

Publisher's Note

Salem Health: Infectious Diseases & Conditions Second Edition is part of the Salem Health series, which also includes *Women's Health* (2019), *Aging* (Second Edition 2019), *Addictions, Substance Abuse & Alcoholism* (Second Edition 2018), *Genetics & Inherited Conditions* (Second Edition 2017), *Community & Family Health Issues* (2017), *Cancer* (Second Edition 2016), *Nutrition* (2016), *Psychology & Behavioral Health* (Second Edition 2015), and the core set *Magill's Medical Guide* (Eighth Edition 2018). All titles within the Salem Health series come with free online access with the purchase of the print set.

This second edition of *Salem Health: Infectious Diseases & Conditions* presents essays on a variety of topics in infectious, or communicable, diseases. Original articles have been updated and new articles added to bring the content up to date. Two introductions, one from the first edition in 2012, and one for this second edition, follow this Note.

SCOPE AND COVERAGE

This A-Z encyclopedia arranges 632 essays covering all aspects of infectious diseases, including pathogens and pathogenicity, transmission, the immune system, vaccines, diagnosis, prevention, treatment, drug resistance, epidemiology, history, organizations, research, and social concerns such as aging, poverty and disease, children and disease, stress, quarantine, and bioterrorism. The essays were written for non-specialists by medical professionals such as doctors, nurses, clinical practitioners, researchers, and therapists, as well as professors in science and medicine and professional medical writers. *Salem Health: Infectious Diseases & Conditions* will interest science and premedical students, students of epidemiology and public health, students of global and tropical medicine, public library patrons, and librarians building collections in science and medicine.

Salem Health: Infectious Diseases & Conditions surveys infectious disease from a variety of perspectives, offering historical and technical (disease-specific) background with a balanced discussion of discoveries, developments, and prognoses. Essays on specific diseases and conditions constitute the core coverage and range from discussions of the common, such as acne and influenza, to the rare,

such as prion diseases and necrotizing fasciitis, or flesh-eating bacteria. Essays also provide overviews of disease prevention, diagnosis, and treatment; outline specific disease-causing agents, such as bacteria, viruses, fungi, parasites, prions, and protozoa; examine pathogen types and structures, modes of transmission, clinical significance, and susceptibility to drugs; and address the social significance of infectious diseases.

The set also includes essays reflecting the global reach of infectious disease, exploring topics such as emerging and reemerging infectious diseases, developing countries, epidemics and pandemics, endemic diseases, tropical medicine, globalization, neglected tropical diseases, water quality and treatment, sanitation, and travel. Prominent in the set is discussion of the work of the World Health Organization and other such global health agencies.

ORGANIZATION AND FORMAT

Essays vary in length from one to five pages. Every essay begins with ready-reference top matter:

- **CATEGORY** lists the focus of the essay, as one of the following –
 - Diagnosis,
 - Diseases and conditions,
 - Epidemiology,
 - Immune response,
 - Pathogen,
 - Prevention,
 - Transmission, and
 - Treatment;
- **ALSO KNOWN AS** provides alternative names used, where applicable;
- **TRANSMISSION ROUTE** (such as blood, direct contact, ingestion, and inhalation) is listed for pathogen essays;
- **ANATOMY OR SYSTEM AFFECTED** lists areas of the body affected for diseases and conditions essays;
- **DEFINITION** introduces, defines, and describes the essay topic;

Essays on diseases and conditions provide information in the following text subsections:

- **CAUSES** identifies the known cause or causes of the disease or condition;

- **RISK FACTORS** identifies the major factors involved and the population affected;
- **SYMPTOMS** lists the main symptoms associated with the disease or condition;
- **SCREENING AND DIAGNOSIS** identifies the procedures used to screen for and diagnose the disease or condition;
- **TREATMENT AND THERAPY** identifies the treatment and therapy regimens, if any;
- **PREVENTION AND OUTCOMES** identifies any behaviors that can catch the infection early, mitigate its effect, or prevent its occurrence, as well as typical short-term and long-range outcomes.

Pathogen essays include the following three text subsections:

- **NATURAL HABITAT AND FEATURES**; Pathogenicity and Clinical Significance; and Drug Susceptibility.

Pathogen essays also feature a sidebar providing the pathogen's taxonomic classification, listing information on genus and species (namely those affecting humans), among other ranks.

The main text of essays covering diagnosis, epidemiology, immune response, prevention, and treatment offer the following subsections:

- **TOPICAL** subheads divide the text and guide readers through the essay.
- **IMPACT** outlines the effects of the topic on areas such as public health, epidemiology, the practice of medicine, medical research, and pharmacology and treatment.

