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IN FIGHTING ANTIMICROBIAL RESISTANCE

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BAD BUGS

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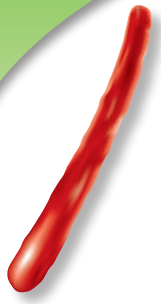
Mycobacterium tuberculosis

Alias: Tuberculosis / TB

Full Name: *Mycobacterium tuberculosis*



- **Hideouts:** Lungs, kidneys, spine, brain
- **Crime:** Causes *tuberculosis* disease
- **Rap Sheet:** Once the leading cause of death in the U.S., although not as prevalent, 13,292 TB cases were reported in the U.S. in 2007
- **Victims:** Babies, children, elderly, HIV, and other immunocompromised patients
- **Evidence:** Bad cough lasting more than three weeks, coughing blood or sputum, pain in chest, fever, chills, weight loss
- **Resistant To:** Traditional Respiratory Tract Infections (RTI) antibiotics (i.e., erythromycin, penicillins and cephalosporins)
- **Distinguishing Features:** Cells divide every 15 to 20 hours; passes through the air easily
- **Self-defense:** A healthy immune system and finishing the entire course of medication
- **Punishment:** Isoniazid, rifampin, ethambutol, pyrazinamide
- **Status:** Being fueled by the spread of HIV/AIDS, poverty, and a lack of health services

BIOMÉRIEUX

PIONEERING DIAGNOSTICS

**Reference: National Center for HIV/AIDS, Viral Hepatitis, STD and TB Prevention*

Clostridium difficile

Alias: *C. difficile*

Full Name: *Clostridium difficile*

- **Hideouts:** Hospitals and healthcare facilities
- **Crime:** Causing diarrhea and more serious intestinal conditions, such as colitis
- **Rap Sheet:** Accounts for 15% to 25% of all antibiotic-associated diarrhea
- **Victims:** The elderly and patients who have other illnesses or conditions requiring prolonged use of antibiotics
- **Evidence:** Watery diarrhea, fever, loss of appetite, nausea, abdominal pain/tenderness
- **Resistant To:** Fluoroquinolones, cephalosporins
- **Distinguishing Features:** Produces hardy spores that can persist in a room for weeks or months
- **Self-defense:** Proper antibiotic usage
- **Punishment:** Metronidazole, vancomycin
- **Status:** Virulent strains are now appearing that resist treatment to common medications

BIOMÉRIEUX

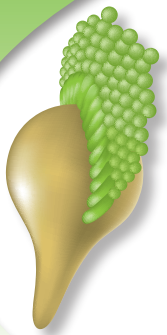
PIONEERING DIAGNOSTICS

**Reference: Centers for Disease Control and Prevention*

Aspergillus fumigatus

Alias: Aspergillosis

Full Name: *Aspergillus fumigatus* or *Aspergillus flavus*



- **Hideouts:** Soil, plants, household dust, building materials, food items
- **Crime:** Causes allergic respiratory symptoms, such as wheezing and coughing. Can invade and damage tissues in the body
- **Rap Sheet:** Approximately 20 species of *Aspergillus* have been reported as causative agents of opportunistic infections in humans. Can cause a syndrome called allergic pneumonitis, which is an allergic reaction to the *Aspergillus* spores and can happen in healthy people
- **Victims:** Most common in people with cancer
- **Evidence:** Wheezing, coughing, fever
- **Resistant To:** Some strains have developed resistance to the azoles
- **Distinguishing Features:** Looks like a flower. Gives off strings of beads that are spores
- **Self-defense:** Avoidance of dusty environments and activities where dust exposure is likely
- **Punishment:** Amphotericin B, Voriconazole, itraconazole
- **Status:** Very common in the environment

