

Microorganisms, Body Sites, and Infections

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Bacteria play an important part in human disease. The development of an infection depends on the complex interactions of the host's susceptibility to infection, the organism's virulence potential, and the opportunity for interaction between host and organism. To better understand the dynamics of infectious disease, I have compiled three tables that cross reference microorganisms with the body areas they usually colonize and the type of infection they cause. Table 1 lists the different types of microorganisms that commonly colonize the human body, their frequency of occurrence, and their propensity to cause disease. Table 2 list different types of infections and the commonly associated pathogens. Table 3 lists many of the common disease causing microorganisms and the types of infections that each can produce.

Table 1: Microbial Flora In & On The Human Body

Body Site	Organism	Frequency ^a	Pathogenicity ^b
Mouth & Oropharynx	Actinomyces	2+	M
	Bacteroides	2+	L
	Candida	2+	L
	Corynebacterium	2+	L
	Eikenella corrodens	1+	L
	Enterobacteriaceae	1+	L
	Fusobacterium	3+	M
	Haemophilus influenzae	1+	M
	Haemophilus, other species	3+	L
	Kingella	1+	M
	Lactobacillus	1+	L
	Moraxella catarrhalis	2+	M
	Moraxella, other species	1+	L
	Mycoplasma	1+	L
	Neisseria	3+	L
	Peptostreptococcus	3+	L
	Staph. aureus	2+	M
	Staph. epidermidis	3+	L
	Strep. viridans	3+	L
	Strep. pyogenes	2+	H
Strep. Non-group A	3+	L	
Strep pneumoniae	2+	M	
Treponema	2+	L	
Nasopharynx	Haemophilus	1+	L
	Neisseria	1+	L
	Staph. aureus	1+	M
	Staph. epidermidis	3+	L
	Strep. viridans	2+	L
	Strep. pneumoniae	1+	M
Outer Ear	Enterobacteriaceae	1+	M
	Pseudomonas	1+	M
	Staph. epidermidis	3+	L
	Strep. pneumoniae	1+	M
Eye	Haemophilus	1+	L
	Staph. Epidermidis	3+	L
Stomach	Helicobacter pylori	1+	H
	Lactobacillus	1+	L
	Streptococcus	1+	L

Small Intestine	Bacteroides	2+	M
	Candida	1+	M
	Clostridium	1+	M
	Enterobacteriaceae	1+	M
	Enterococcus	2+	M
	Fusobacterium	2+	L
	Lactobacillus	3+	L
	Peptostreptococcus	2+	L
	Staphylococcus	1+	L
	Streptococcus	2+	L
Large Intestine	Bacteroides	3+	H
	Candida	1+	M
	Clostridium	3+	M
	Corynebacterium	1+	L
	Enterobacteriaceae	3+	M
	Enterococcus	3+	M
	Fusobacterium	3+	M
	Lactobacillus	2+	L
	Mycobacterium	1+	L
	Peptostreptococcus	3+	M
	Pseudomonas	1+	L
	Staphylococcus	1+	L
	Streptococcus	1+	L
Anterior Urethra	Candida	1+	M
	Corynebacterium	3+	L
	Enterobacteriaceae	1+	M
	Enterococcus	1+	L
	Gardnerella vaginalis	1+	L
	Lactobacillus	3+	L
	Mycoplasma	1+	M
	nonpathogenic Neisseria	1+	L
	Staph. epidermidis	2+	L
Streptococcus	1+	L	
Ureaplasma	1+	M	
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Vagina	Actinomyces	2+	M
	Bacteroides	2+	M
	Candida	2+	M
	Clostridium	1+	M
	Enterobacteriaceae	2+	M
	Enterococcus	2+	L
	Fusobacterium	2+	M
	Gardnerella vaginalis	3+	L
	Lactobacillus	3+	L
	Mobiluncus	2+	H
	Mycoplasma	2+	M
	nonpathogenic Neisseria	2+	L
	Staphylococcus	3+	L
	Streptococcus	2+	L
	Torulopsis	2+	M
Ureaplasma	2+	M	
Skin	Candida	1+	M
	Clostridium	1+	L
	Corynebacterium	3+	L
	Propionibacterium	3+	L
	Staph. aureus	1+	H
	Staph. epidermidis	3+	M
	Strep. pyogenes	1+	L

*Frequency of recovery from healthy individuals: 1+, rare; 2+, frequently isolated; 3+, commonly present.