All essays conclude with the following:

- **CONTRIBUTOR'S BYLINE** notes the specialist who wrote the essay and his or her advanced degrees and other credentials;
- **FURTHER READING** lists sources for further study, often with annotations, and includes the latest relevant works and full citation data for easy library access;
- **WEB SITES OF INTEREST** provides a list of authoritative Web sites, including U.S. governmental agencies such as the Centers for Disease Control and Prevention and the National Center for Emerging and Zoonotic Infectious Diseases; nongovernmental organizations such as the World Health

Organization, the Alliance for the Prudent Use of Antibiotics, and the Clean Hands Coalition; professional and academic societies such as the American Academy of Pediatrics; online texts such as Microbiology and Immunology On-line; and health consumer sites such as MedlinePlus (National Library of Medicine and National Institutes of Health) and WebMD;

- **SEE ALSO** lists cross-references to related essays within the set.

Many essays in the encyclopedia include sidebars featuring key terms, key facts, newsworthy topics, questions to ask one's health care provider, and other topics. A number of essays feature tables with statistics and other data on infection rates, pathogen types, disease trends, and affected populations.

SPECIAL FEATURES

The articles in *Salem Health: Infectious Diseases & Conditions* are arranged alphabetically by title; a Complete List of Contents appears at the beginning of each volume. More than 200 photographs, charts, and other media illustrate the text.

In addition, nine appendixes appear at the end of volume 3. In the section "Reference Tools," the Glossary provides hundreds of definitions of commonly used scientific and medical terms and concepts, especially as they apply to infectious diseases, along with definitions of dozens of common medical prefixes and suffixes. The Bibliography offers citations for both classic and recently published sources for additional research. The Resources appendix provides a list of organizations and support groups. The importance of the Internet to general education in infectious diseases is reflected in the annotated Web Sites appendix. Other appendixes include Medical Journals, which lists professional journals commonly encountered in any study of infectious diseases, and a Pharmaceutical List, categorized by type of drug (antibiotic, antiviral, antifungal, antimalarial, antimycobacterial, and antiparasitic).

In the section "Historical Resources," the Time Line offers a chronological overview of major developments in infectious disease from 1700 b.c.e. to the present. The Biographical Dictionary of Scientists in Infectious Disease features 144 scientists who had an impact on the science of infectious diseases. Nobel Prizes for Discoveries in Infectious Diseases lists

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Nobel laureates who made significant contributions to areas related to that field.

Three indexes appear at the end of volume 3, including Entries by Anatomy or System Affected, a Category Index, and a comprehensive Subject Index that directs readers to related topics throughout the set.

ACKNOWLEDGMENTS

The editors of Salem Press wish to thank the many medical professionals, scholars, and writers who contributed to this set; their names, degrees and other credentials, and academic and other affiliations appear in the list of contributors that follows. Special thanks to editor H. Bradford Hawley, M.D., an infectious disease specialist who applied his broad medical knowledge to this second edition.

ABOUT THE EDITOR

H. Bradford Hawley, M.D. is an Emeritus Professor of Medicine and former Chief of Infectious Diseases at the Boonshoft School of Medicine, Wright State University. He has been elected to fellowship in the American College of Physicians, American College of Chest Physicians, Society for Healthcare Epidemiologists, and Infectious Diseases Society of America. Dr. Hawley is a former member of the Board of Directors of the Certification Board of Infection Control and past President of the Infectious Diseases Society of Ohio. He has made more than one hundred contributions to the medical literature and currently serves as a manuscript reviewer for several medical journals, including the *Annals of Internal Medicine* and *Clinical Infectious Diseases*. He is a frequent contributor to Salem Press health publications.

A

Abscesses

CATEGORY: Diseases and conditions

ANATOMY OR SYSTEM AFFECTED: All

ALSO KNOWN AS: Boils, carbuncles, cysts, fistulas, pustules, whiteheads

DEFINITION

An abscess is an encapsulated accumulation of pus that can form during the body's response to infections from bacteria, viruses, or parasites. Abscesses can form in any part of the body, including the liver, brain, abdomen, skin, muscle, and bones, and in the tissues of the mouth, teeth, uterus, and ovaries.

CAUSES

In general, an abscess forms when the body responds to bacteria, viruses, parasites, and other foreign objects. When tissue is damaged, the cells die, leaving a space where infected cells and fluid can accumulate. White blood cells move into the infected area to fight the infection. As these cells die, they accumulate as pus. The pus pushes against the surrounding tissue, and the surrounding tissue eventually grows around the infected area, encapsulating the pus and thus forming an abscess.

Depending on the location, the causes of abscesses vary. Liver abscesses are predominantly (80 percent) caused by polymicrobial infections, but can also be caused by parasitic (amebic) or fungal (*Candida*) infections. The most common bacterium isolated from liver abscesses is *Escherichia coli*. Another bacterium associated with liver abscesses is *Staphylococcus aureus*. These abscesses usually result from distant infections.

