Cavitations: Slang for Ischemic Osteonecrosis

Images: Leo Cashman
These bacteria were detected in the sample that was submitted for testing:

1. Actinomyces odontolyticus
2. Aggregatibacter actinomycetemcomitans
3. Atopobium rimae
4. Blastomyces dermatitidis chitin synthase
5. Bifidobacterium catenulatum xfp gene for fructose 6-phosphate phosphoketolase (was Lactobacillus bifidus) (bright)
6. Campylobacter gracilis
7. Capnocytophaga ochracea
8. Clostridium tetani TLYD
9. Enterobacter agglomerans
10. Enterobacter gergoviae
11. Escherichia coli
12. Fusobacterium necrophorum
13. Gemella morbillorum (active)
14. Gemella sanguis
15. Haemophilus aphrophilus
16. HPV 16
17. Klebsiella oxytoca
18. Klebsiella pneumoniae
19. Leptotrichia buccalis
20. Lactobacillus vaginalis
21. Mobiluncus curtisi
22. Mobiluncus mulieris (active)
23. Mycobacterium leprae
24. Neisseria gonorrhoeae
25. Neisseria mucosa
26. Ochrobactrum anthropi
27. Parvimonas micra (active/very bright)
28. Porphyromonas endodontalis
29. Porphyromonas gingivalis
30. Prevotella denticola (active/bright)
31. Prevotella melaninogencia
32. Prevotella nigrescens
33. Propionibacterium acnes
34. Pseudomonas aeruginosa
35. Peptostreptococcus micros
36. Salmonella typhi
37. Selenomonas noxia (active)
38. Stenotrophomonas maltophilia
39. Streptococcus anginosus
40. Streptococcus mutans (active/faint)
41. Tannerella forsythia
42. Tannerella forsytheseis sod (bright)
43. Veillonella parvula
Glossary

(**) = presence of sub species

(***) = presence of multiple sub species

(**) Or (***) = the immune system is being challenged

(**) Or (***) PLUS (bright) = micro organism is viable and in heavy concentration

Active = the micro-organism is alive and well and is not is not being effectively attacked by your immune system.

Bright = heavy concentration of micro organism

Faint = positive identification with low concentration of micro organism

Smear = multiple sub species – more than can be identified

Protein A = active staph infection
# Dental DNA

## #30 Root Canalled Tooth

### Heart
- \( \checkmark \) Aggregatibacter actinomycetemcomitans
- \( \checkmark \) Campylobacter gracilis
- \( \checkmark \) Enterobacter aerogenes
- \( \checkmark \) Gemella morbillorum
- \( \checkmark \) Leptotrichia buccalis
- \( \checkmark \) Neisseria gonorrhoeae
- \( \checkmark \) Neisseria mucosa
- \( \checkmark \) Prevotella denticola
- \( \checkmark \) Propionbacterium acnes
- \( \checkmark \) Pseudomonas aeruginosa
- \( \checkmark \) Tannerella forsythia (53% increase)

### Nerves
- \( \checkmark \) Capnocytophaga ochracea
- \( \checkmark \) Escherichia coli
- \( \checkmark \) Fusobacterium necrophorum
- \( \checkmark \) Gemella morbillorum
- \( \checkmark \) Haemophilus aphrophilus
- \( \checkmark \) Neisseria gonorrhoeae
- \( \checkmark \) Pseudomonas aeruginosa
- \( \checkmark \) Salmonella typhi
- \( \checkmark \) Streptococcus mutans

### Lungs
- \( \checkmark \) Klebsiella pneumonia
- \( \checkmark \) Pseudomonas aeruginosa
- \( \checkmark \) Streptococcus anginosus

