

Ziehl-Neelsen basic fuchsin dyes—is satisfactory, although time consuming and operator dependent. Most modern laboratories processing large numbers of diagnostic specimens use auramine–rhodamine staining and fluorescence microscopy; this approach is more sensitive than the Ziehl-Neelsen method. However, it is expensive because it requires high-cost mercury vapor light sources and a darkroom. Less expensive light-emitting diode (LED) fluorescence microscopes are now recommended by the WHO as the microscopy tool of choice. They are as sensitive as—or more sensitive than—traditional fluorescence microscopes. As a result, conventional light and fluorescence microscopes are being replaced with this more recent technology, especially in developing countries. For patients with signs or symptoms of pulmonary TB, it has been recommended that one or two sputum specimens, preferably collected early in the morning, should be submitted to the laboratory for AFB smear and mycobacterial culture. If tissue is obtained, it is critical that the portion of the specimen intended for culture not be put in preservation fluid such as formaldehyde. The use of AFB microscopy in examining urine or gastric lavage fluid is limited by the low numbers of organisms, which can cause false-negative results, or the presence of commensal mycobacteria, which can cause false-positive results.

## ■ MYCOBACTERIAL CULTURE

Definitive diagnosis depends on the isolation and identification of *M. tuberculosis* from a clinical specimen. Commercial liquid-culture systems such as the Mycobacterial Growth Indicator Tube (MGIT) system (Becton Dickinson; Franklin Lakes, NJ) are recommended by the WHO as the reference standard for culture. The MGIT system uses a fluorescent compound sensitive to the presence of oxygen dissolved in the liquid medium. The appearance of fluorescence, detected by fluorometric technology, indicates active growth of mycobacteria. MGIT cultures usually become positive after a period ranging from 10 days to 2–3 weeks; the tubes are read weekly until the eighth week of incubation before the result is declared to be negative. Specimens may also be inoculated onto egg- or agar-based medium (e.g., Löwenstein-Jensen or Middlebrook 7H10 or