

# MICROBIAL A-Z

A DIRECTORY OF INFAMOUS MICROBES THAT BIOCOTE® TECHNOLOGY IS EFFECTIVE AGAINST







# MICROBIAL A-Z

Microbial A-Z is a guide of everything you need to know about important microbes – what they are, how to pronounce their names, where you find them, and what kind of reputation they have for causing illness and other negative effects.

BioCote® Antimicrobial Technology has been tested against all of these microbes, and performed successfully to control and reduce their presence on a protected surface.


**What does this mean for you as a BioCote® customer?** This guide demonstrates that the BioCote® Technology contained in your product performs across the board against a wide range of microbes – not just bacteria and mould, but also viruses.


It also means that whilst the specific materials tested against each microbe may not be your product, the technology contained within is the same as that contained in yours; allowing you to safely assume that your product would perform in much the same way.



Please remember it is important that any marketing material you release that references BioCote® is approved by the Partner Development Team before it is put into use; this not only forms part of your branding agreement but also ensures your message is market appropriate.


A DIRECTORY OF INFAMOUS MICROBES THAT BIOCOTE® TECHNOLOGY IS EFFECTIVE AGAINST

ANTIBIOTIC RESISTANT BACTERIA

MICROBE	SOURCE OF INFECTION	SYMPTOMS OF INFECTION	INTERESTING FACTS
<p><b>CRE <i>Klebsiella</i></b> kleb-zee-el-uh</p>	<p><b>ASSOCIATED WITH:</b> Humans, animals and the environment.</p> <p><b>SPREAD THROUGH:</b> Patients whose care requires ventilators, urinary catheters, or intravenous catheters.</p>	<ul style="list-style-type: none"> <li>• Meningitis</li> <li>• Pneumonia</li> <li>• Urinary tract infections</li> </ul>	<p>The frequency of CRE strains among clinical isolates has increased. Numbers are typically higher in India.</p>
<p><b>ESBL</b> producing <i>Escherichia coli</i></p>	<p><b>ASSOCIATED WITH:</b> Humans, animals and the environment.</p>	<ul style="list-style-type: none"> <li>• Diarrhoea</li> <li>• Urinary tract infections (UTI)</li> <li>• Respiratory illness</li> <li>• Pneumonia</li> </ul>	<p>The number of ESBL cases is steadily increasing. Whilst the numbers vary according to region, they are typically high in the Middle East.</p>
<p><b>MRSA</b> <i>Methicillin-resistant Staphylococcus aureus</i></p>  <p><b>AVERAGE SURVIVAL TIME ON SURFACES</b> — UP TO 7 MONTHS —</p>	<p><b>ASSOCIATED WITH:</b> The skin, nose and throat of colonised individuals.</p> <p><b>SPREAD THROUGH:</b> Skin-to-skin contact and contaminated objects e.g. towels, sheets, clothes, dressings, surfaces, door handles and floors.</p>	<ul style="list-style-type: none"> <li>• Wound infection</li> <li>• Skin infection</li> <li>• Septicaemia</li> <li>• Endocarditis</li> </ul>	<p>The frequency of MRSA strains has shown an increase and decrease in clinical settings and increases in the community.</p>
<p><b>VRE</b></p>	<p><b>ASSOCIATED WITH:</b> Human intestines, female genital tract and is also often found in the environment.</p> <p><b>SPREAD THROUGH:</b> Large amounts of use of antibiotics selects for the bacteria and allows it to multiply and cause infection.</p>	<p><b>IN A WOUND:</b></p> <ul style="list-style-type: none"> <li>• Red, inflamed and tender skin</li> </ul> <p><b>IN THE URINARY TRACT:</b></p> <ul style="list-style-type: none"> <li>• Back pain urning sensation and increaed urination</li> </ul> <p>Others symptoms include diarrhoea, weakness, chills, and fever.</p>	<p>There has been a dramatic increase of VRE in the United States possibly due to more use of the antibiotic Vancomycin.</p>