### Red Blood Cells
- \( \checkmark \) Aggregatibacter actinomycetemcomitans

### Porins
- \( \checkmark \) Neisseria gonorrhoeae

### Oral Cancer
- \( \checkmark \) Prevotella melaninogena

### Liver & Spleen
- \( \checkmark \) Salmonella typhi

### Prostrate & Skin Acne
- \( \checkmark \) Propionbacterium acnes

### Kidney
- \( \checkmark \) Porphyromonas gingivalis

### White Blood Cells
- \( \checkmark \) Neisseria gonorrhoeae
Lactobacillus vaginalis
Vaginal fluids

Leptotrichia buccalis
Neutropenia – perio – hepatic abscesses (rare) - expansion of problems if patient’s immune is compromised
(Minocycline, doxycycline)

Mobiluncus curtisi
Vaginal fluids – a marker” for Bacterial vaginosis (BV) – mainly associated with pelvic inflammatory disease.

Mobiluncus mulieris
Sexually transmitted disease – Primary bacteria in Bacterial vaginosis (BV) – only occurs in females of reproductive age.
Lactobacillus lowers pH of vagina making it more resistant to growth of microbes. Antibiotics and intrauterine devices alter vaginal growth bacteria – pH < 4.5 kills bacteria, > 6.5 favors growth. H$_2$O$_2$ inactivates M. mulieris (Clindamycin resistant – hydrogen peroxide inactivates it)

Mycobacterium leprae
Causes leprosy – Hansen’s disease – attacks skin, nerves, mucous membranes – peripheral nerves and upper respiratory tract – muscle weakness – swollen lymph nodes – nose bleeds – loss of touch sensation – also sensations of hear and pain in peripheral nerves. Some kidney disease (Clarithromycin)

Neisseria gonorrhoeae
Invasive toward phagocytes causing release of cytokines leading to apoptosis by releasing cytochrome C from mitochondria. This leads to apoptosis. Endotoxin releases it – causes calcium fluxes – meningitis – seizures (Amoxil, Doxycycline, Erythromycin Minocycline)
**BACTERIAL SUMMARY SHEET**

**Actinomyces odontolyticus**
Draining sinus's - found in mouth, colon, vagina, Generally due to injury to mucous membranes
[-] (-)

**Aggregatibacter actinomycetemcomitans**
Heart - endocarditis - hemolysin, porin with high demand for Fe, significant drops in Hgb, Hct - LtxA virulence factor that lyses only PMNs, macrophages and Monocytes by triggering degranulation - if present in perio makes it 500% worse than if absent -- hard to overcome
[PMN, Hct, Hgb, Mono, Macrophage] (Doxy)

**Atopobium rima**
Perio
[-] (-)

**Bifidobacterium Catenulatum xfp gene for fructose 6 phosphate phosphoketolase (was Lactobacillus bifidus)**

**Blastomyces dermatitidis chitin synthase**
Carried on cats - fungal infection leading to osteomyelitis
(-)

**Campylobacter gracilis**
Heart attacks - perio - impaired immune response (Erythromycin) [imm system - WBC]

**Capnocytophaga ochracea**
Brain abscesses of dental source - CNS infections - Meningitis, septicemia.
(-)

**Enterobacter agglomerans**
Bone and joint infections following penetrating trauma
(-)
Enterobacter gergoviae
Has endotoxin of sepsis – creates excessive suffering – long hospitalizations – (expensive bactericidals)

Escherichia coli
Multiple problems – forms a toxin like insulin, result elevates glucose – attacks WBC, RBC leading to cell death – causes imbalances in electrolytes – UTI – inhibits protein synthesis
(Amoxil, Doxycycline – Minocycline) [WBC, RBC, Na, K]

Fusobacterium necrophorum
Prevalent in root canals – causes periapical bone loss
(Clindamycin)

Gemella morbillorum
Invasive endocarditis – hemolysin – meningitis – scattered invasive infections such as septic – somewhat rare until recent investigations have identified it more often. Rare case of neuroblastoma cited. Lactic acid is its major metabolic product. Infections similar to Step viridians. Serves as an opportunistic pathogen rendering toxic effects far greater in immunocompromised patients, especially if being given chemotherapy.
(penicillin, amoxicillin, cefoxacin {very effective} – resistant to Cipro) [slight increase in WBC with unusually predominant PMNs, very low hemoglobin, slight elevation of platelets.]