*Cause of disease: H, high; M, moderate; L, low.

Table 2: Various Infections & Suspected Organisms

Type of Infection		Suspected Organism
Respiratory		
Pharyngitis		Strep. pyogenes
Bronchitis, Otitis		Haemophilus influenzae, Strep. pneumoniae, Moraxella catarrhalis
Acute Sinusitis		Strep. pneumoniae, Haemophilus influenzae, Moraxella catarrhalis
Chronic Sinusitis		anaerobes, Staph. aureus
Epiglottitis		Haemophilus influenzae
Pneumonia		
Community Acquired	Normal host	Strep. pneumoniae, viral, Mycoplasma
	Aspiration	Normal aerobic & anaerobic mouth flora
	Pediatric, COPD	Strep. pneumoniae, Haemophilus influenzae
	Alcoholic	Strep. pneumoniae, Klebsiella
Hospital Acquired	Aspiration	Mouth anaerobes, Gram (-) rods, Staph. aureus
	Neutropenic	Fungi, Gram (-) rods, Staph. aureus
	AIDS	Fungi, pneumocystis, Legionella, Nocardia, Strep. pneumoniae
Urinary Tract		
Community Acquired		E. coli, other Gram (-) rods, Staph. aureus, Staph. epidermidis, Enterococcus
Hospital Acquired		Resistant Gram (-) rods, Enterococcus
Skin/Soft Tissue		
Cellulitis		Strep. pyogenes, Staph. aureus
IV Catheter Site		Staph. aureus, Staph. epidermidis
Surgical Wound		Staph. aureus, Gram (-) rods
Diabetic Ulcer		Staph. aureus, Gram (-) rods, anaerobes
Furuncle		Staph. aureus
Intra-Abdominal		
Gastroenteritis		Salmonella, Shigella, Helicobacter, Clostridium, Amoeba, Giardia, viral, E. coli
Endocarditis		
Subacute		Strep. viridans
Acute	IV Drug Abuser	Staph. aureus, Gram (-) rods, Enterococcus, fungi
	Prosthetic Valve	Staph. epidermidis
Osteomyelitis/Septic Arthritis		Staph. aureus, Strep, Gram (-) rods
Menigitis		
<2 Months Old		E. coli, group B Strep, Listeria
2 Months -12 Years		Haemophilus influenzae, Strep. pneumoniae, Neisseria meningitidis
Adults		Strep. pneumoniae, Neisseria meningitidis, Gram (-) rods
Post-neurosurgery		Staph. aureus, Gram (-) rods