Dental abscesses are found in the mouth, face, jaw, throat, or tooth. They are caused by the bacteria in a cavity or by the bacteria that accumulate within pockets formed in supportive bone in periodontal disease. Poor dental health and a lack of proper dental care that leads to cavities or gum disease can lead to the formation of dental abscesses.

Skin abscesses are caused by clogged oil ducts or sweat glands that become infected. Skin abscesses also are caused by bacteria entering through pores, hair follicles, or minor cuts.

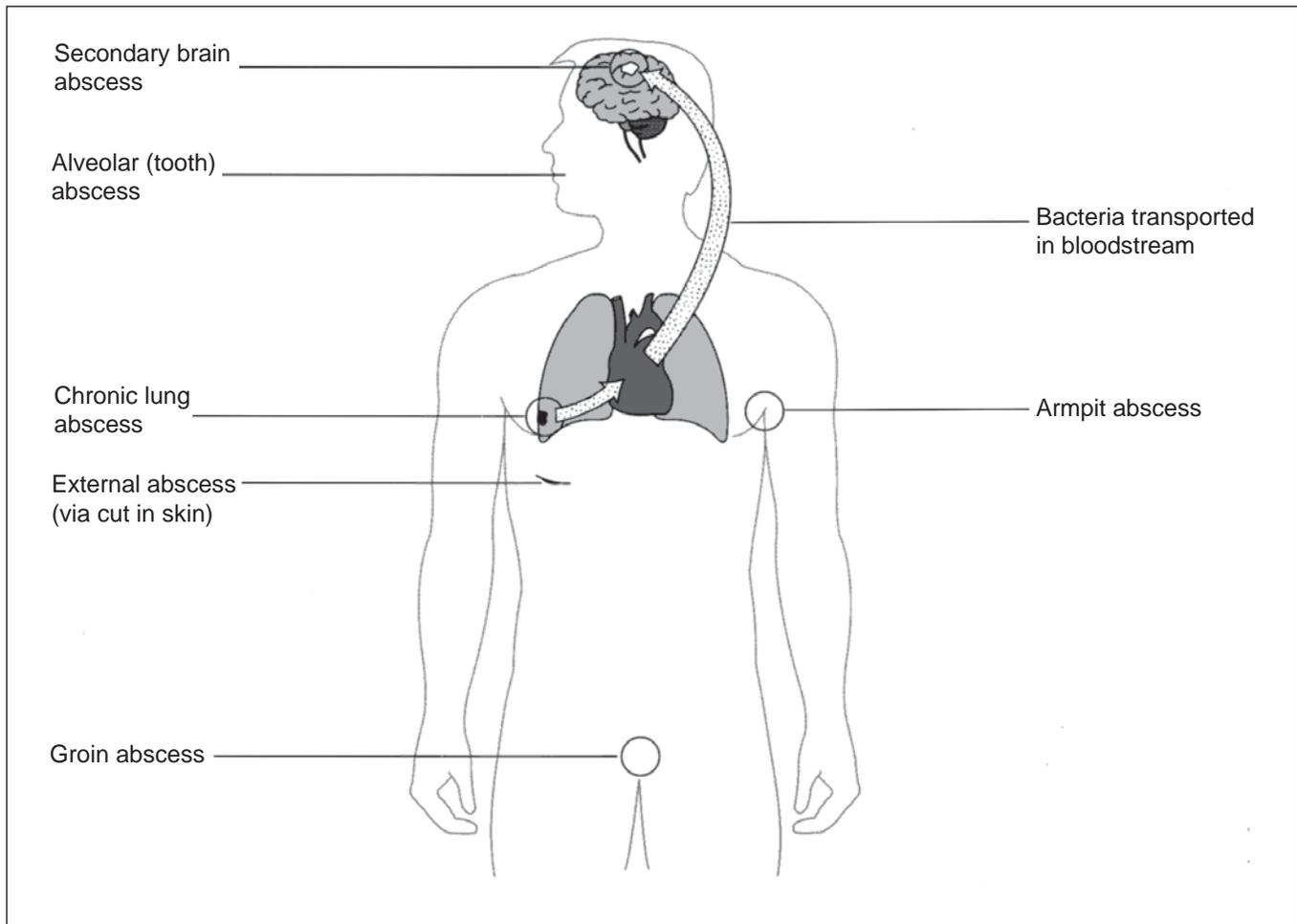
A ruptured appendix is one of the common causes of an abdominal abscess. Brain abscesses are caused by bacteria or fungi infecting the brain. Although brain abscesses are rare (because the blood-brain barrier protects the brain), some conditions, such as heart disease and some congenital diseases (especially in children), allow infections from other parts of the body to reach the brain. Ovarian abscesses are usually caused by bacterial infections from the genital tract. There are cases in which abscesses can form within the ovary from *Salmonella* infections remote from the site.

