Table 23-4 Rapid Microbial Method Platforms (courtesy of Dr. Michael Miller (20))

Platform	Description and examples
Growth-based methods	Measurement of biochemical or physiological parameters associated with microbial growth • Measure changes in electrical impedance in solution due to changes in electrolyte composition—bioMérieux Bactometer® • Measure CO_2 production resulting from microbial growth—BacT/ALERT® • ATP bioluminescence, utilizing the luciferin–luciferase reaction—Milliflex® Rapid System, Celsis Advance™ Luminometer, PallChek™ Microbiology system • Monitors changes in kinetic reactions resulting in color change—Omnilog® or turbidity–VITEK® 2 • Digital imaging of growth on agar surfaces—Rapid Micro Growth Direct™
Viability-based methods	The use of viability stains or markers for detection and enumeration of microorganisms without the requirement for cell growth • Solid-phase cytometry—Esterases in viable cells cleave a substrate to form a fluorophore—Chemunex Scan RDI® • Flow cytometry—viability market, cells pass through flow chamber, detect fluorescence and light scattering signals—Advance Analytical (AATI) Rapid Bacterial Detector 3000, Chemunex D-Count®, and BactiFlow® systems
Artifact-based methods	Analysis of cellular components using highly selective and sensitive methods • Fatty acid analysis—MIDI Sherlock® • Mass spectrometric methods—Waters MicrobeLynx™, Ciphergen Biosystems • Endotoxin detection systems using Limulus Amebocyte Lysate—see chap. 28
Nucleic acid-based methods	Gene amplification and detection platforms that detect presence or absence of a specific microorganism according to strain differentiation • 16 S rRNA typing—DuPont Qualicon RiboPrinter® • Polymerase chain reaction to find specific DNA sequence—DuPont Qualicon BAX® • Polymerase chain reaction + mass spectrometry—Sequenom MassARRAY®, Ibis TIGER Universal Pathogen Sensor • Transcription-mediated gene amplication—MilliPROBE, bioMérieux Nucleic Acid Sequence Based Amplification
Micro-electro-mechanical systems (MEMS)	Integration of mechanical, electrical, fluidic, and optical elements, sensors, and actuators on common silicon substrate (Lab-on-a-Chip) technologies • Bacterial Barcodes DiversiLab Microbial Typing System • Affymetrix GeneChip® • CombiMatrix CustomArray™ • Ambri-ICS™ Chip • STMicroelectronics In-CheckTM Chip • BioForce NanoArray™

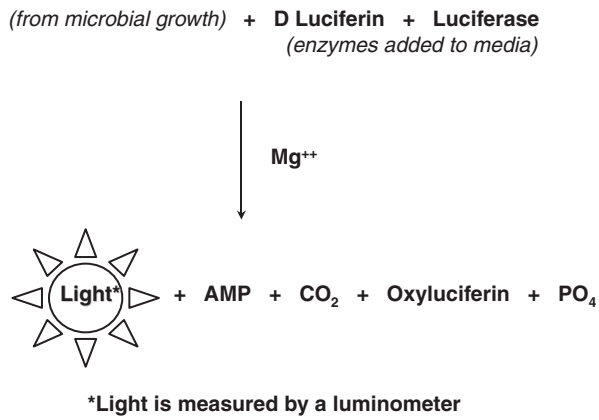

Figure 23-8 Basic principle of ATP bioluminescence rapid microbial detection system.