BIOMÉRIEUX

PIONEERING DIAGNOSTICS

**Reference: Centers for Disease Control and Prevention*

Bacillus anthracis

Alias: Anthrax

Full Name: *Bacillus anthracis*

- **Hideouts:** Sheep, goats
- **Crime:** Severe breathing problems, intestinal disease, skin infection. Varies based on how disease was contracted, including skin infection (cutaneous) pneumonia (pneumonic), intestinal disease (GI). Mortality approaches 100% for pneumonic and GI
- **Rap Sheet:** Highly transmissible through aerosolization in the laboratory. Currently can be associated with bioterrorism
- **Victims:** Animals and humans when exposed to infected animals or tissue from infected animals
- **Evidence:** Black sore (eschar), vomiting, fever, abdominal pain, severe diarrhea, prostration, shortness of breath
- **Resistant To:** Extended-spectrum cephalosporins
- **Distinguishing Features:** Small, rod shaped. Spores are usually spherical structures, smaller than the bacteria
- **Self-defense:** Vaccination, avoid contact with livestock and animal products. Anthrax Vaccine Adsorbed (AVA)
- **Punishment:** Penicillin, gentamicin, erythromycin, chloramphenicol. Combination therapy of ciprofloxacin and doxycycline has been successful
- **Status:** Estimated 20,000 to 100,000 cases occur yearly worldwide, mostly in developing countries

**Reference: Centers for Disease Control and Prevention*

Clostridium botulinum

Alias: Botulism

Full Name: *Clostridium botulinum*

- **Hideouts:** Commonly found in soil
- **Crime:** Rare but serious paralytic illness
- **Rap Sheet:** The bacteria manufacture a toxin that causes the symptoms. All forms of botulism can be fatal and are considered medical emergencies. Foodborne botulism can be especially dangerous, as eating from a batch of contaminated food can poison many people
- **Victims:** Infants get infant botulism, but anyone can get foodborne or wound botulism
- **Evidence:** Headache, double vision, blurred vision, drooping eyelids, slurred speech, difficulty swallowing, dry mouth, muscle weakness
- **Resistant To:** Antibiotics are not indicated. Antitoxin therapy is the treatment of choice
- **Distinguishing Features:** In active state, looks like a tiny rod
- **Self-defense:** Follow strict hygienic procedures to reduce contamination of foods. Avoid feeding honey to children under 12 months old
- **Punishment:** Equine antitoxin, human-derived antitoxin
- **Status:** In the U.S., an average of 145 cases are reported each year

BIOMÉRIEUX

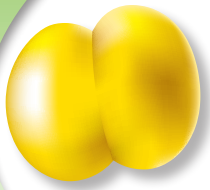
PIONEERING DIAGNOSTICS

**Reference: Centers for Disease Control and Prevention*

Neisseria meningitidis

Alias: Meningococcus

Full Name: *Neisseria meningitidis*



- **Hideouts:** Human respiratory tract
- **Crime:** Meningitis, bacteremia
- **Rap Sheet:** In recent years, several outbreaks have occurred in college students. Affects about three in 100,000 people each year
- **Victims:** Infants and young children, refugees, military recruits, college students living in dormitories
- **Evidence:** Bleeding into the skin (purpura), high fever, headache, stiff neck, shock
- **Resistant To:** Ampicillin, co-trimoxazole, tetracycline, chloramphenicol. Resistance to penicillin is rare
- **Distinguishing Features:** Heterotophic, Gram negative diplococcal bacterium with six clinically important strains
- **Self-defense:** Polysaccharide vaccine, meningococcal conjugate vaccine, exposed people should be prophylaxed with rifampin, ciprofloxacin or ceftriaxone
- **Punishment:** Penicillin G is drug of choice, chloramphenicol, and supportive care, isolation
- **Status:** Leading cause of bacterial meningitis in children and young adults in the U.S., with an estimated 2,600 cases each year. 10%-14% of cases are fatal

