

**BOX 23.1 DEFINITION OF TERMS**

- a. *Gram<sup>-</sup>/Gram<sup>+</sup>*: Gram staining, a staining procedure introduced by C. Gram in 1884, distinguishes bacteria into two types based on their cell wall structure. Bacteria that retain the dye crystal violet after solvent treatment are Gram-positive (Gram<sup>+</sup>) while those that do not are Gram-negative (Gram<sup>-</sup>). The ability of Gram<sup>+</sup> bacteria to retain the crystal violet dye after solvent treatment (in Gram staining) is due to their thick and multilayered peptidoglycan layer. A smaller group of Gram<sup>+</sup> bacteria, including *Mycobacterium tuberculosis*, retain the Gram stain even after acid washing and are called acid-fast bacteria.
- b. *Antibiotics* (examples of the contemporary definitions; see text for Walksman and Ehrlich's definitions)
  1. The term antibiotic is used as a synonym for antibacterials used to treat bacterial infections in both people and animals (WHO, 2011).
  2. Antibiotics are drugs of natural or synthetic origin that have the capacity to kill or inhibit the growth of microorganisms (FAO, 2005).
  3. Antibiotics, also known as antimicrobial drugs, are drugs that fight infections caused by bacteria. They are not effective against viral infections like common cold, most sore throats, and the flu. (FDA, 2015).
- c. *Bactericidal antibiotics* cause bacterial cell death.
- d. *Bacteriostatic antibiotics* inhibit bacterial growth without any loss in viability.
- e. *Broad-spectrum antibiotics* are active on a large number of bacterial species.
- f. *Narrow-spectrum antibiotics* are active against a small number of bacterial species.
- g. *Antibiotic resistance* is the acquired ability of bacteria to survive and multiply despite the presence of therapeutic levels of one or more antibiotics.
- h. *Multidrug-resistant (MDR)* is defined as acquired nonsusceptibility to at least one agent in three or more antimicrobial categories.
- i. *Extensively drug-resistant (XDR)* is defined as nonsusceptibility to at least one agent in all but two or fewer antimicrobial categories (i.e., bacterial isolates remain susceptible to only one or two categories).
- j. *Pandrug-resistant (PDR)* is defined as nonsusceptibility to all agents in all antimicrobial categories.
- k. *Antimicrobial resistance mechanisms*: Given the limited number of targets on which the known classes of antibiotics act, resistance mechanism are also well developed. The major types of clinically relevant resistance mechanisms are (1) modification of target structures/overproduction of target (2) enzymatic modification/inactivation of the antibiotic/elimination through the efflux pumps/decreased penetration of the antibiotic (3) bypassing a particular step in a pathway.
- l. *Combination therapy* involves the use of two or more agents that (1) inhibit different targets in different pathways (e.g., the cocktail of antituberculosis drugs [see Table 23.3]), (2) inhibit different steps in the same pathway (e.g., sulfamethoxazole/trimethoprim), and (3) inhibit the same target in different ways (e.g., streptogramins).