

Infectious Disease Update

News

Medical

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Our Values

Quality
Integrity
Innovation
Accountability
Collaboration
Leadership

Infections caused by Members of The Genus *Klebsiella*

The Genus

Members of the genus *Klebsiella* are gram-negative rods belonging to the tribe Klebsiellae of the family Enterobacteriaceae.



Gram stain of *Klebsiella pneumoniae*
Picture by the author

First described by a German microbiologist, Krebs, in the 19th century, these organisms are nonmotile and grow very well on moist conventional laboratory culture media.

One of the distinguishing features of this genus is the presence of a prominent capsule. This capsule imparts a very characteristic look to the colonies of these organisms on most culture media giving them a moist, mucoid appearance. When the colony is probed with an inoculating loop or needle, it has a consistency similar to soft butter. Since the members of this genus are lactose-positive, on differential enteric culture media, such as MacConkey agar, very distinctive pink (due to lactose fermentation), mucoid colonies are formed. This gives the microbiologist an immediate clue that a

member of this genus is probably present.

The polysaccharide capsule is the main determinant of the pathogenicity and virulence of the *Klebsiella*. The capsule is composed of complex acidic polysaccharides. Its sheer size protects the microorganism from phagocytosis by white cells (polymorphonuclear granulocytes) and protects it from the activity of bactericidal antibodies.



The distinctive mucoid colonies of *Klebsiella pneumoniae* grown on MacConkey agar
Picture by the author

Speciation

Even though these microorganisms have been well known for over a hundred years, there is still some



Suggest decreasing the size of the quality mark on the right, above, and inserting it to the left of “Our Values”. Looks somewhat out of place where it is.

question concerning the number of species and their relationship to each other. Most writers recognize the following species:

Klebsiella pneumoniae (the most common species associated with human disease)

Klebsiella oxytoca (second most common species associated with human disease)

Klebsiella ozaenae

Klebsiella rhinoscleromatis

Klebsiella terrigena

Klebsiella planticola

Klebsiella ornithinolytica

Some investigators have suggested that *K. pneumoniae*, *K. ozaenae* and *K. rhinoscleromatis* all be considered subspecies of *K. pneumoniae*. This suggestion, however, is not generally followed and most microbiologists and clinicians treat them as if they were separate species.

Diseases caused by the *Klebsiella*

First of all, the *Klebsiella* are found widely throughout nature and are often found as part of the normal flora of the GI tract, throat and skin of man and animals.

K. pneumoniae and *K. oxytoca* are responsible for almost **all** the infections associated with humans. The number of infections caused by *K. pneumoniae*, however, is far greater in number than those caused by *K. oxytoca*.

Pneumonia

Pneumonia caused by *K. pneumoniae* is the **most common** infection caused by this microorganism inside and outside of healthcare facilities. In previous eras, the disease was given the name “Friedländer’s pneumonia” and the organism referred to as “Friedländer’s bacillus”.

Most cases occur in middle-aged and older men with underlying debilitating diseases such as alcoholism, diabetes and chronic lung diseases. The main population group-at-risk, however, are persons suffering from alcoholism accounting for approximately two-thirds of patients with this pneumonia. Mortality rates can be as high as 50 % and, in the case of alcoholics who become bacteremic, mortality can reach almost 100 %!

The onset of the disease is usually rather sudden and symptoms associated with it are as follows:

- high fever
- chills
- flu-like symptoms
- malaise and body aches
- productive cough with a great deal of sputum

The sputum is usually quite thick and tinged with blood. The term “currant jelly sputum” has often been used to describe it.

On X-ray, pneumonia caused by *K. pneumoniae* is basically indistinguishable from that caused by *Streptococcus pneumoniae* (pneumococcal pneumonia). Infection usually involves one upper lobe but involvement of the lower lobes is not uncommon. While pneumococcal pneumonia usually resolves without any complications, that is not always true with *Klebsiella pneumoniae*. Often there are abscesses formed and lung tissue destruction.

Neonatal Infections

Both *K. pneumoniae* and *K. oxytoca* are associated with neonatal bacteremias. Most cases have occurred among premature infants.

Urinary Tract Infections

The most common causative agent is *K. pneumoniae* followed by *K. oxytoca*. These urinary tract infections are usually clinically indistinguishable from those caused by other common urinary tract pathogens. Most of these infections are the result of urinary

catheterization and are nosocomial in nature.

Wounds and Abscesses

In the hospital and long-term care setting, *Klebsiella* sp. are occasionally isolated from wounds and abscesses. Their pathogenic role, however, is often questionable as they are often colonizers causing no symptoms as opposed to being actual pathogens.