Gemella sanguis
Endocarditis in immune compromised people – osteomyelitis, lung abscesses – emphysema

Haemophilus aphrophilus
Parasite occurring in respiratory area – meningitis and otitis – pneumonia.
(penicillin G)

HPV 16

Klebsiella oxytoca
Low back pain – Implants – lungs as serious infections – stimulated by antibiotics – pneumonia – osteomyelitis – meningitis (very bad bacterium)
The following bacteria were detected in the sample that was submitted for testing:

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streptococcus mutans</td>
<td>1</td>
</tr>
<tr>
<td>Stenotrophomonas maltophilia</td>
<td>2</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>3</td>
</tr>
<tr>
<td>Serratia liquefaciens</td>
<td>4</td>
</tr>
<tr>
<td>Salmonella typhi</td>
<td></td>
</tr>
<tr>
<td>Rothia dentocariosa</td>
<td></td>
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<tr>
<td>Pseudomonas aeruginosa</td>
<td></td>
</tr>
<tr>
<td>Peptostreptococcus micros</td>
<td></td>
</tr>
<tr>
<td>Ochrobactrum anthropi</td>
<td></td>
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<tr>
<td>Eubacterium saburreurum</td>
<td></td>
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<tr>
<td>Eubacterium nodatum</td>
<td></td>
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<tr>
<td>Escherichia coli</td>
<td></td>
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<tr>
<td>Enterobacter aerogenes</td>
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<tr>
<td>Campylobacter showae</td>
<td></td>
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<tr>
<td>Campylobacter rectus</td>
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<tr>
<td>Campylobacter gracilis</td>
<td></td>
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<tr>
<td>Blastomyces dermatitidis</td>
<td></td>
</tr>
<tr>
<td>Bifidobacterium catenulatum</td>
<td></td>
</tr>
<tr>
<td>Actinomyces naeslundii</td>
<td></td>
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<tr>
<td>Actinomyces israelii</td>
<td></td>
</tr>
<tr>
<td>Actinomyces gerencseriae</td>
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</tbody>
</table>

9 or greater indicates a serious risk
Greater than 7.5 but less than 9 indicates a moderate risk

Total Risk Factor, as reported on the chart above, is the sum of the Pathogen Risk Factor and Measured Risk Factor. Total Risk Factor equal to or greater than 9 is considered a serious risk. Total Risk Factor between 7.5 and 9 is considered of moderate risk.

Pathogen Risk Factor is the innate risk of the microbe based on the biology of the organism, disease causation, and microbial antibiotic resistance. It is reported on a scale of 1-10, with 10 being most serious and 1 most benign.

Measured Risk Factor is the value given to the sample taking into account the quantity and configuration of the pathogen DNA. It is reported on a scale of 1-10, with 10 being most serious and 1 most benign.

Interpretation of Results:
These results are from DNA PCR testing, and indicate the presence of targeted foreign DNA. The verbiage is supplied as a courtesy to health care providers to aide in an overall assessment. This information alone should not be used to diagnose or treat a health problem or disease. Consultation with a qualified health care provider is required.
<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Total Risk Factor</th>
<th>Clinical Significance</th>
</tr>
</thead>
</table>
| Actinomyces gerencseriae      | 8.20              | **General Description**
Actinomyces species are Gram-positive and are normally present in the gingival area. Actinomyces gerencseriae is one of the most common causes of infections in dental procedures.

**Symptoms of Infection**
Many Actinomyces species are opportunistic pathogens of humans and other mammals, particularly in the oral cavity. In rare cases, these bacteria can cause actinomycosis, a disease characterized by the formation of abscesses in the mouth, lungs, or the gastrointestinal tract.