BIOMÉRIEUX

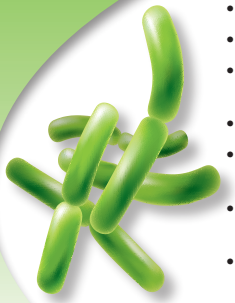
PIONEERING DIAGNOSTICS

**Reference: Centers for Disease Control and Prevention*

Yersinia pestis

Alias: Plague/Black Death

Full Name: *Yersinia pestis*



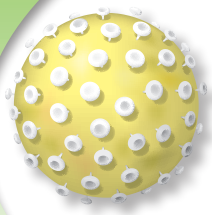
- **Hideouts:** Rodents, especially prairie dogs, fleas
- **Crime:** Causes bubonic or pneumonic plague
- **Rap Sheet:** Occurs in the U.S. as mostly scattered cases in rural areas of the desert southwest (an average of 10 to 15 persons each year)
- **Victims:** People who are bitten by fleas feeding on infected rodents
- **Evidence:** Enlarged, tender lymph nodes (bubos), fever, chills, prostration, abdominal pain, shock, bleeding into skin and other organs, cough, difficulty breathing, high mortality
- **Resistant To:** Penicillins, cephalosporins, and macrolides have a suboptimal clinical effect and are not recommended to treat plague
- **Distinguishing Features:** Gram negative facultative anaerobic bipolar-staining (giving it a safety pin appearance)
- **Self-defense:** Cleanliness, preventative antibiotic usage. Exposed people should be prophylaxed with doxycycline
- **Punishment:** Antibiotics, including streptomycin, gentamicin, doxycycline, chloramphenicol, supportive care, isolation
- **Status:** As many as 3,000 cases of plague are reported to the World Health Organization each year

**Reference: Centers for Disease Control and Prevention*

Human Immunodeficiency Virus

Alias: HIV

Full Name: Human Immunodeficiency Virus



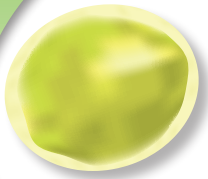
- **Hideouts:** Primarily found in the blood, semen, or vaginal fluid of an infected person
- **Crime:** Infects and destroys CD4 cells (T lymphocytes). Causes acquired immunodeficiency syndrome (AIDS), the final stage of HIV infection
- **Rap Sheet:** First identified in the U.S. in 1981 after a number of homosexual men presented with Kaposi's sarcoma. During the early 1980s, approximately 150,000 people became infected with HIV each year. However, by the early 1990s, this rate had dropped to about 40,000 each year, where it remains today
- **Victims:** Men and women who have unprotected sex or share needles with an infected individual, patients who received a blood transfusion or clotting factor during 1978-1985, babies born to infected mothers
- **Evidence:** 25% of HIV-infected people in the U.S. are unaware they are HIV positive. Following an acute flu-like illness, months to years later, a variety of viral symptoms such as fatigue, weight loss and lymphadenopathy and opportunistic pathogens such as *Candida*, CMV, atypical mycobacteria, Pneumocystis carinii
- **Resistant To:** Resistance emerges in an infected individual; periodic assessment of viral susceptibility is necessary
- **Distinguishing Features:** Retrovirus (single-stranded, enveloped, RNA virus)
- **Self-defense:** Celibacy and avoidance of sharing needles. Latex condoms, used correctly, can decrease the incidence of transmission. Appropriate antiretroviral therapy for pregnant women
- **Punishment:** Antiretroviral drugs. Highly active antiretroviral therapy (HAART) revolutionized the treatment of HIV. Combination of antiretroviral agents taken for life, healthy lifestyles, and appropriate immunizations such as Hepatitis B, flu, pneumonia, and other opportunistic viruses
- **Status:** Leading cause of death in people with an infectious disease. Several million people die and are newly infected each year

**Reference: Centers for Disease Control and Prevention*

Staphylococcus aureus

Alias: MRSA / "Golden Staph"