RISK FACTORS

For liver abscesses, some risk factors include biliary tract disease, in which the obstruction of bile flow allows bacteria to grow. Risk factors for liver and other abdominal abscesses include appendicitis (if the appendix ruptures and releases bacteria), inflammatory bowel disease, and trauma. A urinary tract infection can cause pelvic or kidney abscesses.

There is also evidence that persons with a prior injury (for example, a history of benign ovarian cysts) that leaves a scar or cavity at the injury site may be more susceptible to abscesses of the ovaries or uterus. One case involved the formation of a uterine abscess at the site where an intrauterine device was removed years earlier. *Salmonella* infections from other sources can lead to abscess formation in the ovaries weeks to years after the original infection.

Poor dental hygiene and periodontal gum disease, which lead to bacteria accumulation in the mouth, are risk factors for dental abscesses. Also, in general, underlying autoimmune disorders or conditions that weaken the immune system increase the risk for abscess formation because of the body's decreased ability to fight infections. The use of some medications, such as corticosteroids and



Abscesses are commonly located in soft tissues and near lymph nodes but may appear in internal organs and may cause other abscesses via bacterial migration.

chemotherapy, which weaken the immune system, are also risk factors.

SYMPTOMS

Symptoms of an abscess vary depending on the location of the abscess, on whether it interferes with the function of the specific organ, and on whether it affects the nerves. In general, tenderness, pain, swelling, and redness are early signs of superficial abscesses. Deeper abscesses, which may go undiagnosed for some time, may also be accompanied by pain, tenderness, nausea, vomiting, fever, and chills.

SCREENING AND DIAGNOSIS

Skin abscesses appear as bumps or inflamed areas that may be tender to the touch. Deeper skin abscesses usually display the foregoing symptoms. An X ray,

computed tomography (CT) scan, magnetic resonance imaging (MRI) scan, or ultrasound can be used to diagnose suspected deeper abscesses.

TREATMENT AND THERAPY

Antibiotics alone cannot cure an abscess because the medication cannot enter the skin encapsulating the pus. Abscesses need to be drained by a medical provider, who will insert a sterile needle into the abscess and then aspirate (drain) the contents. For deep abscesses, the procedure is guided by MRI or CT scans. Then, antibiotic therapy is used to prevent reinfection and to treat the underlying infection. The antibiotic used depends on the location of the abscess and on the microorganism causing the infection. Sometimes, abscesses drain on their own. Incomplete drainage can cause the abscess to reform.

PREVENTION AND OUTCOMES

Bacteria are everywhere. The prevention of dental abscesses and superficial skin abscesses can be accomplished by good dental and general hygiene. The treatment of other infections and the control of associated risk factors may also help prevent the formation of deeper abscesses in other parts of the body.

Joan Y. Letizia, Ph.D.

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WEB SITES OF INTEREST

American Academy of Dermatology
<http://www.aad.org>

American Dental Association
<http://www.ada.org>

See also: Actinomycosis; Anal abscess; Boils; Cold sores; Eikenella infections; Empyema; Hygiene; Infection; Inflammation; Mastitis; Mouth infections; Mycetoma; Oral transmission; Pilonidal cyst; Skin infections; Tooth abscess.

Acanthamoeba and other free-living infections

ANATOMY OR SYSTEM AFFECTED: Brain, central nervous system, eyes, skin, vision

ALSO KNOWN AS: Acanthamoeba encephalitis, Acanthamoeba keratitis, Cutaneous acanthamebiasis, Granulomatous amebic encephalitis, Primary Amoebic Meningoencephalitis (PAME)

DEFINITION

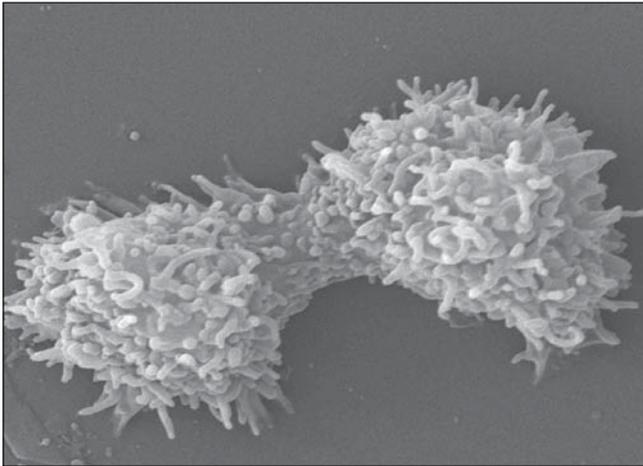
Infection by *Acanthamoeba* spp. and other free-living amoeba such as *Naegleria fowleri* and *Balamuthia mandrillaris* is often an infection of the eye, skin, and brain, but sometimes can lead to pneumonitis, encephalitis and dermatitis.