**Treatment**
Actinomyces bacteria are generally sensitive to penicillin, which is frequently used to treat actinomycosis. In cases of penicillin allergy, doxycycline is used. Sulfonamides such as sulfamethoxazole may be used as an alternative regimen at a total daily dosage of 2-4 grams. Response to therapy is slow and may take months.

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| Actinomyces naeslundii        | 8.20              | **General Description**
Actinomyces species are Gram-positive and are normally present in the gingival area. Actinomyces naeslundii is one of the most common causes of infections in dental procedures.

**Symptoms of Infection**
Many Actinomyces species are opportunistic pathogens of humans and other mammals, particularly in the oral cavity. In rare cases, these bacteria can cause actinomycosis, a disease characterized by the formation of abscesses in the mouth, lungs, or the gastrointestinal tract.

**Treatment**
Actinomyces bacteria are generally sensitive to penicillin, which is frequently used to treat actinomycosis. In cases of penicillin allergy, doxycycline is used. Sulfonamides such as sulfamethoxazole may be used as an alternative regimen at a total daily dosage of 2-4 grams. Response to therapy is slow and may take months.

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</table>
| Bifidobacterium catenulatum   | 3.10              | **General Description**
Bifidobacterium is a genus of Gram-positive, non-motile, often branched anaerobic bacteria. They are ubiquitous, endosymbiotic inhabitants of the gastrointestinal tract, vagina, and mouth. Some bifidobacteria are used as probiotics to help against rotoviral diarrhea, nacrotizing enterocolitis, atopic eczema, and irritable bowel syndrome.

**Symptoms of Infection**
Bifidobacterium are nonpathogenic for healthy adults and children. In some healthy people, bifidobacteria might upset the stomach and intestine, causing bloating and gas. However, in immunocompromised patients, they may cause infections with symptoms including diarrhea, nausea, and vomiting.

**Treatment**
Bifidobacteria may be resistant to vancomycin; however, most antibiotics treatment regimes are effective.
<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Total Risk Factor</th>
<th>Clinical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blastomyces dermatitidis</td>
<td>10.70</td>
<td><strong>General Description</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blastomyces dermatitidis is a dimorphic fungal pathogen, found primarily in the Mid-West and Northern United States and Canada. It exists in the soil in a filamentous form that produce spores. The natural reservoir of this organism in the environment is not clearly defined, but it seems to be associated with rivers and lakes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Symptoms of Infection</strong></td>
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<tr>
<td></td>
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<td>These agents infect human and animal hosts when they are inhaled. At the elevated temperature of 37°C in a host, the fungus undergoes a phase transition to the pathogenic yeast form. Yeast form cells multiply in the lung and may cause disease in immuno-competent hosts, sometimes disseminating to the skin, central nervous system and bones.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Treatment</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Itraconazole (trade name SporanoxTM) can be used on mild cases, and for more severe cases amphotericin B intravenous treatment is done for several days followed by Itraconazole treatment for multiple months.</td>
</tr>
<tr>
<td>Campylobacter gracilis</td>
<td>8.50</td>
<td><strong>General Description</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Campylobacter gracilis is a Gram-negative, microaerophilic spirochete. Motile, with either unipolar or bipolar flagella, the organisms have a characteristic spiral/corkscrew appearance. At least a dozen species of Campylobacter have been implicated in human disease.</td>
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<td></td>
<td></td>
<td><strong>Symptoms of Infection</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>It produces an inflammatory, sometimes bloody, diarrhea, or dysentery syndrome accompanied by cramps fever and pain. Campylobacter species are also implicated in periodontitis.</td>
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<td></td>
<td></td>
<td><strong>Treatment</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The infection is usually self-limiting and in most cases, asymptomatic treatment by liquid and electrolyte replacement is enough in human infections. The use of antibiotics, on the other hand, is controversial. Symptoms typically last for five to seven days. Standard treatment is now azithromycin and on occasion terbinafine. Quinolone antibiotics such as ciprofloxacin or levofloxacin are no longer as effective due to resistance.</td>
</tr>
<tr>
<td>Campylobacter rectus</td>
<td>9.45</td>
<td><strong>General Description</strong></td>
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</tr>
<tr>
<td>Campylobacter showae</td>
<td>8.55</td>
<td><strong>Symptoms of Infection</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Campylobacter showae produces an inflammatory, sometimes bloody, diarrhea, or dysentery syndrome accompanied by cramps fever and pain. Campylobacter species are also implicated in periodontitis.</td>
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<td><strong>Treatment</strong></td>
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</tbody>
</table>
Enterobacter aerogenes 8.30