Full Name: Methicillin-resistant *Staphylococcus aureus*



- **Hideouts:** Hospitals and healthcare facilities, nursing homes, dialysis centers, unwashed gym equipment
- **Crime:** Causing serious and potentially life-threatening infections, such as bloodstream infections, surgical site infections, pneumonia, skin and soft-tissue infections
- **Rap Sheet:** 94,000 life-threatening infections and nearly 19,000 deaths in the U.S. in 2005, of these infections about 86% were healthcare associated and 14% were community associated
- **Victims:** Patients who undergo invasive medical procedures or who are immunocompromised
- **Evidence:** Red, swollen and painful skin infection, looks like a boil or pimple
- **Resistant To:** Penicillin, methicillin
- **Distinguishing Features:** Has the mecA gene
- **Self-defense:** Healthcare workers should wash hands frequently, disinfect surfaces, wear gloves when working with patients; others should wash their hands frequently, avoid sharing personal items, and keep wounds covered
- **Punishment:** Vancomycin
- **Status:** Invading high school gym locker rooms

BIOMÉRIEUX

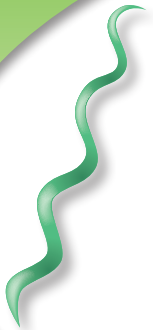
PIONEERING DIAGNOSTICS

**Reference: Centers for Disease Control and Prevention*

Borrelia burgdorferi

Alias: Lyme Disease

Full Name: *Borrelia burgdorferi*



- **Hideouts:** Infected ticks
- **Crime:** Acute asymptomatic flu-like illness with a bull's-eye rash, may result in neurologic, cardiac or joint disease
- **Rap Sheet:** Most common arthropod-borne illness in U.S. Diagnosis and treatment can be challenging due to its diverse manifestations and limitations of available serological (blood) tests
- **Victims:** People who spend time in grassy and wooded environments
- **Evidence:** Bull's-eye skin rash, headache, fatigue, skin rash
- **Distinguishing Features:** Rash on the skin that looks like a bull's eye
- **Self-defense:** Insect repellent containing DEET, proper clothing, removing ticks promptly, integrated pest management
- **Punishment:** Doxycycline, amoxicillin, ceftriaxone, cefuroxime
- **Status:** A high percentage of cases is found in the Northeast, Mid-Atlantic, and Upper Midwest

BIOMÉRIEUX

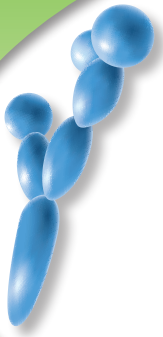
PIONEERING DIAGNOSTICS

**Reference: Centers for Disease Control and Prevention*

Candida albicans

Alias: Candidiasis, Moniliasis

Full Name: *Candida albicans*



- **Hideouts:** Part of the normal microbial flora of the mouth and gastrointestinal tract
- **Crime:** Broad spectrum of infections caused by yeast overgrowth, including thrush, vaginitis, and infections of the urinary tract, liver, spleen, and retina
- **Rap Sheet:** Fourth most common cause of nosocomial bloodstream infections – eight cases per 100,000 in general population
- **Victims:** Newborns, women, denture wearers, people who use inhaled corticosteroids, people with weakened immune systems, particularly those with AIDS, and people undergoing treatment for cancer
- **Evidence:** Ranges from oral sores to vaginal discharge, fever and chills
- **Resistant To:** Some strains may acquire resistance to azoles after prolonged treatment
- **Distinguishing Features:** Gram positive, unicellular, round to oval budding cells. Can produce pseudohyphae
- **Self-defense:** Keeping skin clean, dry, and free from abrasions, judicious use of antibacterial agents
- **Punishment:** Antifungals, including azoles, echinocandin, flucytosine, amphotericin B
- **Status:** Nearly 75% of all adult women will be diagnosed with at least one form, the genital "yeast infection," in their lifetime