CAUSES

Acanthamoeba spp., *Naegleria fowleri* and *Balamuthia mandrillaris* are single-celled protozoa found in soil, contaminated water and the environment in general. Acanthamoeba infections can occur when the organism enters the body through corneal abrasions, lesions in the skin, upper-respiratory-tract olfactory epithelium, or through inhalation of airborne cysts. *N. fowleri* is often found in contaminated water (fresh water or swimming pools). The parasite can enter the host through the nose and then travel to the brain where it attacks the brain tissue. *B. mandrillaris* typically can enter the host through cuts or by breathing in dust containing the parasite.

RISK FACTORS

One common risk factor for *Acanthamoeba* keratitis (eye infection) is corneal trauma such as that caused by wearing contact lenses without adequate lens disinfection. Persons who wear soft contact lenses appear to be at a higher risk than persons who wear rigid lenses. Orthokeratology, a procedure that uses a rigid contact lens to modify the shape of the cornea, also leads to an increased risk of infection. A common risk factor for both *Acanthamoeba* spp. and *Naegleria sp.* infections is swimming in poorly chlorinated swimming pools, hot springs or warm freshwater environments like lakes and rivers. Furthermore, human immunodeficiency virus (HIV) infection, acquired immunodeficiency syndrome (AIDS) and the use of immunosuppressive drugs are risk factors for cutaneous (skin) *Acanthamoeba* as well as *Balamuthia* infections. Besides these, factors such as chronic health problems, malnutrition and corticosteroid treatment have been implicated in predisposing individuals to *Balamuthia* infections.



Acanthamoeba in the process of mitosis, or cell division. This image was recorded on a scanning electron microscope. Image courtesy of CDC. Photo by Catherine Armbruster, Margaret Williams, via Public Health Image Library.

SYMPTOMS

Symptoms of Acanthamoeba keratitis include blurred vision, conjunctival hyperemia, a corneal ring, a foreign-body sensation in the eye, pain, perineural infiltrates, photophobia, redness, and tearing. Symptoms of granulomatous amebic encephalitis (GAE), which affects the brain, include anorexia, confusion, hallucinations, headache, irritability, loss of balance, nausea, seizures, sleep disturbances, stiff neck, and vomiting. Several symptoms of primary amoebic meningoencephalitis (PAME) (caused by *Naegleria* sp.) as well as *Balamuthia* sp. are similar to GAE in that these patients also suffer from frontal headache, vomiting, stiff neck, hallucinations followed possibly by coma in later stages. Skin lesions are hallmarks of cutaneous *Acanthamoeba* infections as well as *Balamuthia* infections, with the latter usually distinguished by ulcerative plaque lesions on the nose or knee, elbow and chest.

SCREENING AND DIAGNOSIS

The initial diagnosis of acanthamoeba infection is based on a person's medical history. Corneal scrapings stained with agents like acridine orange or calcofluor white, or Giemsa stain, may reveal the cyst and trophozoite forms of the organism. Corneal culturing on non-nutrient agar plates seeded with bacteria such as *Escherichia coli* is frequently performed.

Confocal microscopy may also be helpful as a noninvasive diagnostic tool. Additionally, methods useful in obtaining an acute diagnosis for the GAE and cutaneous forms include biopsy, indirect immunofluorescence, culture, and the polymerase chain reaction (PCR) technique. *Naegleria fowleri* infections are diagnosed by analysis of CSF color as well as by looking for presence of *Naegleria* trophozoites by staining with agents such as Giemsa stain or Trichome. Furthermore, diagnosis of *Naegleria* infections also utilizes molecular methods such as Restriction Fragment Length Polymorphism (RFLP) and PCR. Techniques like PCR and serological methods like Immunofluorescent (IF) Antibody Staining and Enzyme-Linked Immunosorbent Assay (ELISA) are all commonly used to detect *Balamuthia* infections.

TREATMENT AND THERAPY

Due to the resistance of the cystic form of *Acanthamoeba*, treatment can be problematic. For keratitis, aggressive treatment with agents such as 0.1% propamidine isethionate, 0.02 to 0.04% chlorhexidine, and 0.02% PHMB is standard practice. A corneal transplant may be required for some cases. Medications such as amphotericin B, azithromycin, chlorhexidine, clindamycin, fluconazole, fluorocytosine, itraconazole, ketoconazole, metrometronidazole, pentamidine, sulfamethoxazole, and trimethoprim, have been used to treat other forms of acanthamoeba infection. The mortality rate for these infections can be quite high. For persons with HIV infection or AIDS, the mortality rate for cutaneous acanthamebiasis without central nervous system involvement is thought to be about 75 percent. The antibiotic Amphotericin B is usually the antibiotic of choice for *Naegleria* and *Balamuthia* infections but there are recent reports of fluconazole, miconazole, azithromycin, miltefosine and rifampin usage as well, both alone or in combination.

PREVENTION AND OUTCOMES

To minimize the risk of acanthamoeba and other free-living amoeba infection, persons should avoid swimming or bathing in contaminated water, practice good contact-lens hygiene, and maintain a healthy immune system.