**General Description**
Enterobacter aerogenes is a Gram-negative, rod-shaped bacterium. Enterobacter aerogenes is found in the human gastrointestinal tract and does not generally cause disease in healthy individuals.

**Symptoms of Infection**
Enterobacter aerogenes is not normally pathogenic, but may cause various types of infection in immune compromised individuals. Antibiotic resistant strains are becoming increasingly common nosocomial pathogens.

**Treatment**
The major classes of antibiotics used to manage infections include the beta-lactams, carbapenems, the fluoroquinolones, the aminoglycosides, and TMP-SMZ. Because most Enterobacter species are either resistant to many antibiotics or can develop resistance during antimicrobial therapy, the choice of appropriate antimicrobial agents can be complicated.

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Escherichia coli 6.50

**General Description**
Escherichia coli is a Gram-negative, rod-shaped bacterium that is found in the lower intestine of mammals and birds. Most Escherichia coli strains are harmless, but some can cause food poisoning in humans.

**Symptoms of Infection**
Escherichia coli may cause bloody diarrhea and in some rare instances, may also cause severe anemia or kidney failure. Other strains of Escherichia coli can cause urinary tract infections.

**Treatment**
Most people recover from Escherichia coli infections in 5 to 10 days without the need for medicine. Antibiotics are not recommended. Symptomatic treatment recommended if serious symptoms, such as anemia or kidney failure occur, reevaluate the treatment options. E. coli is resistant to penicillin and penicillin type antibiotics, but is susceptible to sulfamethoxazole and chloramphenicol.

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Eubacterium nodatum 9.52

**General Description**
Eubacterium nodatum is a Gram-positive member of the human oral flora, but has been linked to chronic periodontitis.

**Symptoms of Infection**
Eubacterium nodatum is an opportunist pathogen of humans and other mammals, particularly in the oral cavity. In rare cases, these bacteria can cause actinomyces, a disease characterized by the formation of abscesses in the mouth, lungs, or the gastrointestinal tract.

**Treatment**
It is generally sensitive to penicillin, which is frequently used to treat actinomyces. In cases of penicillin allergy, doxycycline is used. Sulfonamides such as sulfamethoxazole may be used as

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**Table**

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Total Risk Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eubacterium saburreum</td>
<td>4.50</td>
</tr>
<tr>
<td>Ochrobactrum anthropi</td>
<td>8.95</td>
</tr>
<tr>
<td>Peptostreptococcus micros 2</td>
<td>12.73</td>
</tr>
</tbody>
</table>

**General Description**
Eubacterium saburreum is a Gram-positive, non-spor-forming anaerobic bacillus. It is frequently found in the human oral cavity.

**Symptoms of Infection**
Eubacterium saburreum is normally nonpathogenic in healthy adults, but it is linked to subgingival bacterial infections. These infections which start at the gum line can result in damage or loss of bone in the jaw if left untreated.

**Treatment**
Good oral hygiene is the first step to avoiding Eubacterium infections. In the case of more serious infections, penicillin is usually a successful treatment for Eubacterium saburreum infections.