BIOMÉRIEUX

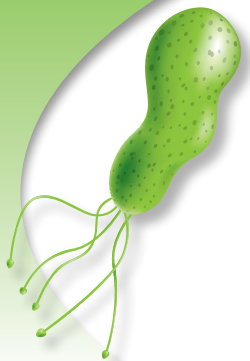
PIONEERING DIAGNOSTICS

**Reference: Centers for Disease Control and Prevention*

Helicobacter pylori

Alias: Peptic Ulcer

Full Name: *Helicobacter pylori*



- **Hideouts:** Gastric mucous layer, epithelial lining of the stomach
- **Crime:** Acute and chronic gastritis, duodenal and gastric ulcers, gastric carcinoma
- **Rap Sheet:** An estimated 0.5% of the susceptible population in industrialized countries becomes infected each year
- **Victims:** More prevalent among older adults, lower socioeconomic groups, and those with type O blood
- **Evidence:** Gnawing or burning pain in the epigastrium
- **Resistant To:** 20%-40% of isolates are resistant to metronidazole, amoxicillin, clarithromycin
- **Distinguishing Features:** Spiral-shaped bacterium that looks like small, red crater on the lining of the stomach or duodenum
- **Self-defense:** Wash hands thoroughly, eat foods that have been properly prepared, drink clean water
- **Punishment:** Initial course includes two antibiotics and a proton pump inhibitor. Antibiotics include amoxicillin, clarithromycin and fluoroquinolones
- **Status:** Causes an estimated 1 million hospitalizations and 6,500 deaths per year

BIOMÉRIEUX

PIONEERING DIAGNOSTICS

**Reference: Centers for Disease Control and Prevention*

Listeria monocytogenes

Alias: Listeriosis

Full Name: *Listeria monocytogenes*

- **Hideouts:** Contaminated food, especially dairy
- **Crime:** Fever, muscle aches, nausea, diarrhea
- **Rap Sheet:** Pregnant women are approximately 20 times more likely than other healthy adults to get listeriosis
- **Victims:** People of advanced age, pregnant women, newborns, adults with weakened immune systems
- **Evidence:** Headache, fever, stiff neck, confusion, loss of balance, convulsions
- **Resistant To:** Cephalosporins
- **Distinguishing Features:** Rod-shaped bacterium with flagella
- **Self-defense:** Thoroughly cook raw food from animal sources. Wash raw vegetables, hands, knives, and cutting boards after handling uncooked foods
- **Punishment:** Antibiotics, such as penicillin, trimethoprim-sulfamethoxazole
- **Status:** An estimated 2,500 persons become seriously ill each year

BIOMÉRIEUX

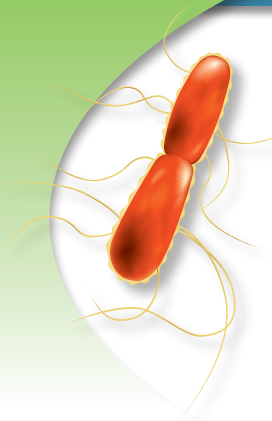
PIONEERING DIAGNOSTICS

**Reference: Centers for Disease Control and Prevention*

Salmonella enteritidis

Alias: Salmonellosis

Full Name: *Salmonella enteritidis*



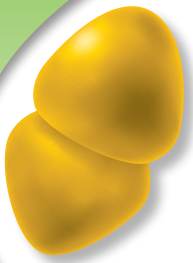
- **Hideouts:** Eggs, meat, poultry, milk, and other foods
- **Crime:** Infects ovaries of hens and contaminates eggs prior to shell formation causing illness to people who eat the normal-looking eggs raw or undercooked
- **Rap Sheet:** Approximately 40,000 cases reported in U.S. annually
- **Victims:** Elderly, infants, people with impaired immune systems
- **Evidence:** Fever, abdominal cramps, diarrhea beginning 24 to 72 hours after consumption of contaminated food or beverage
- **Resistant To:** Some strains are acquiring resistance to ampicillin, ciprofloxacin and trimethoprim-sulfamethoxazole
- **Distinguishing Features:** Rod-shaped, flagellated, Gram negative
- **Self-defense:** Keep foods refrigerated; avoid uncooked or undercooked foods such as eggs, chicken, and meat products; wash hands and utensils regularly; avoid cross-contaminating cooking utensils
- **Punishment:** Fluids and antidiarrheals. Antibiotic treatment is recommended for neonates, those 50 and older, the immunocompromised, and those with cardiac valve disease. For severe infections, use of antibiotics, including ampicillin, amoxicillin, ciprofloxacin, and trimethoprim-sulfamethoxazole
- **Status:** Current estimates indicate that one in 50 consumers could be exposed to contaminated eggs each year in the U.S.