*Julie Y. Crider, Ph.D.
reviewed by Sibani Sengupta, Ph.D.*

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WEB SITES OF INTEREST

American Academy of Dermatology
<http://www.aad.org>

American Academy of Ophthalmology
<http://www.aao.org>

Encephalitis Society
<http://www.encephalitis.info>

National Institute of Neurological Disorders and Stroke
<http://www.ninds.nih.gov>

Public Health Agency of Canada
<http://www.phac-aspc.gc.ca>

See also: Bacterial infections; Bacterial meningitis; Conjunctivitis; Encephalitis; *Escherichia*; Eye infections; Impetigo; Keratitis; Skin infections; Soilborne illness and disease; Waterborne illness and disease.

Acariasis

CATEGORY: Diseases and conditions

ANATOMY OR SYSTEM AFFECTED: Gastrointestinal system, skin, urinary system

ALSO KNOWN AS: Acaridiasis, acarinosis, scabies

DEFINITION

Acariasis is both an infestation of mites and a disease caused by mites.

CAUSES

Mites are a vast and diverse species of tiny parasitic and free-living arthropods that can infect the skin, gastrointestinal tract, lungs, urinary tract, and other areas of the body. Cutaneous infestation is one of the most common forms of acariasis and occurs when mites, such as *Sarcoptes scabiei* var. *hominis* (human scabies), burrow into the skin or hair follicles and deposit proteins that produce an allergic cutaneous dermatitis. The remains of dead dust mites and their fecal matter are also a major source of allergens. These allergens mediate a type 1 hypersensitivity reaction in atopic persons. In addition to causing cutaneous dermatitis and producing allergens, mites can cause illness by acting as vectors for parasitic diseases. For example, the larvae of trombiculid mites, the chigger mite (*Trombicula*), transmits scrub typhus (tsutsugamushi disease) and other rickettsial agents.

RISK FACTORS

Mites often thrive and multiply in warm moist areas and feed on dead skin from humans and animals. Some mites are also highly contagious. Thus, environmental factors such as overcrowding and poor hygiene are important risk factors for acariasis. Other risk factors include delayed treatment of primary cases, which can foster the spread of acariasis, and a lack of public awareness. Some persons may also have a genetic predisposition for developing hypersensitive reactions to mites.

SYMPTOMS

The symptoms of acariasis vary depending on the type of infestation. The inflammation and skin lesions of cutaneous acariasis are often accompanied by severe itching. Infestation of the gastrointestinal tract can present with symptoms such as abdominal pain and diarrhea. Pulmonary acariasis can cause respiratory symptoms such as a runny nose, coughing, sneezing, and wheezing. Acariasis of the urinary tract can result in symptoms of urinary frequency, urinary urgency, and hematuria.



A micrograph of the chigger mite *Trombicula*, which causes acariasis.

SCREENING AND DIAGNOSIS

The diagnosis of acariasis differs depending on the organ affected. Cutaneous acariasis is diagnosed by the presence of mites and mite eggs in microscopic analysis of skin scrapings. Gastrointestinal acariasis is diagnosed by detection of mites in stools. Pulmonary acariasis is diagnosed by isolating and identifying mites using physical or chemical methods of sputum liquefaction. The presence of mites in microscopic analysis of the urine is helpful in the diagnosis of acariasis of the urinary tract. In addition, blood examination for eosinophils and specific antibodies, and radiographic studies of the affected organs, may be useful in diagnosing acariasis.

TREATMENT AND THERAPY

A number of effective topical, oral, and systemic therapies, and avoidance and containment strategies, are available for the treatment of acariasis. The specific treatment plan depends on the type of acariasis being treated. For example, treatment of allergic rhinitis and asthma symptoms in people who are allergic to dust mites includes reducing exposure; taking medications such as antihistamines, decongestants, and topical nasal steroids; and getting allergy shots.

PREVENTION AND OUTCOMES

Acariasis can be prevented by addressing the risk factors. Preventive measures include reducing overcrowding, improving hygiene, promptly and adequately treating the illness to stop further disease spread, and promoting public awareness of the disease.

Diep Koly, M.D.

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WEB SITES OF INTEREST

*Centers for Disease Control and Prevention, Division of
Vector Borne Infectious Diseases*

<http://www.cdc.gov/ncidod/dvbid>

Microbiology and Immunology On-line: Parasitology

<http://pathmicro.med.sc.edu/book/parasit-sta.htm>

*National Center for Emerging and Zoonotic Infectious
Diseases*

<http://www.cdc.gov/ncezid>

See also: Arthropod-borne illness and disease; Body lice; Crab lice; Fleas and infectious disease; Flies and infectious disease; Head lice; Insect-borne illness and disease; Mites and chiggers and infectious disease; Mosquitoes and infectious disease; Parasitic diseases; Scabies; Ticks and infectious disease; Vectors and vector control.