BACTERIA	MICROBE	SOURCE OF INFECTION	SYMPTOMS OF INFECTION	INTERESTING FACTS
	<p><b><i>Acinetobacter baumannii</i></b> As-sin-ee-toe-bac-ter bau-mahn-ee-eye</p>	<p>ASSOCIATED WITH: Soil and water.</p> <p>SPREAD THROUGH: Person to person contact or contaminated surfaces, such as bedside tables, hand rails, floors.</p>	<ul style="list-style-type: none"> <li>• Pneumonia</li> <li>• Blood infections</li> <li>• Wound infections</li> </ul>	<p>Acinetobacter baumannii is responsible for 80% of all Acinetobacter infections.</p>
	<p><b><i>Bacillus subtilis</i></b> buh-sil-uh s</p>	<p>ASSOCIATED WITH: Soil and water.</p> <p>SPREAD THROUGH: Spore producing microbes, it is a cause of food spoilage.</p>	<p>Used on plants as a fungicide.</p> <p>They are also used on agricultural seeds, such as vegetable and soybean seeds, as a fungicide.</p>	<p>Bacillus subtilis survive extreme environmental conditions.</p>
	<p><b><i>Campylobacter</i></b> cam-py-lo-back-ter</p> <div data-bbox="226 1066 701 1208">  <p><b>AVERAGE SURVIVAL TIME ON SURFACES</b> — UP TO 6 DAYS —</p> </div>	<p>ASSOCIATED WITH: Raw meat (usually poultry), raw milk.</p> <p>SPREAD THROUGH: Consumption of undercooked meat or contaminated surfaces, such as cooking utensils, chopping board, work surfaces.</p>	<ul style="list-style-type: none"> <li>• Diarrhoea (often with blood)</li> <li>• Abdominal pain and cramping</li> <li>• Fever</li> <li>• Headache</li> <li>• Nausea and/or vomiting</li> </ul> <p>Symptoms take 3-6 days to develop.</p>	<p>Campylobacter is the most common food poisoning bacterium in Britain with around 280,000 cases a year.</p>
	<p><b><i>Chelatococcus asaccharovorans</i></b></p>	<p>ASSOCIATED WITH: Waste water.</p> <p>SPREAD THROUGH: Environmental contamination, contact with surfaces such as hand rails, tables, chairs, door handles.</p>	<p>Non-infectious, Involved in biodegradation of compounds.</p>	<p>Numbers increase with both temperature and richness of nutrients.</p>

BACTERIA	MICROBE	SOURCE OF INFECTION	SYMPTOMS OF INFECTION	INTERESTING FACTS
	<p><i>Clostridium difficile</i></p> <p>klo-strid-ee-uh m dif-i-seel</p>  <p><b>AVERAGE SURVIVAL TIME ON SURFACES</b> — UP TO 5 MONTHS (SPORES) —</p>	<p><b>ASSOCIATED WITH:</b> The human intestines.</p> <p><b>SPREAD THROUGH:</b> Person to person contact or contaminated surfaces, such as sheets, beds, handrails, wall cladding.</p>	<ul style="list-style-type: none"> <li>• Watery diarrhoea</li> <li>• Fever</li> <li>• Loss of appetite</li> <li>• Nausea and abdominal pain</li> </ul> <p>May also show signs of dehydration.</p>	<p>C. difficile bacteria are found in the digestive system of about 1 in every 30 healthy adults and around 2/3 of babies.</p>
	<p><i>E. coli</i> &amp; <i>E. coli</i> O157</p> <p>ee-koh-lahy</p>  <p><b>AVERAGE SURVIVAL TIME ON SURFACES</b> — UP TO 3 WEEKS —</p>	<p><b>ASSOCIATED WITH:</b> Intestines of animals, environments infected with <i>E. coli</i> containing faeces.</p> <p><b>SPREAD THROUGH:</b> Consumption of contaminated food and drink, and contaminated surfaces, such as chopping boards, equipment, kitchen/bathroom sinks.</p>	<ul style="list-style-type: none"> <li>• Diarrhoea</li> <li>• Vomiting</li> <li>• Stomach cramps</li> <li>• High temperature and aching muscles</li> </ul> <p>O157 causes more severe infections. For example, kidney complications.</p>	<p><i>E. coli</i> O157 causes approximately 100,000 illnesses, 3,000 hospitalisations, and 90 deaths each year in the United States.</p>
	<p><i>Enterobacter aerogenes</i></p> <p>en-tuh-roh-bak-ter air-oh-jeen s</p>	<p><b>ASSOCIATED WITH:</b> Soil, water, dairy products and intestines of animals (including humans).</p> <p><b>SPREAD THROUGH:</b> Hospital settings - equipment, skin to skin contact, beds, table surfaces.</p>	<ul style="list-style-type: none"> <li>• Skin and eye conditions</li> <li>• Meningitis</li> <li>• Bacteremia (bacterial blood infection)</li> <li>• Pneumonia</li> <li>• Urinary tract infections</li> </ul>	<p>Enterobacter spp. are commonly found in intensive care units and are responsible for 8.6% of nosocomial infections.</p>
	<p><i>Enterococcus faecalis</i></p> <p>buh-sil-uh s fay-cal-is</p>	<p><b>ASSOCIATED WITH:</b> Human intestines, female genital tract and is also often in the environment.</p> <p><b>SPREAD THROUGH:</b> Intravascular or urinary catheters.</p>	<p>In a wound:</p> <ul style="list-style-type: none"> <li>• Red, inflamed and tender skin</li> </ul> <p>In the urinary tract:</p> <ul style="list-style-type: none"> <li>• Back pain, burning sensation and increased urination</li> </ul>	<p>Enterococci faecalis is isolated from 80-90% of human intestine samples.</p>


