Microcyn® Technology vs. Antibiotics: A comparative view of Microcyn Technology products, liquids and gels, containing HOCl and topical and systemic products containing antibiotics.

Vetericyn® is based on Microcyn Technology. The antimicrobial agent in Microcyn Technology is hypochlorous acid (HOCl), is found naturally produced in animals and humans for protection against infectious agents, including bacteria, viruses, yeasts and some fungi. This small molecule is nontoxic to host cells at the concentrations used in Microcyn Technology and does not cause the development of allergic reactions with repeated use.

Antibiotics are molecules that either stop the growth of bacteria (bacteriostatic) or kill them (bactericidal). They are not effective against bacterial endospores. Antibiotics have no effect on viruses or most fungi. Some fungi and some bacteria naturally produce these molecules as a means of controlling competing bacteria for nutritional resources and giving the antibiotic producers an edge in the battle of "survival of the fittest." For medical and other uses, the antibiotics are either isolated directly from the microbes or the molecules are synthetically produced and chemically modified to improve their function.

Some antibiotics are said to be broad spectrum if they are capable of stopping or killing many different kinds of bacteria, usually both Gram positive and Gram negative species. Some are effective only against a narrow range of bacterial species. Different antibiotics have different mechanisms of action, but most can be broadly classified into four groups: penicillins and cephalosporins, which both interfere with bacterial cell wall synthesis; tetracyclines, which affect bacterial protein synthesis; and flouroquinolones, which inhibit bacterial DNA synthesis. [1] The key point is that these different classes of molecules specifically target ***bacterial*** metabolic and growth processes, while not attacking host cellular activities. That's the good news. So what is the bad news?

Resistance to any specific antibiotic tends to appear clinically within a few short years following the introduction of that antibiotic for treatment or control of infection. [1, 2, 3] Why? Recall that antibiotics are produced by microbes. The producing organisms must have a means of protecting themselves from the toxic molecules they produce. This is accomplished either by specific mechanisms to inhibit or break down the antibiotic or by modified target structures, thereby rendering the microbes immune to the toxic antibiotics that they produce. The genes responsible for this protection can be carried either on the chromosome or on a plasmid, a small independent donut of DNA.

Resistance genes, especially those on plasmids, can be easily transferred between different bacteria, even to unrelated species! [4, 5, 6] In addition, random mutations occurring in bacteria exposed to antibiotics can yield individual cells that are resistant. [7] These bacteria will grow and replace the dying sensitive population originally targeted. These are real problems due to the widespread and often inappropriate use of antibiotics, which has led to an increasing variety of resistant strains of clinically significant bacteria. The solution has been to synthetically modify the molecular structure of specific antibiotics to render them resistant to breakdown or blockage by the resistant factors. However, use of these next generation antibiotics lead to the appearance of new mutant strains capable once again of resistance. [8, 9] So the arms race continues!

Microcyn Technology has been shown to have antimicrobial activity against antibiotic-resistant strains of bacteria with the same efficacy as antibiotic-sensitive strains of numerous pathogens, including methicillin resistant *Staphylococcus* aureus [MRSA] and vancomycin resistant *Enterococcus faecalis* [VRE]. The table below shows a representative sample of pathogens used in standardized industry tests conducted by a variety of GMP/ISO certified independent testing laboratories. In these tests, Microcyn Technology has been shown to be highly effective. [10]

Antibiotic-Resistant Bacteria:	
Vancomycin Resistant *Enterococcus faecalis* (VRE)	
Methicillin Resistant *Staphylococcus aureus* (MRSA)	
Other Bacteria:	
Acinetobacter baumanii	*Escherichia coli*
Aspergillus niger	*Escherichia coli* O157:H7
Bacillus atrophaeus	*Mycobacterium bovis*
Clostridium difficile	*Pseudomonas aeruginosa*
Enterococcus hirae	*Salmonella typhi*
Viruses:	**Fungi:**
Human Coronavirus	*Candida albicans*
HIV Type 1	*Trichophyton mentagrophytes*
Influenza A	
Rhinovirus Type 37	

In addition to the potential of resistance, use of antibiotics can lead to a variety of negative effects, including allergic reactions and incompatibility with other drugs and nutrient minerals. Common side effects of systemic antibiotics include nausea and diarrhea as the natural GI bacterial flora is disrupted, headaches, and photosensitivity. [11]

In contrast, Microcyn Technology has been shown to be non-sensitizing and nontoxic through exposure on skin or mucosal surfaces as shown by GMP & ISO approved animal testing, including skin irritation, dermal sensitization, intracutaneous reactivity, nasal irritation, eye irritation; acute oral, acute inhalation and systemic toxicity. *In vitro* testing demonstrated that Microcyn Technology was neither cytotoxic nor genotoxic.

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