**Reference: Centers for Disease Control and Prevention*

Streptococcus pneumoniae

Alias: Pneumococcus

Full Name: *Streptococcus pneumoniae*



- **Hideouts:** Upper respiratory tract
- **Crime:** Common cause of bacterial meningitis, community-acquired pneumonia, bacteremia, otitis media, sinusitis
- **Rap Sheet:** Approximately 41,400 cases of invasive pneumococcal disease occur each year. Of these, 38% are caused by pneumococci non-susceptible to at least one drug, and 15% are due to a strain non-susceptible to three or more drugs
- **Victims:** Elderly, young children, people with underlying medical conditions, including HIV infection, sickle cell disease, asplenia, and alcoholism
- **Evidence:** Otitis media with potential resulting hearing impairment, sinusitis, pneumonia, bacteremia, meningitis
- **Resistant To:** Multi-drug-resistant strains are developing to the following antibiotic classes: beta-lactams, macrolides, tetracyclines, sulfonamides. Spread of these resistant bacteria increased dramatically during the 1990s
- **Distinguishing Features:** Encapsulated, Gram positive diplococcal bacteria have a distinctive morphology on Gram stain, "lancet shape," polysaccharide capsule acts as virulence factor for the organism
- **Self-defense:** Vaccination
- **Punishment:** Penicillin-G, ceftriaxone, cefotaxime, erythromycin, vancomycin
- **Status:** Still causes a substantial amount of morbidity and mortality, despite antibiotics. Incidence among young adults and young children is decreasing due to improved HIV therapy and use of new conjugate vaccine for children

**Reference: Centers for Disease Control and Prevention*

Streptococcus pyogenes

Alias: Group A Streptococcus, flesh-eating bacteria

Full Name: *Streptococcus pyogenes*

- **Hideouts:** Throat and skin
- **Crime:** Strep throat, impetigo, scarlet fever, necrotizing fasciitis, streptococcal toxic-shock syndrome
- **Rap Sheet:** Can cause a range of infections, from relatively mild sore throats and skin infections to life-threatening invasive disease
- **Victims:** Strep throat is more prevalent in young children, but everyone is susceptible
- **Evidence:** Severe pain and swelling, redness, fever, dizziness, flu-like symptoms, confusion, flat red rash over large areas of the body
- **Resistant To:** Some strains developing resistance to erythromycin and other macrolides
- **Distinguishing Features:** Small, spherical, Gram positive bacteria occurring in pairs or chains
- **Self-defense:** Hand washing and proper cleansing
- **Punishment:** Penicillin, narrow-spectrum cephalosporins, clindamycin
- **Status:** Approximately 9,000 to 11,500 cases of invasive GAS disease occur each year in the U.S., resulting in 1,000 to 1,800 deaths annually

BIOMÉRIEUX

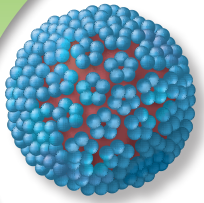
PIONEERING DIAGNOSTICS

**Reference: Centers for Disease Control and Prevention*

Human Papilloma Virus

Alias: HPV

Full Name: Human Papilloma Virus



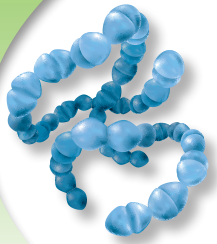
- **Hideouts:** Infects the genital area of men and women, including the skin of the penis, vulva (area outside the vagina), or anus, and the linings of the vagina, cervix, or rectum
- **Crime:** Certain types of HPV can cause genital warts in men and women. Other HPV types can cause cervical cancer and other less common cancers, such as cancers of the vulva, vagina, anus, and penis
- **Rap Sheet:** Approximately 20 million Americans are currently infected with HPV, and another 6.2 million people become newly infected each year, with at least 50% of sexually active men and women acquiring the genital HPV infection at some point in their lives
- **Victims:** Sexually active people. Promiscuous populations are at greater risk
- **Evidence:** Most people who become infected with HPV will be asymptomatic
- **Resistant To:** There is no treatment for the virus itself
- **Distinguishing Features:** Human papillomavirus is a double-stranded DNA virus. There are more than 100 different strains or types, with more than 30 of these viruses sexually transmitted
- **Self-defense:** Celibacy, monogamous relationships; condoms may not fully protect against HPV. A vaccine can now protect females from the four types of HPV that cause most cervical cancers
- **Punishment:** A variety of topical treatments have been tried with limited results. Surgery and chemotherapy for cervical cancer
- **Status:** This is the most common venereal disease in the U.S. Studies are now being conducted to find out if the vaccine is also safe in men, and if it can protect them against HPV and related conditions. Currently, there is no vaccine licensed to prevent HPV-related diseases in men