	MICROBE	SOURCE OF INFECTION	SYMPTOMS OF INFECTION	INTERESTING FACTS
BACTERIA	<p><i>Legionella pneumophila</i></p> <p>lee-juh-nel-uh</p>	<p><b>ASSOCIATED WITH:</b> Water and potting mixes</p> <p><b>SPREAD THROUGH:</b> Inhalation of contaminated aerosols e.g. Water sprays, jets and mist from backsplash from a sink or shower.</p>	<ul style="list-style-type: none"> <li>• Respiratory failure</li> <li>• Multi-organ failure/ dysfunction (MOD)</li> <li>• Eventually death</li> <li>• Legionnaires' disease, ranging from mild cough to fatal pneumonia (duration 2-10 days)</li> </ul>	<p>The name "Legionnaires' disease" came from the outbreak that occurred in 1976 in an American Legion convention in Philadelphia.</p>
	<p><i>Listeria monocytogenes</i></p> <p>li-steer-ee-uh</p>	<p><b>ASSOCIATED WITH:</b> Chilled ready-made food - such as deli soil, animals, refrigerated foods, raw milk and soft cheeses.</p> <p><b>SPREAD THROUGH:</b> Ingestion of contaminated foods.</p>	<ul style="list-style-type: none"> <li>• Fever</li> <li>• Stiff neck</li> <li>• Confusion</li> <li>• Vomiting and diarrhoea</li> </ul>	<p>Listeria caused the largest food-bourne illness outbreak in the USA, resulting in 30 deaths and 147 reported illnesses.</p>
	 <p><b>AVERAGE SURVIVAL TIME ON SURFACES</b> — UP TO 18 DAYS —</p> <p><i>Methylobacterium mesophilicum</i></p>	<p><b>ASSOCIATED WITH:</b> Soils, on leaves and other parts of plants, tap water in hospitals and sewage.</p> <p><b>SPREAD THROUGH:</b> Environmental contamination, such as touch surfaces like bedside tables, door handles and hand rails. Also by exposure – skin to skin contact, hospital equipment, such as beds, bed rails, temperature probes.</p>	<ul style="list-style-type: none"> <li>• Bacteraemia – bacteria in the blood stream</li> <li>• Central catheter infections</li> <li>• Peritonitis in patients on chronic ambulatory peritoneal dialysis</li> </ul>	<p>Ability to form biofilms and develop a tolerance to disinfecting agents, high temperatures and drying make this microbe highly relevant.</p>