Acne

CATEGORY: Diseases and conditions

ANATOMY OR SYSTEM AFFECTED: Skin

ALSO KNOWN AS: Acne vulgaris, blackheads, pimples, whiteheads

DEFINITION

Acne is a skin condition that occurs when the pores of the skin become clogged, inflamed, and sometimes infected. These clogged pores can lead to the formation of blackheads, whiteheads, or pimples. Acne is more prevalent in teenagers but also occurs in adults.

CAUSES

The main causes of acne include changes in levels of male hormones called androgens, increased sebum production, changes inside the hair follicle, and bacteria. Acne starts in the skin's sebaceous glands. These glands secrete an oily substance called sebum. This sebum normally travels through a tiny hair follicle from the gland to the skin's surface. Sometimes the sebum becomes trapped, mixing with dead skin cells and bacteria. This causes clogged pores called comedones.

Blackheads are comedones that reach the skin's surface. Whiteheads are comedones that stay beneath the surface of the skin. Small red bumps, pimples, and cysts may also develop.

RISK FACTORS

Risk factors for acne include an age range of twelve to twenty-four years; Caucasian; changes in hormone levels, such as during puberty and pregnancy and before a menstrual period; stress; certain medicines (for example, androgens, lithium, and barbiturates); and certain cosmetic products.

SYMPTOMS

Acne symptoms vary from person to person and can range from mild to severe. They include excess oil in the skin, blackheads, whiteheads, papules (small pink bumps that may be tender to the touch), pimples (inflamed, pus-filled bumps that may be red at the base; also called pustules), nodules (large, painful, solid lumps that are lodged deep within the skin), and cysts (deep, inflamed, pus-filled lumps that can cause pain and scarring).

SCREENING AND DIAGNOSIS

A health care provider will examine areas of skin with the most sebaceous glands, such as the face, neck, back, chest, and shoulders. If the acne is severe, the patient may be referred to a dermatologist, or skin specialist.

TREATMENT AND THERAPY

Acne may require a combination of treatments, but most acne does not require surgery. Some treatments may take several weeks to work, and the skin may actually appear to get worse before it gets better.

Over-the-counter topical medicines (for example, cleansers, creams, lotions, and gels) reduce the amount of oil or bacteria, or both, in the pores. These medicines may contain benzoyl peroxide, salicylic acid, sulfur, and resorcinol.

Prescription topical medicine includes cleansers, creams, lotions, and gels to reduce the amount of oil or bacteria, or both, in the pores. These prescription medicines include antibiotics such as clindamycin (Cleocin T), erythromycin, tretinoin (Retin-A, Avita), adapalene (Differin), azelaic acid (Azelex), tazarotene

U.S. Government Registry for Women Using Accutane

On March 1, 2006, the U.S. Food and Drug Administration (FDA) started iPledge, a mandatory registry designed to control use of the powerful acne medicine isotretinoin, sold under the brand name Accutane and also under the trade names Amnestream, Claravis, and Sotret. The registry had been recommended by FDA advisory committees in 2000 and 2004 to help prevent birth defects and disorders in children born to women using isotretinoin and to collect information on the incidence of suicide among users.

The manufacturer of Accutane, Roche Pharmaceuticals, had always strongly warned women of the dangers posed to developing fetuses by the use of Accutane during pregnancy. Even so, Roche reported that between 1982, when the FDA first approved the sale of isotretinoin, and 2000 there had been 383 live births among women taking the drug; 162 of the infants (42 percent) were born with brain or heart defects or mental retardation.

Women who plan to become pregnant and who seek a prescription for isotretinoin must register with iPledge and must submit two negative pregnancy tests before receiving a prescription; they also

must be tested before each monthly refill, and they must agree to take two forms of birth control while using the drug—or else promise to abstain from sex for one month before treatment, while under treatment, and for one month afterward. Women have to sign a document acknowledging that they understand isotretinoin increases the risk of birth defects, depression, and suicide. Men desiring the drug are required to sign the document as well, to ensure that they know why they should not share pills with women. Physicians prescribing isotretinoin and wholesalers and pharmacists who distribute it are also required to register with iPledge and to agree to enforce the restrictions.

Many dermatologists and other doctors are uncomfortable with the iPledge regulations. Although aware of the drug's dangers, they consider isotretinoin indispensable in treating severe cases of acne that are resistant to less powerful medications, and they fear that onerous conditions for access to the drug might discourage persons from obtaining the medication they really need.

—Milton Berman, Ph.D.

(Tazorac), and dapsone (Aczone). Oral antibiotics, aimed at controlling the amount of bacteria in pores, include doxycycline, minocycline, tetracycline, erythromycin, clindamycin, amoxicillin, cephalosporins, sulfamethoxazole, and trimethoprim.