**Reference: Centers for Disease Control and Prevention*

Vancomycin-resistant Enterococcus

Alias: VRE

Full Name: Vancomycin-resistant *Enterococcus*



- **Hideouts:** Hospitals and healthcare facilities
- **Crime:** Leading cause of hospital-associated infections, urinary tract infections and bloodstream infections
- **Rap Sheet:** CDC data from 2006-2007 indicated enterococci caused one of every eight infections in hospitals – 30% of these were VRE
- **Victims:** Immunocompromised people treated with antibiotics over a long period of time, patients who have undergone surgical procedures, and patients with medical devices, such as catheters
- **Evidence:** Fever, urinary tract symptoms
- **Resistant To:** Vancomycin, ampicillin
- **Distinguishing Features:** Most VREs are *Enterococcus faecium*, whereas *Enterococcus faecalis* are susceptible to vancomycin
- **Self-defense:** Wash hands frequently and keep living areas, such as bathrooms, clean
- **Punishment:** Linezolid
- **Status:** Competing with MRSA to be the number one HAI infection

BIOMÉRIEUX

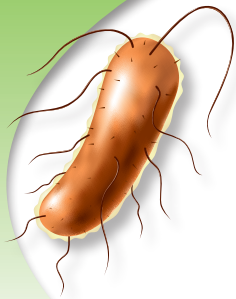
PIONEERING DIAGNOSTICS

**Reference: Centers for Disease Control and Prevention*

Escherichia coli O157:H7

Alias: Hemorrhagic *E. coli*

Full Name: *Escherichia coli* O157:H7



- **Hideouts:** Hospitals and healthcare facilities; undercooked and/or raw meat, spinach
- **Crime:** Gastroenteritis, hemolytic-uremic syndrome (HUS)
- **Rap Sheet:** First identified as a pathogen in 1982; in 2007, there were an estimated 25,000 cases in the U.S.
- **Victims:** Very young children and the elderly
- **Evidence:** Stomach cramps, often bloody diarrhea, vomiting
- **Resistant To:** Streptomycin, sulfonamides, tetracycline
- **Distinguishing Features:** Cells divide every 20 minutes; is sorbital negative on Sorbitol-MacConkey Agar
- **Self-defense:** Wash raw produce thoroughly; wash hands frequently; disinfect utensils and kitchen surfaces; cook meats thoroughly; and keep raw food separate from ready-to-eat foods
- **Punishment:** Supportive care, hydration, no antibiotics should be used
- **Status:** Contaminating ground beef supplies worldwide

BIOMÉRIEUX

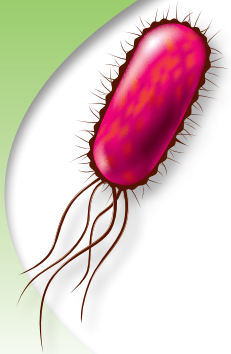
PIONEERING DIAGNOSTICS

**Reference: Centers for Disease Control and Prevention*

Pseudomonas aeruginosa

Alias: Pseudomonas

Full Name: *Pseudomonas aeruginosa*



- **Hideouts:** Hospitals and healthcare facilities
- **Crime:** Pneumonia, urinary tract infections, bloodstream infections
- **Rap Sheet:** Accounts for 10% of all hospital-associated infections
- **Victims:** Hospitalized, immunocompromised, and cystic fibrosis patients
- **Evidence:** Coughing, shortness of breath, fatigue, fever, sepsis syndrome
- **Resistant To:** Cephalosporins
- **Distinguishing Features:** Colonies are pearlescent in appearance and give off a grape-like odor
- **Self-defense:** Healthcare workers should wash hands frequently and wear gloves while working with patients
- **Punishment:** Aminoglycosides, quinolones
- **Status:** Commonly resistant to a variety of antibiotics