BACTERIA	MICROBE	SOURCE OF INFECTION	SYMPTOMS OF INFECTION	INTERESTING FACTS
	<p><b><i>Pseudomonas aeruginosa</i></b> soo-dom-uh-nuh s ah-ridge-in-oh-sa</p>	<p><b>ASSOCIATED WITH:</b> faeces, soil, sewage and hospital equipment.</p> <p><b>SPREAD THROUGH:</b> Use of contaminated equipment, including catheters.</p>	<ul style="list-style-type: none"> <li>• Serious infection (usually occurs if there is already an underlying disease)</li> <li>• External otitis – infection of the ear canal</li> <li>• Endophthalmitis – inflammation of interior of the eye.</li> <li>• Meningitis</li> <li>• Pneumonia</li> <li>• Diarrhoea</li> <li>• Fever</li> <li>• Nausea</li> </ul>	<p>Pseudomonas aeruginosa accounts for about 10% of hospital acquired infections.</p>
	<p><b><i>Ralstonia pickettii</i></b></p>	<p><b>ASSOCIATED WITH:</b> moist environments such as soil, rivers and lakes.</p> <p><b>SPREAD THROUGH:</b> contaminated fluids used for patient care.</p>	<ul style="list-style-type: none"> <li>• Respiratory tract infections</li> <li>• Sepsis</li> <li>• Wound infections</li> <li>• Infections of the ear and nose</li> </ul>	<p>In healthy individuals, infections with Ralstonia spp. are extremely rare – they are more commonly found in individuals with compromised immune systems, such as those with cystic fibrosis.</p>
	<p><b><i>Salmonella</i> spp.</b> sal-muh-nel-uh</p>	<p><b>ASSOCIATED WITH:</b> Poultry, pigs and cattle. Reptiles also carry the bacteria.</p> <p><b>SPREAD THROUGH:</b> Consumption of contaminated food or drink, person to person or animal to person.</p>	<ul style="list-style-type: none"> <li>• Diarrhoea</li> <li>• Fever</li> <li>• Nausea</li> <li>• Abdominal cramps</li> </ul> <p>Symptoms usually last around 4-7 days.</p>	<p>The CDC estimates 1.2 million illnesses and 450 deaths each year in the United States.</p>
	<p><b><i>Shigella</i> spp.</b> shi-gel-uh</p>	<p><b>ASSOCIATED WITH:</b> Human faeces, water from ponds, lakes and untreated pools.</p> <p><b>SPREAD THROUGH:</b> A faecal-oral route, e.g. eating food washed in contaminated water, contaminated surfaces e.g. table tops, kitchen equipment.</p>	<ul style="list-style-type: none"> <li>• Diarrhoea</li> <li>• Fever</li> <li>• Abdominal pain</li> <li>• Tenesmus</li> </ul> <p>Symptoms take 1-2 days to develop.</p>	<p>Shigella causes about 500,000 cases of diarrhoea each year in the United States.</p>




**AVERAGE SURVIVAL TIME ON SURFACES**  
UP TO 2 WEEKS | BIOFILM - UP TO 200 DAYS

BACTERIA	MICROBE	SOURCE OF INFECTION	SYMPTOMS OF INFECTION	INTERESTING FACTS
	<p><i>Sphingomonas paucimobilis</i></p>	<p><b>ASSOCIATED WITH:</b> both wet and dry environments.</p> <p><b>SPREAD THROUGH:</b> hospital equipment, humidifiers, water, air, bedside water bottles, sinks and temperature probes.</p>	<ul style="list-style-type: none"> <li>• Leg ulcers</li> <li>• Peritonitis</li> <li>• Respiratory infection</li> <li>• Urinary infection</li> <li>• Meningitis</li> </ul>	<p>An unidentified strain of Sphingomonas is held responsible for coral plague – first discovered in 1995, and a study in 2004 found it present in shower curtain biofilms.</p>
	<p><i>Staphylococcus aureus</i></p> <p>staf-uh-luh-kok-uh s awr-ee-uh s</p>  <p><b>AVERAGE SURVIVAL TIME ON SURFACES</b> — UP TO 100 DAYS —</p>	<p><b>ASSOCIATED WITH:</b> The skin, nose and throat of colonised individuals.</p> <p><b>SPREAD THROUGH:</b> Skin-to-skin contact and contaminated surfaces, such as hospital beds, hand rails, floors wall cladding, bathroom fittings.</p>	<ul style="list-style-type: none"> <li>• Wound infection</li> <li>• Skin infection</li> <li>• Septicaemia</li> <li>• Endocarditis</li> </ul>	<p>Found on the skin of 80-100% of patients with skin conditions such as atopic dermatitis, yet the reason is unclear.</p>
	<p><i>Staphylococcus epidermidis</i></p> <p>staf-uh-luh-kok-uh s ep-i-dur-mis</p>	<p><b>ASSOCIATED WITH:</b> The skin, nose and throat of colonised individuals.</p> <p><b>SPREAD THROUGH:</b> Biofilms growing on catheters and intravenous lines.</p>	<ul style="list-style-type: none"> <li>• Wound infection</li> <li>• Skin infection</li> <li>• Septicaemia</li> <li>• Endocarditis</li> </ul>	<p>Part of the normal skin flora, but infections are usually hospitalacquired.</p>
	<p><i>Streptococcus faecalis</i></p> <p>strep-tuh-kok-uh s fay-cal-is</p>	<p><b>ASSOCIATED WITH:</b> Human intestines, female genital tract and is also the environment.</p> <p><b>SPREAD THROUGH:</b> Intravascular or urinary catheters devices.</p>	<p>In a wound:</p> <ul style="list-style-type: none"> <li>• Red, inflamed and tender skin</li> </ul> <p>In the urinary tract:</p> <ul style="list-style-type: none"> <li>• Back pain, burning sensation and increased urination</li> </ul>	<p>It is the most frequent species isolated from human intestine samples (80-90%).</p>



