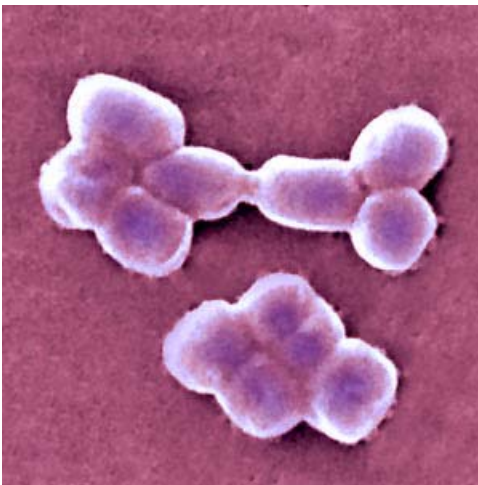


# The Battlefield Bacterium

By Barbara L. Fox, MS, MPH, MT (ASCP)

The horrors of combat include many dangers both physical and biological. One of the most deadly bacterial threats to combat personnel has been the environmentally resilient organism found in nosocomial and community-acquired infections, *Acinetobacter baumannii*.

This organism, in the Family Moraxellaceae, is a gram negative, aerobic, non fermenting coccobacilli, oxidase negative, that grows on MacConkey agar and is non motile.



**Figure 1:** *A. baumannii* has emerged as an important “multi-drug resistant” organism. For this reason the resistant strains are known as “MDRAB”.

Although other species of *Acinetobacter* such as *lwoffii* are found in soil and water, a natural reservoir for *A.*

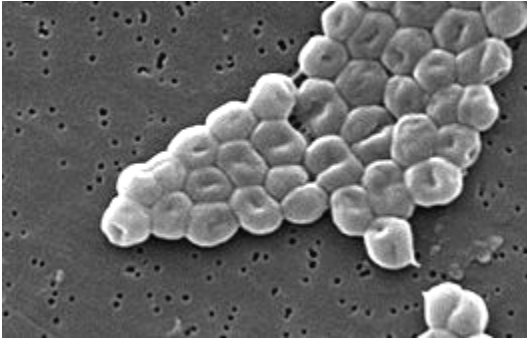
*baumannii* outside of the hospital environment has not been found. In settings such as hospitals and long term care facilities, *Acinetobacter* organisms can colonize the skin, respiratory and gastrointestinal tracts of patients, as well as surgical and respiratory care equipment, catheters, or personal protective gowns or gloves.



**Figure 2:** *A. baumannii* has earned itself the nickname “Iraqnobacter” due to the high incidence in wounded soldiers from the Middle East. Field hospitals are often the source of infection. Although *A. baumannii* infections were seen during the Viet Nam war, widespread drug resistance had not been seen.

Infections in these compromised patient populations include pneumonia, endocarditis, meningitis, peritonitis,

osteomyelitis, endophthalmitis, urinary tract infections, and skin and wound infections.



**Figure 3:** The word, *Acinetobacter*, comes from the Greek word for “motionless rod”, since the bacilli have no flagella.

*A. baumannii* is very adept at developing resistance to all existing classes of antibiotics, becoming what is called MDR, or multi drug resistant, due to factors including plasmid insertion of resistance genes. Effective drugs have included the carbapenems (imipenem and meropenem), but the organism is now showing resistance to this class of antibiotics as well. More than one-third of *A. baumannii* infections are multidrug resistant (MDRAB), which means the pathogens are resistant to at least three different classes of antibiotics.



**Figure 4:** A study in 2004 at the Indiana University School of Medicine Burn Unit revealed that a patient with an MDRAB infection incurred costs of \$98,575 more than similar patients who were not infected.



**Figure 5:** The first line treatment is with a carbapenem antibiotic such as imipenem or meropenem, but carbapenem resistance is increasingly common. Other treatment options include polymyxins, tigecycline and aminoglycosides. See [Hardy's complete technical information on selective media for Acinetobacter](#).

[Selective media](#) is now available for the isolation of *Acinetobacter* and its resistant strains.

This organism has caused numerous outbreaks globally, being reported from hospitals in Europe, North and South America, Asia and elsewhere.

Recently, MDR *Acinetobacter baumannii* has emerged as a problem for wounded military personnel returning from Iraq and Afghanistan. This alarming increase prompted the CDC to send a team of ID specialists to Iraq in 2004 to determine the source of these infections. Soil was ruled out as a reservoir; however, one strain found in combat wound infections was found to be the same strain circulating in hospitalized patients in Europe. Some studies suggest field hospitals may also be contributing to the organism's spread.

Additional factors contributing to colonization, virulence, and infection are still being investigated.



***Figure 6: Soil analysis in Iraq failed to find it as a source of the infection. However, many isolates were found on surfaces and in solutions within field hospitals. Acinetobacter is a “water loving” organism that can be found in catheters, respiratory equipment, and irrigation solutions.***

Infection control measures in health care facilities both abroad and in the U.S can do much to control the spread of “superbugs” such as MDR *Acinetobacter baumannii*. As part of the health care team, we microbiologists must be vigilant about washing our hands, wearing personal protective equipment while working with microorganisms, and wearing only our street clothes when in other areas of the health care facility. We will be helping in the war against a very tenacious enemy and doing our part to improve patient care.

*Barbara L. Fox, MS, MPH, MT (ASCP)  
Infectious Disease Consultant*