**General Description**
Ochrobactrum anthropi are rod shaped, obligately aerobic, Gram-negative bacterium. Ochrobactrum anthropi is a common soil bacteria and in recent years, has emerged as an opportunistic pathogen in humans.

**Symptoms of Infection**
Although cases of Ochrobactrum anthropi infections are rare, there are several documented cases showing that it is possible for individuals with an underlying medical condition to develop an infection. Ochrobactrum anthropi may cause disease by colonizing indwelling synthetic devices, such as catheters, of individuals who are immune compromised. Ochrobactrum anthropi can cause bacteremia, infective endocarditis and osteomyelitis.

**Treatment**
Ochrobactrum anthropi has a very broad spectrum of antibiotic resistance (particularly to beta-lactams). It has shown susceptibility to aminoglycosides, fluoroquinolones, imipenem, tetracycline and trimethoprim-sulfamethoxazole.

**General Description**
Peptostreptococcus micros is an anaerobic, Gram-positive, slow-growing non-spor-forming bacterium with increasing resistance to antimicrobial drugs. It is a commensal organism, living predominately in the mouth, skin, gastrointestinal, vagina and urinary tracts.

**Symptoms of Infection**
Under immune suppressed or traumatic conditions, Peptostreptococcus micros can become pathogenic. The organism can cause brain, liver, breast, and lung abscesses, as well as generalized neurovirulent soft tissue infections.

**Treatment**
Peptostreptococcus micros shows resistance to many antimicrobials including, aminoglycosides, and trimethoprim-sulfamethazine. It has been susceptible to newer
### Bacteria | Total Risk Factor | Clinical Significance
--- | --- | ---
**Pseudomonas aeruginosa** | 9.90 | **General Description**
Pseudomonas aeruginosa is Gram-negative, aerobic, rod-shaped bacterium with unipolar motility. An opportunistic human pathogen, Pseudomonas aeruginosa is also an opportunistic pathogen of plants. It is found in soil, water, on skin and on most man-made environments throughout the world. Antibiotic resistant strains have become a serious problem in hospitals.
**Symptoms of Infection**
Pseudomonas aeruginosa is an opportunistic, nosocomial pathogen of immunocompromised individuals. Pseudomonas aeruginosa typically infects the pulmonary tract, urinary tract, burns, wounds, and also causes blood infections. Pseudomonas aeruginosa uses the virulence factor exotoxin A to ADP-ribosylate eukaryotic elongation factor 2 in the host cell. Without elongation factor 2, eukaryotic cells cannot synthesize proteins and undergo apoptosis. The release of intracellular contents induces an immunologic response in immunocompetent patients.
**Treatment**
The species is naturally resistant to penicillin. It shows susceptibility to gentamicin, ciprofloxacin, antipseudomonal penicillins, carbapenems polymyxins, and monobactams.

**Salmonella typhi**

| Bacteria | Total Risk Factor | Clinical Significance
--- | --- | ---

**General Description**
Salmonella typhi is a Gram-negative, flagellated bacillus. It causes systemic infections and typhoid fever in humans. It has caused many deaths in developing countries where sanitation is poor and is spread through contamination of water and undercooked food.

**Symptoms of Infection**
Symptoms of typhoid fever often include a sudden onset of a high fever, a headache, and nausea. Other common symptoms include loss of appetite, diarrhea, and enlargement of the spleen (depending on where it is located).

**Treatment**
Strains of MDR (multi-drug resistant) Salmonella typhi have emerged. They show resistance to nalidixic acid and have reduced susceptibility to fluoroquinolones. The species is still susceptible to azithromycin, ampicillin, amoxicillin and ciprofloxacin.

**Serratia liquefaciens**

| Bacteria | Total Risk Factor | Clinical Significance
--- | --- | ---

**General Description**
Serratia liquefaciens is a Gram-negative, facultatively anaerobic bacillus. Serratia species are usually motile and contain peritrichous flagella. Serratia liquefaciens is commonly found on many plant species and more specifically in the rhizosphere.