Diarrhea

Members of the genus *Klebsiella* are found as normal flora in the intestine, some strains of *Klebsiella* are considered “enterotoxigenic” and are capable of causing diarrhea. This is especially true in immunocompromised and immunosuppressed individuals.

Rhinoscleroma

This condition is caused by *K. rhinoscleromatis* and is a chronic inflammatory disease of the nasopharynx and other parts of the respiratory tract. It may also affect the trachea, bronchi, lips and nose. In some cases, the disease can lead to pronounced deformities of the nose



Deformity of the nose due to rhinoscleroma
McAllison University
Used with permission

The disease is rarely fatal unless the airway becomes blocked. The organism was first described in 1877 but it wasn't until 1961 that scientists were able to prove that it was the causative agent of

this condition. The disease is usually contracted by direct inhalation of the microorganism.

This disease occurs across the world but especially in Africa, Eastern Europe, Southern Asia and South America. It is still relatively rare in the United States with most cases being observed among recent immigrants. The incidence here, however, is increasing. Most cases occur in persons 10 to 30 years in age and the incidence is slightly higher among females.

Ozena

This is a disease of the nasal passages and is characterized by a disintegration of the mucous membranes and bony ridges of the nose. The causative agent is believed to be *K. ozaenae* but this is still conjectural. Common symptoms include nasal congestion and a very bad odor coming from the nose. Other symptoms include headache and sinusitis-like symptoms. Most cases occur among elderly persons abroad.

Epidemiology of *Klebsiella* Infections

Klebsiella infections are far more prevalent in health care settings than in the community. The two species that we see in this country, *K. pneumoniae* and *K. oxytoca*, are considered to be opportunistic pathogens associated mostly with the GI tract and mucosal surfaces.

In the healthcare setting, almost **all** cases are transmitted via the hands of healthcare workers. These organisms account for about 8 % of all nosocomial infections in the hospital setting. *K. pneumoniae* is among the top eight pathogens isolated from hospital patients.

Treatment of *Klebsiella* Infections

Almost universally, the members of this genus are resistant to the early beta-lactam antimicrobials such as penicillin,

ampicillin and amoxicillin. They are usually susceptible to the cephalosporins which are the drugs-of-choice. However, in recent years, isolates of *K. pneumoniae* resistant to the cephalosporins are rapidly emerging. This resistance is due to the presence of a group of enzymes referred to as "Extended spectrum beta-lactamases" or "SKBLs." The strains of *K. pneumoniae* that produce SKBLs are often referred to as SKBL-KP. These enzymes have the ability to break down the cephalosporins by cleaving the beta-lactam ring of the drug. The genetic characteristic to produce these enzymes is usually carried on a "plasmid." Organisms are often able to transfer this characteristic to another microorganism via plasmid transfer. As a consequence, we are now starting to see a number of other enteric bacteria (such as *E. coli*) that have the capability to produce SKBLs as a result of plasmid transfer.

Laboratory Tests used for the Identification of this Species

Members of the genus *Klebsiella* grow very well on all conventional laboratory media. Their capability to ferment lactose and their production of copious capsular material make their colonies very easy to detect on certain differential culture media, such as MacConkey agar. Not much of a chance to miss these microorganisms in a clinical specimen!

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Selected References

Bouza, E. and E. Cercenado. 2002. *Klebsiella* and *Enterobacter*: antibiotic resistance and treatment options. *Seminars in Respiratory Infections* **17**: 215-230.

Gupta, A. *et al.* 2003. Extended spectrum beta lactamase producing *Klebsiella pneumoniae* infections: a review of the literature. *Journal of Perinatology* **23**: 439-443.

Podschun, R. and U. Ullmann. 1998. *Klebsiella* spp. as nosocomial pathogens: epidemiology, taxonomy, typing methods and pathogenicity factors. *Clinical Microbiology Reviews* **11**: 589-603.

Electronic Resources

Umeh, O. and L.B. Berkowitz. 2002. *Klebsiella* infections. E-Medicine at <http://www.emedicine.com/med/topic1237.htm>

CDC announces New Workbook to protect Healthcare Workers from Sharps injuries

Feb 18, 2004 Press Release

The Centers for Disease Control and Prevention (CDC) announced a new tool to protect healthcare personnel from injuries caused by needlesticks and other sharps medical instruments. Such injuries can lead to diseases, such as hepatitis B and C and AIDS. These diseases may be caused when a healthcare worker is accidentally stuck by needles or other devices that are contaminated with the blood of an infected patient.