Oral medicines, aimed at controlling androgen levels, include birth control pills (pills that have a combination of hormones, such as estrogen and progestin, may be the most effective in improving acne); spironolactone; oral retinoids, aimed at reducing the size and secretions of sebaceous glands and used only for severe cases of cystic acne; and isotretinoin (Accutane), which must not be taken by women who are pregnant or who may become pregnant because of the risks of serious birth disorders.

There are a number of procedures to treat acne. These procedures, some of which have risks, such as scarring and infection, include the injection of corticosteroid directly into the cyst (mostly used for large, cystic acne lesions); acne surgery, in which specialized extractors are used to open, drain, and remove con-

tents of acne lesions; and acne scar revision to minimize acne scars, which includes chemical peels (consisting of glycolic acid and other chemical agents to loosen blackheads and decrease acne papules) and dermabrasion (which smooths the skin by “sandpapering” it). Other procedures to treat acne include scar excision (a tiny punch tool or a scalpel is used to remove scars), collagen fillers (the pits of scars are filled with a collagen substance), laser resurfacing (scars are removed and underlying skin is tightened), and phototherapy (skin is exposed to an ultraviolet light source for a set time).

PREVENTION AND OUTCOMES

It can be difficult to prevent acne. This is because it can be difficult to control the factors that cause it. However, there are some things one can do to keep acne from getting worse, such as gently washing one's face with mild soap and warm water twice a day (no more than twice) to remove excess oil. Scrubbing or washing too often can make acne worse. When

washing one's face, one should use his or her hands rather than a washcloth, use mild soap, and allow the face to dry before applying any lotion. One should not pick at or squeeze blemishes. Also, one should use lotions, soaps, and cosmetics labeled noncomedogenic, which keeps these products from clogging pores. Topical acne treatments should be used only as directed; using them more often could worsen the condition. One should wear sunscreen year-round. This is especially important when using medicine that can make skin more sensitive to the sun. Also helpful is recognizing and limiting emotional stress.

Jennifer Hellwig, M.S., R.D.;
reviewed by Ross Zeltser, M.D. FAAD

FURTHER READING

Arowojolu, A., et al. "Combined Oral Contraceptive Pills for Treatment of Acne." *Cochrane Database of Systematic Reviews* (2009): CD004425. Available through EBSCO DynaMed Systematic Literature Surveillance at <http://www.ebscohost.com/dynamed>.

EBSCO Publishing. *Health Library: Phototherapy*. Available through <http://www.ebscohost.com>.

National Institute of Arthritis and Musculoskeletal and Skin Diseases. "Questions and Answers About Acne." Available at http://www.niams.nih.gov/health_info/acne.

WEB SITE OF INTEREST

American Academy of Dermatology
<http://www.aad.org>

See also: Abscesses; Boils; Chickenpox; Children and infectious disease; Impetigo; Infection; Pilonidal cyst; Pityriasis rosea; Rubella; Scabies; Skin infections.

Actinomycosis

CATEGORY: Diseases and conditions

ANATOMY OR SYSTEM AFFECTED: Abdomen, gastrointestinal system, jaw, lungs, mouth, respiratory system

DEFINITION

Actinomycosis is a treatable bacterial infection that results in abscesses (collections of pus) in the

abdominal cavity, jaw (cervicofacial), lungs (thoracic), or throughout the body (generalized actinomycosis).

CAUSES

Actinomycosis is most often caused by infection by the bacterium *Actinomyces israelii*, which is present in the gums, teeth, and tonsils.

RISK FACTORS

The risk factors that increase the chance of developing actinomycosis include dental disease, trauma, and aspiration (that is, when liquids or solids are sucked into the lungs).

SYMPTOMS

The symptoms of actinomycosis include pain; fever; vomiting; diarrhea; constipation; weight loss; sputum-producing cough; drainage of pus through the skin; and small, flat, hard, and sometimes painful swellings around the mouth, neck, or jaw, which may or may not discharge pus.

SCREENING AND DIAGNOSIS

Screening for actinomycosis includes a full medical history, questions about symptoms, and a physical exam. Tests may include analyses of pus, sputum, or tissue, and could include X rays.

TREATMENT AND THERAPY

Treatment options include medications (high doses of antibiotics) and the drainage of abscesses.

PREVENTION AND OUTCOMES

The best way to reduce the chance of developing actinomycosis is to prevent dental disease by practicing good dental hygiene and by regularly visiting a dentist for cleaning and an examination.

Krishna McCoy, M.S.;
reviewed by David L. Horn, M.D., FACP

FURTHER READING

EBSCO Publishing. *DynaMed: Actinomycosis*. Available through <http://www.ebscohost.com/dynamed>.

Gorbach, Sherwood L., John G. Bartlett, and Neil R. Blacklow, eds. *Infectious Diseases*. 3d ed. Philadelphia: W. B. Saunders, 2004.