**Symptoms of Infection**
The Serratia genus, as a whole, is responsible for about 2% of nosocomial infections, though Serratia liquefaciens infections are rare. Serratia liquefaciens can cause urinary tract infections, bloodstream infections, sepsis, pneumonia, meningitis, and other debilitating infections - sometimes even death. The fatality rate is about 75% for Serratia liquefaciens sepsis though cases of this are exceedingly unusual.

**Treatment**
Serratia liquefaciens is naturally resistant to multiple antibiotics, and is becoming increasingly resistant to others. The bacteria still shows susceptibility to carbenicillin, third-generation cephalosporins, chloramphenicol, streptomycin, kanamycin, gentamicin, tobramycin, amikacin, trimethoprim/sulfamethoxazole, fosfomycin, nalidixic acid, and other quinolones.
Staphylococcus aureus

General Description
Staphylococcus aureus is a facultatively anaerobic, Gram-positive coccus. Staphylococcus aureus is responsible for many infections but its presence does not always indicate infection. Staphylococcus aureus is asymptomatically present on the skin, in the nose and mouth of at least 20% of all people. It also can survive for hours, weeks, or even months on dry environmental surfaces.

Symptoms of Infection
Staphylococcus aureus can infect tissues when the skin or mucosal barriers have been breached. This can lead to many different types of infections including furuncles and carbuncles (a collection of furuncles). Staphylococcus aureus infections can spread through contact with pus from an infected wound, or skin-to-skin contact with an infected person. Antibiotic resistant strains are becoming an increasingly problematic nosocomial infection. Deeply penetrating Staphylococcus aureus infections can be severe and even fatal. It is also a well known cause of endocarditis.

Treatment
Staphylococcus aureus is frequently penicillin and methicillin resistant (Methicillin-resistant Staphylococcus aureus or MRSA). There has been success in treating antibiotic resistant strains with oxacillin, fusidic acid and gentamicin.

Stenotrophomonas maltophilia

General Description
Stenotrophomonas maltophilia is an aerobic, nonfermentative, Gram-negative bacterium. It is a tenacious and uncommon bacterium making human infections difficult to treat.

Symptoms of Infection
Stenotrophomonas maltophilia frequently colonizes breathing tubes such as endotracheal, central venous catheters, tracheotomy tubes and indwelling urinary catheters. Infection is usually facilitated by the presence of prosthetic material (plastic or metal), and the most effective treatment is removal of the prosthetic material. In immune compromised patients, Stenotrophomonas maltophilia is a growing source of latent pulmonary infections.

Treatment
Stenotrophomonas maltophilia is naturally resistant to many broad-spectrum antibiotics (including all carbapenems) due to the production of two inducible chromosomal metallo-beta-lactamases (designated L1 and L2). Removal of any synthetic substance or device in the patient is always the most essential step. A broad spectrum anti-biotic treatment should be started at the first sign of infection. Co-trimoxazole has been effective, and there is some evidence to suggest regimens of ciprofloxacin, cefoxitin, ceftriaxone, ticarcillin, and clavulanate may also work.

Streptococcus mutans

General Description
Streptococcus mutans is a facultatively anaerobic, Gram-positive coccus commonly found in the human oral cavity. It is a significant contributor to tooth decay, which it accomplishes by producing lactic acid.

Symptoms of Infection
Cavities in the tooth are the most common signs of infections. It has been implicated in certain cardiovascular diseases such as eptirated heart valve tissues and atheroconus plaques.

Treatment
Good oral hygiene should prevent most infections. The growth and spread of S. mutans can also be reduced by the consumption of certain foods such as, green tea, nutmeg and various herbs. It responds to cindamycin and chloramphenicol if a serious infection needs treatment.