MOULD AND FUNGI	MICROBE	SOURCE OF INFECTION	SYMPTOMS OF INFECTION	INTERESTING FACTS
	<p><i>Aspergillus niger</i> as-per-jil-uh s nahy-jer</p>  <p><b>AVERAGE SURVIVAL TIME ON SURFACES</b> — UP TO 2 MONTHS (SPORES) —</p>	<p><b>ASSOCIATED WITH:</b> Soil, indoor and outdoor environment.</p> <p><b>SPREAD THROUGH:</b> Mould spores in the air.</p>	<p>Can cause aspergillosis diseases:</p> <ul style="list-style-type: none"> <li>• Allergic bronchopulmonary aspergillosis</li> <li>• Allergic Aspergillus sinusitis</li> <li>• Aspergilloma (fungus ball)</li> <li>• Chronic pulmonary aspergillosis</li> </ul>	<p>Aspergillus niger is found growing all over the world, and is the third most common species associated with invasive pulmonary aspergillosis.</p>
	<p><i>Candida albicans</i> kan-di-duh al-bee-cans</p>  <p><b>AVERAGE SURVIVAL TIME ON SURFACES</b> — UP TO 120 DAYS —</p>	<p><b>ASSOCIATED WITH:</b> The mucoid membranes and on the skin.</p> <p><b>SPREAD THROUGH:</b> Skin-to-skin contact, contaminated equipment like hospital bed.</p>	<ul style="list-style-type: none"> <li>• Thrush</li> <li>• Fever and chills</li> <li>• Invasive infections</li> </ul>	<p>Candida can naturally be present on human skin and in the human gastrointestinal tract, and is usually an opportunistic pathogen in patients with compromised immune systems. In a vegetative state can survive for up to 21 years.</p>
	<p><i>Penicillium sp.</i> pen-uh-sil-ee-uh m</p>	<p><b>ASSOCIATED WITH:</b> Common cause of food spoilage by microbial contamination.</p> <p><b>SPREAD THROUGH:</b> Mould spores in the air.</p>	<ul style="list-style-type: none"> <li>• Endocarditis: heart murmur, fever and chills, fatigue</li> <li>• Mycotic keratitis: eye pain, redness, blurred vision</li> </ul>	<p>Penicillium sp. is present in the air of both indoor and outdoor environments.</p>


	MICROBE	SOURCE OF INFECTION	SYMPTOMS OF INFECTION	INTERESTING FACTS
VIRUSES	<p><b>Influenza A H1N1</b></p> <p>in-floo-en-zuh</p>  <p><b>AVERAGE SURVIVAL TIME ON SURFACES</b> — UP TO 2 DAYS —</p>	<p><b>ASSOCIATED WITH:</b> Influenza virus occurs naturally in various animals and birds.</p> <p><b>SPREAD THROUGH:</b> Coughing and sneezing. Short distance airborne transmission of influenza virus may occur particularly in crowded or enclosed spaces.</p>	<ul style="list-style-type: none"> <li>• Fever</li> <li>• Chills</li> <li>• Sore throat</li> <li>• Cough</li> <li>• Aching muscles</li> </ul>	<p>The 2009 pandemic caused 17,000 deaths worldwide.</p>



# MICROBIAL A-Z

A DIRECTORY OF INFAMOUS MICROBES THAT BIOCOTE® TECHNOLOGY IS EFFECTIVE AGAINST

THE ANTIMICROBIAL BRAND YOU CAN TRUST

 +44 (0) 2477 712489

 [biocote@biocote.com](mailto:biocote@biocote.com)

 [www.biocote.com](http://www.biocote.com)

 BioCote®