Table 3: Pathogenic Organisms & Associated Infections

Organism	Infection
Acinetobacter	opportunistic infections
Actinomyces	cervicofacial, pulmonary, abdominal, pelvic or CNS (brain abscess) actinomycosis.
Bacillus anthracis	anthrax.
Bacillus cereus	food poisoning, bacteremia.
Bacteroides	abscess infection, bacteremia, endocarditis, soft tissue infection, gangrene.
Bordetella pertussis	pertussis (whooping cough).
Borrelia burgdorferi	Lyme disease
Brucella	Brucellosis (Malta fever).
Campylobacter jejuni	enteritis, bacteremia, septic abortion, reactive arthritis.
Chlamydia pneumoniae	atypical pneumonia, bronchitis, pharyngitis, sinusitis
Chlamydia trachomatis	nongonococcal urethritis, pelvic inflammatory disease, proctocolitis, epididymitis.
Clostridium botulinum	infant botulism, foodborne botulism, wound botulism.
Clostridium difficile	antibiotic-associated diarrhea, pseudomembranous colitis.
Clostridium perfringens	bacteremia, gas gangrene, soft tissue infections, food poisoning,
Clostridium tetani	tetanus.
Citrobacter	lower respiratory tract infection, UTI, hospital associated bacteremia, neonatal CNS infection
Corynebacterium jeikeium	septicemia, endocarditis, foreign body infection,
Corynebacterium other than jeikeium	UTI, skin infections, bacteremia, pharyngitis, pneumonia, diphtheria (C. diptheria).
Enterobacter	lower respiratory tract infection, UTI, hospital associated bacteremia, burn wound infections
Enterococcus	bacteremia, endocarditis, osteomyelitis, UTI, intraabdominal infection.
Escherichia coli	UTI, hemorrhagic colitis, hemolytic uremic syndrome, septicemia, neonatal meningitis, gastroenteritis.
Gardnerella vaginalis	bacterial vaginosis, UTI, bacteremia.
Haemophilus ducreyi	genital ulceration with regional adenopathy.
Haemophilus influenza	pneumonia, meningitis, epiglottitis, ditis.
Klebsiella	pneumonia, bronchitis, UTI, bacteremia, wound infection, biliary tract infection.
Legionella	Legionaire's Disease (pneumonia), Pontiac fever.
Leptospira	leptospirosis, Weil's Disease
Listeria monocytogenes	meningitis, bacteremia, endocarditis, cerebritis, listeriosis in pregnancy, granulomatosis infantiseptica
Moraxella catarrhalis	sinusitis, otitis media, acute urethritis, respiratory tract infections
Mycobacterium	tuberculosis, opportunistic systemic infections
Mycoplasma	community acquired pneumonia, tracheobronchitis, pharyngitis.

Neisseria gonorrhoeae	gonorrhoea
Neisseria meningitidis	meningitis, urethritis, arthritis, pneumonia
Nocardia	pneumonia, brain abscess, disseminated nocardial infection, mycetoma, cellulitis, lymphocutaneous nodules, keratitis.
Pasteurella	animal bite wound infections, respiratory tract infection, opportunistic infection.
Proteus	pneumonia, UTI, wound infection, chronic destructive ear infection, septicemia.
Pseudomonas aeruginosa	bacteremia, endocarditis, pulmonary infection, ear infection, burn wound infection, UTI, gastroenteritis, eye infection, musculoskeletal infection.
Pseudomonas cepacia	pulmonary infection in cystic fibrosis.
Rickettsia	Rocky Mountain Spotted Fever
Salmonella	enteritis, septicemia, enteric fever, typhoid fever.
Serratia	lower respiratory tract infection, UTI, bacteremia, wound infection.
Shigella	Shigellosis (dysentery), reactive arthritis.
Staph. aureus	scalp skin syndrome, cutaneous infections, toxic shock syndrome, endocarditis, pneumonia, food poisoning, septic arthritis, osteomyelitis, septicemia.
Staph. epidermidis	endocarditis, foreign body infection, osteomyelitis, UTI
Strep. pneumoniae	pneumonia, sinusitis, otitis media, meningitis, bacteremia
Strep. pyogenes	pharyngitis, scarlet fever, streptococcal toxic shock syndrome, erysipelas, pyoderma, rheumatic fever, glomerular nephritis.
Strep. viridans	bacteremia, endocarditis, dental caries.
Strep. Group B	neonatal infections (bacteremia, meningitis, pneumonia, postpartum sepsis).
Treponema pallidum	syphilis
Ureaplasma	nongonococcal urethritis, postpartum bacteremia, urethrostatis, epididymitis, septic arthritis, chorioamnionitis, respiratory infection in newborns, newborn meningitis.
Vibrio cholerae	cholera.
Yersinia enterocolitica	enterocolitis, polyarthritis, liver abscess, septicemia.
Yersinia pestis	plague (Bubonic, Septicemic, Pneumonic).

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