I. **Basic principles of surgical prophylaxis.** Animal model studies as well as clinical studies have established some basic guidelines for surgical antibiotic prophylaxis.

A. **Timing of antibiotic administration**

1. **Theory and animal studies.** Animal studies by Burke and others in the late 1950s and early 1960s showed that administration of antibiotics just before, during, and up to 3 hours after surgery effectively prevented infections in wounds experimentally inoculated with bacteria. This was called the **effective period of preventive antibiotic action or the "decisive period".** The use of antibiotics for a brief period after this effective time period did not prevent wound infection. These experimental studies provided the data on which the timing of prophylactic antibiotics is based. Many clinical studies have been performed that support this principle. A large, recent clinical study of patients receiving prophylactic antibiotics confirms that prophylactic antibiotics are most effective when given 0-2 hours before surgery. Beginning an antibiotic regimen 2-24 hours before surgery is not required or useful. In addition, if antibiotic administration begins more than 3 hours after the surgical incision, the prophylactic regimen is not effective.

2. **Clinical application.** For surgical antibiotic prophylaxis to be successful, the antibiotic must be given so that good tissue levels are present at the time of the procedure and for the first 3-4 hours after the surgical incision. There is neither need nor reason to start prophylactic antibiotics days in advance.

3. **Recommended timing.** Recent reviews suggest administering the parenteral antibiotic **30-60 minutes before the surgical incision is made** (i.e., with the induction of anesthesia). For cesarean section, antimicrobial prophylaxis should be delayed until the umbilical cord is clamped and then should be initiated immediately.

B. **Duration of prophylaxis.** This remains a controversial issue and an important one in terms of the cost of prophylaxis. The **optimal duration of perioperative antimicrobial prophylaxis is not known.** Burke has emphasized that since "the effective period lasts no longer than three hours after bacterial contamination of tissue and since bacterial contamination in most surgical procedures ends when the wound is closed, there is little evidence to support prophylactic administration of antibiotics past the period of operation and recovery of normal physiology following anesthesia." Clinical studies by Stone and colleagues and others also support this approach.

1. **Practical approach.** For many surgical procedures, a single dose of antibiotic given just before the procedure provides adequate tissue levels, especially in biliary tract surgery, hysterectomies, and gastric operations. Some authors suggest that, in addition, two postoperative doses are reasonable. Most
experts recommend that antimicrobial prophylaxis should certainly be discontinued within 24 hours of the operative procedure. In prophylaxis for nonperforated appendectomy and colorectal surgery, up to 24 hours of prophylaxis often is recommended. In addition, when a prosthetic device is inserted, prophylaxis often is continued beyond one dose. The optimal duration of prophylaxis in open heart surgery and neurosurgery awaits further study. Many experts believe the continuation of prophylaxis until all catheters and drains have been removed is not appropriate. Data are not available to resolve this issue clearly, and largescale studies are needed.

2. **Prolonged procedures.** If a procedure lasts for several hours, repeat doses of the antibiotic may be necessary intraoperatively to maintain adequate and constant blood and tissue levels. This is particularly important as the period of highest risk for bacterial contamination is most likely the close, not the beginning, of surgery. In prolonged procedures, cefoxitin (with a short half-life) should be readministered every 2 hours until the wound is closed. Whether a similar cephalosporin, cefotetan, which has a longer half-life, is a better agent to use in colorectal surgery awaits further clinical experience with this agent (see Chap. 28F). When an agent with a longer half-life is used (e.g., cefazolin), readministration is suggested every 4 hours. Common regimens are described in sec. V.B. See Table 28B-1 (Table Not Available).