BIOMÉRIEUX

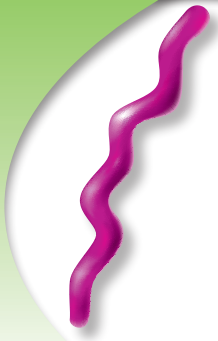
PIONEERING DIAGNOSTICS

**Reference: Centers for Disease Control and Prevention*

Campylobacter enteritis

Alias: Campylobacteriosis, Campylobacter enteritis

Full Name: *Campylobacter jejuni* or *Campylobacter coli*



- **Hideouts:** Uncooked poultry products, unpasteurized milk, contaminated water, domestic pets
- **Crime:** Diarrhea, cramping, abdominal pain, fever
- **Rap Sheet:** Estimated to affect more than 2.4 million people every year
- **Victims:** The organism is isolated from infants and young adults more frequently than from people in other age groups, and from males more frequently than females. Most cases are associated with eating improperly handled or cooked food, primarily poultry products
- **Evidence:** Diarrhea, cramping, abdominal pain, fever within two to five days after exposure to the organism
- **Resistant To:** Penicillins and cephalosporins. Some strains are developing resistance to macrolides, fluoroquinolones, aminoglycosides, chloramphenicol, nitrofurantoin, and tetracycline
- **Distinguishing Features:** Gram negative, curved, microaerophilic bacterium
- **Self-defense:** Cook all poultry products thoroughly; wash hands
- **Punishment:** Fluids, antibiotics (azithromycin, erythromycin, ciprofloxacin)
- **Status:** One of the most common causes of diarrheal illness in the U.S. The vast majority of cases occur as isolated, sporadic events

BIOMÉRIEUX

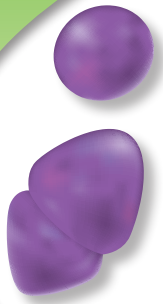
PIONEERING DIAGNOSTICS

**Reference: Centers for Disease Control and Prevention*

Enterococcus faecalis

Alias: Enterococcus

Full Name: *Enterococcus faecalis* or *Enterococcus faecium*



- **Hideouts:** Human colon
- **Crime:** Common cause of UTI and bloodstream infections, endocarditis, linked with healthcare-associated infections. Third most common cause of infection in intensive care units
- **Rap Sheet:** Other than UTI and endocarditis/bloodstream infections, *Enterococcus* is usually part of a mixed infection (i.e., peritonitis, abscess). *E. faecalis* is isolated more frequently than *E. faecium*, but *E. faecium* is more likely to be vancomycin resistant
- **Victims:** Patients with indwelling urinary catheter, patients who have received lengthy courses of antibiotics, organ transplant recipients, patients with hematologic malignancies, healthcare workers
- **Evidence:** Fever, heart murmur, urinary tract symptoms
- **Resistant To:** Cephalosporin antibiotics, emerging resistance to ampicillin, aminoglycosides, and vancomycin
- **Distinguishing Features:** Observed singly, in pairs, or in short chains. Grows on bile esculin
- **Self-defense:** Good hand washing; judicious use of antibiotics
- **Punishment:** Ampicillin plus or minus gentamicin, or vancomycin, or newer antibiotics (quinupristin/dalfopristin, linezolid, daptomycin, tigecycline)
- **Status:** Accounts for 10% of healthcare-acquired infections, 9% of bacteremia infections, 16% UTI, and 5%-15% of cases of bacterial endocarditis

**Reference: Centers for Disease Control and Prevention*