CDC estimates that hospital workers sustain more than 1,000 injuries a day from contaminated needles and other sharp devices used during the delivery of patient care. CDC data suggest that at least 65 % of these injuries are preventable by using safer devices and by taking appropriate safety measures.

The CDC workbook, entitled "*Sharps Safety: Be Sharp. Be Safe,*" promotes a comprehensive prevention program in the healthcare setting. A major goal is to heighten awareness among frontline healthcare personnel of specific steps they can take to protect themselves from sharps injuries.

"Protecting healthcare personnel is a CDC priority. Safer devices play an important role in preventing injuries to

healthcare personnel, but they aren't the complete solution," said CDC Director Julie L. Gerberding. "We need to create a culture of safety in this work environment to make sure healthcare organizations promote and support sharps injury prevention."

The Prevention Program targets both healthcare administrators and frontline workers.

"The cost of these injuries to the healthcare system and to healthcare personnel can be extensive," said Dr. Denise Cardo, Director of CDC's program to promote healthcare quality. "Treating a healthcare worker to prevent disease from a needlestick injury can cost \$ 500 to \$ 3,000. In addition, there can be a huge emotional toll associated with the fear and anxiety about getting a life-threatening disease from a needlestick."

The CDC workbook, available to all healthcare facilities, provides a practical plan for preventing injuries from needlesticks and other sharps devices. Once implemented, the program should lead to improved workplace safety for healthcare personnel. In addition, the strategies should help healthcare facilities meet certain aspects of accreditation organization requirements as they apply to healthcare worker safety and federal and state regulatory standards.

For more information on CDC's Sharps Safety Workbook, go to:
<http://www.cdc.gov/sharpsafety/>

Other Infectious Disease Notes

Bacteria from Environmental Surfaces in The Hospital

What happens when a healthcare worker puts his or her hand down on an environmental surface near a patient?

In a hospital study, it was found that 53% of the time, healthcare workers come away with a significant pathogen such as methicillin-resistant

Staphylococcus aureus (MRSA) or vancomycin-resistant enterococci (VRE).

Definitely makes you think about washing your hands after you've been in a patient's room!

Bhalla, A. *et al.* 2004. Acquisition of nosocomial pathogens on hands after contact with environmental surfaces near hospitalized patients. *Infection Control and Hospital Epidemiology* **25**: 164-167.

Drinking Fluids for Cold not supported by Medical Evidence

Contrary to what your mother and grandmother told you, there is no proof that this does any good for a cold. This is according to a review of the literature published in the February 28th issue of the *British Medical Journal*.

Guppy, M.P. *et al.* 2004. "Drink plenty of fluids": a systematic review of evidence for this recommendation in acute respiratory infections. *British Medical Journal* **328**: 499-500.

HDL Cholesterol levels increase after *Helicobacter pylori* Eradication

Not only is the presence of *Helicobacter pylori* bad for you in that it is the major cause of peptic ulcer disease, but now investigators have found that its presence causes one's HDL cholesterol level (the "good" cholesterol) to go down. On top of an ulcer, a person could also end up with coronary heart disease.

Researchers in Austria recently found that when *Helicobacter pylori* was eradicated through antimicrobial treatment, there was a **significant increase** in the HDL cholesterol levels. According to the investigators, the increase was equivalent to that seen with the use of statin drugs.

In the case of LDL cholesterol (the "bad" cholesterol), treatment and eradication had no effect.

Scharnagl, H. *et al.* 2004. Effect of *Helicobacter pylori* eradication on high-density lipoprotein cholesterol. *American Journal of Cardiology* **93**: 219-220.

Breast Cancer may be linked to Antibiotic Usage

Long-term antibiotic usage seems to increase the risk of breast cancer according to a recent report that appeared in the *Journal of the American Medical Association*.

Just how this relationship occurs is still not known. It has been speculated that it may involve weakened immune functions.

Velicer, C. M. *et al.* 2004. Antibiotic use in relation to the risk of breast cancer. *Journal of The American Medical Association* **291**: 827-835.

Survival of Causative Agent of Lyme Disease Studied

Researchers at the University of Texas Southwestern Medical Center have found that a substance found on the outer surface of the organism and called Outer-surface lipoprotein A or "OspA" for short, is essential if the causative agent of Lyme disease, *Borrelia burgdorferi*, is to colonize the tick and be able to reproduce.

The medical implications of these findings are not known at this time. However, the investigators feel that the more we learn about this organism and its life cycle, the closer we will come to being able to effectively treat and prevent Lyme disease.

Yang, X.F. *et al.* 2004. Essential role for OspA/B in the life cycle of the Lyme disease spirochete. *Journal of Experimental Medicine* **199**: 641-648.

