provide an adequate sample (red, amber, or green light) in three tries. Three patients were unable to provide an adequate sample of exhaled air in three attempts (although one of the three was successful at a subsequent attempt). The scatter diagram (Fig 1) shows the distribution of patients by FVC. All three patients who were unable to perform the test had COPD and were dyspneic at rest. From the characteristics of the machine, it appears that a minimum volume of 605 ml of exhaled air at a constant flow rate over 5.5 s would be the minimum acceptable for purposes of analysis. All patients studied had an FVC >605 ml. One patient with a clinical diagnosis of COPD and an FVC of 1.43 L was unable to pass the test, although six of eight patients with an FVC between 0.75 and 1.43 L could pass it. The other two patients who failed had FVC values of 0.81 and 0.78 L.

Similar studies have been conducted in Britain by Briggs et al.1 The characteristics of the machine used in their study vary considerably from those of the machine we used. The British study concluded that, with the type of machine that they used, subjects with an FEV₁ <1.5 L were unlikely to be able to activate the machine. In our study we used a machine that was obtained from the local police force and was currently in use at the roadside. This machine is in widespread use across Canada.

Our study indicated that all patients with an FVC >1.43 L could perform the test. Many patients (75 percent) with an FVC <1.43 L could still do the test. Patients with an FVC <1.00 L caused by airways obstruction may not be able to provide an adequate sample.
for analysis, although one dyspneic and somewhat stubborn patient with an FVC of 0.75 L succeeded in doing the test on his third attempt.

**Table 1—Occurrence of Tuberculosis in HIV-infected Subjects in 1985 to 1989**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total No.</th>
<th>No. of Subjects with AIDS</th>
<th>No. of Subjects with Tuberculosis*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>1,380</td>
<td>123</td>
<td>5 (0.36 [0.12-0.85])</td>
</tr>
<tr>
<td>1986</td>
<td>2,857</td>
<td>227</td>
<td>27 (0.95 [0.62-1.37])</td>
</tr>
<tr>
<td>1987</td>
<td>4,714</td>
<td>449</td>
<td>49 (1.04 [0.77-1.37])</td>
</tr>
<tr>
<td>1988</td>
<td>5,633</td>
<td>920</td>
<td>75 (1.33 [1.05-1.69])</td>
</tr>
<tr>
<td>1989</td>
<td>6,504</td>
<td>1,235</td>
<td>150 (2.31 [1.85-2.71])</td>
</tr>
</tbody>
</table>

*Values in parentheses represent percentage of total number of HIV-infected subjects (p<10^-4 by χ^2 analysis). Values in brackets represent 95 percent confidence limits.

**REFERENCES**

1. Reichman LB. Tuberculosis as a manifestation of the acquired immunodeficiency syndrome [letter]. JAMA 1986; 256:3003

**Tuberculosis and Human Immunodeficiency Virus Infection in Italy**

**Preliminary Results from a Multicenter Study**

To the Editor:

Infection with the human immunodeficiency virus (HIV) reflects and magnifies diseases that are endemic in a particular country. The incidence of tuberculosis in HIV-infected patients depends on the overlap between HIV-seropositive subjects and the population previously infected with tuberculosis.

Even before the acquired immunodeficiency syndrome (AIDS) epidemic, intravenous (IV) drug abusers were considered at special risk for tuberculosis in the United States. This risk substantially increased after HIV spread. Tuberculosis should be expected to occur frequently among HIV-infected persons in Italy.

In fact, about 150,000 subjects are estimated to use illicit IV drugs in Italy, and HIV seroprevalence has been shown to range from 20 to 60 percent in this group. Intravenous drug abusers represent the largest number of AIDS patients (67.2 percent of the 6,068 AIDS cases reported as of March 31, 1990, according to a report from the Italian Ministry of Health).

Moreover, tuberculosis is still endemic in Italy, and about 20,000 new cases are estimated to occur each year (National Research Council, unpublished data, 1987).

In order to evaluate the magnitude of the association between tuberculosis and HIV infection in our country, the Italian Multicenter Study Group on Tuberculosis and AIDS was set up in 1986, supported by a grant from the Italian Ministry of Health. Twenty-one departments of infectious diseases and 15 pneumologic departments located in the most important urban areas collaborate in this group.

As of July 1990, the coordinating center has collected data from all 21 departments of infectious diseases. Tuberculosis cases that occurred from 1985 to 1989 among HIV-infected subjects were reviewed. A total of 306 episodes of bacteriologically proved tuberculosis were observed; in 142 of them, sputum culture was positive for *Mycobacterium tuberculosis*. Annual proportions of tuberculosis in HIV-infected patients observed during the study period are shown in Table 1. A significant increase in prevalence was found from 1985 to 1989. On average, IV drug abusers represented 73.5 percent of HIV-seropositive subjects seen each year; no significant difference in the prevalence of tuberculosis was found between IV drug abusers and nonabusers. The observed increase in tuberculosis in our patients could be explained, at least in part, by an increase in HIV-infected subjects progressing to symptomatic stages.

Our data show that tuberculosis is an emerging problem among HIV-infected persons in Italy. In comparison with other Western countries (chiefly the United States and Great Britain), some particular features stand out. In Italy, where circulation of *M. tuberculosis* is elevated, the population with both HIV and tuberculosis infections is likely to be so large that the risk of tuberculosis in HIV-infected subjects does not seem to be restricted to IV drug abusers.

- Giorgio Antonucci, M.D.,*  
- Orlando Armignacco, M.D.,*  
- Enrico Girardi, M.D.,*  
- Giuseppe Ippolito, M.D.,*  
- Giacchino Angarano, M.D.,† Sergio Babudieri, M.D.,†  
- Alessandra Bini, M.D.,† Patrizia Bottura, M.D.,†  
- Paolo Costigliola, M.D.,† Antonietta Cargnel, M.D.,†  
- Antonio Chirianni, M.D.,† Ivo Maria Crocato, M.D.,†  
- Giovanni Di Perri, M.D.,† Isabella Errante, M.D.,†  
- Massimo Fantoni, M.D.,† Massimo Galli, M.D.,†  
- Paolo Guarascio, M.D.,† Luigi Isabella, M.D.,†  
- Marco Libanore, M.D.,† Elio Manzillo, M.D.,†  
- Lorenzo Minoli, M.D.,† Gabriella Pugano, M.D.,†  
- Tiziana Quirino, M.D.,† Stefania Salmaso, B.Sc.,†  
- Domenico Santoro, M.D.,† Fredy Suter, M.D.,†  
- Antonio Traverso, M.D.,† and Giovanni Maria Vigezzi, M.D.,†  

*Coordinating Center of the Italian Multicenter Study Group on Tuberculosis and AIDS, L. Spallanzani Hospital for Infectious Diseases, Rome, Italy.

**Italian Multicenter Study Group on Tuberculosis and AIDS.**  
(This work was supported by the Italian Ministry of Health, AIDS Research Project, Grant No. 4205.07155.)

Reprint requests: Dr Antonucci, Unità Operativa AIDS, Ospedale L. Spallanzani, Via Portuense, 292, Rome, Italy 00149