Anthrax spores can germinate and grow in Soil

Traditionally, microbiologists have assumed that when the spores of *Bacillus anthracis*, the causative agent of anthrax, were in the soil, they were dormant and stayed that way until they met up with a warm-blooded animal.

According to researchers at the University of Michigan, this appears not to be the case! They used a nonpathogenic strain of *B. anthracis* and placed its spores into soil. To their surprise, the spores germinated into vegetative cells and reproduced.

Public Press release dated 14 Feb 2004 from The American Association for the Advancement of Science Annual Meeting entitled "Anthrax spores can germinate, grow and reproduce in soil"

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CDC upset with Low Flu Immunization Rates among Healthcare Workers

The Advisory Committee on Immunization Practices of the Centers for Disease Control and Prevention (CDC) met on February 25th to discuss the dismal record for healthcare workers in terms of getting the flu vaccine. Of all the recommended groups who should get the vaccine (persons over 50, very young children, pregnant women, persons with immune disorders, etc.), the healthcare worker group has the lowest compliance.

Across the nation, only 36 % of hospital workers get the flu vaccine yearly. Several years ago, in Connecticut, the Editor did a study of long-term care facilities and found the average to be about 47 %.

At this meeting, the National Foundation for Infectious Diseases pointed out that healthcare workers are often a key cause in the spread of flu. For example, in an outbreak in a neonatal unit where there were 19 cases and one death, only 15 % of the staff had received the vaccine.

Editor's Note: It has been this writer's observation that there are several key ingredients in a successful influenza immunization program. One very important one is an infection control practitioner who has a strong opinion in favor of the vaccine and tries every possible avenue to get employees to receive the vaccine. Another important ingredient is management – both nursing and administrative. If they get the vaccine, that certainly sets the stage for the employees.

Gimmicks work! Raffles, contests, etc. won't hurt in the least and often have a considerable effect on the participation.

Piercing of the Upper Ear Cartilage can be dangerous to Your Health!

Getting your ears pierced usually isn't considered a dangerous procedure.

That is, of course, if the piercing is of the traditional earlobe – not the upper ear cartilage!

Going through the grocery line at the local supermarket, I never cease to be amazed by the body piercing practices that have come into vogue.

Research in Oregon recently examined 118 individuals with a total of 186 piercings of upper ear cartilage. Seven were confirmed to have an infection caused by *Pseudomonas aeruginosa*. Four of these individuals ended up being hospitalized.

A follow-up study showed that the disinfectant bottle used by the establishment doing the piercings contained a strain of *P. aeruginosa* which was indistinguishable from the ones isolated from the patients by molecular subtyping.

Keene, W.E. *et al.* 2004. Outbreak of *Pseudomonas aeruginosa* infections caused by commercial piercing of upper ear cartilage. *Journal of The American Medical Association* **291**: 981-985.

Respiratory Syncytial Virus (RSV) Infections in the Elderly: Risk Factors

RSV infections are very common among children but their frequency and severity wane with age due to the presence of protective antibody levels.

In the frail elderly, however, these infections become a problem again. Researchers found that the risk factors for RSV infections in the elderly included underlying respiratory diseases (such as COPD), functional disabilities and a low serum titer of neutralizing antibodies (this last one being probably the most important).

The recommendation was made that a vaccine against RSV be considered by elderly persons, especially those with risk factors. Even if such a vaccine did not completely protect the person, it

would certainly reduce the severity of disease.

Walsh, E.E. *et al.* 2004. Risk factors for severe respiratory syncytial virus infection in elderly persons. *Journal of Infectious Diseases* **189**: 233-238.

Ask The Experts!

West Nile Virus Infection from Donated Blood

Question: I live in an area where the West Nile Virus (WNV) infection rate is relatively high. I have been told that it is possible to get this disease from donated blood. Is this true?

Answer: Yes, it's true but the odds are pretty slim! In 2003, we tested somewhere between 90 and 95 % of all blood donations for the presence of WNV). That was 6.2 million units that were screened. Of these, 1,027 were found to be positive. That's about 0.002 % of all the units tested.

The CDC has reported that if you receive a unit of blood containing WNV, you have about a 1 % chance of getting West Nile Virus neurological disease (WNND) and about a 6 % chance of getting West Nile Fever (WNF) which is relatively benign.

If you are scheduled for elective surgery and this is really a big concern to you, you might want to consider having your surgery in February through March when there is very little chance of the virus being in human blood. No guarantee though!

Additional information on this subject can be obtained from CDC at http://www.cdc.gov/ncidod/dvbid/westnile/conf/pdf/SMontgomery_1_04.pdf

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