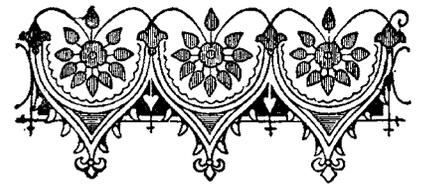


Health & Wellness



AntiMicrobial Resistance: A Call to Think More Holistically



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Infectious Diseases have been with us always. We live with bugs/germs/microorganisms inside us and outside us. And whether human, animal, bacteria, virus, fungus or parasite – each species is programmed for survival in a perceived environment of limited resources. There are genetic and behavioral mechanisms involved in outcompeting other species. We humans think we have the advantage by having a large brain – which we have used to identify and then outsmart the bugs. But are we winning???

We have been learning about the “germs” that affect us since ancient times. The Ayurvedic texts informed us of invisible pathogens growing on the blood. In the 1670s, Anton van Leeuwenhoek directly observed these microorganisms in a crude microscope. In 1847, a Hungarian obstetrician, Ignaz Semmelweis, tried to prove that hand washing would reduce the deadly infections transferred to women in the delivery room from doctors who were performing autopsies immediately prior to delivering babies. It is hard to believe that his observation was ridiculed and rejected at the time. In 1854, John Snow traced clusters of cholera cases to the Broad Street pump in London, identifying contaminated water as the source of the infection. Between 1860 and 1864, Louis Pasteur’s experimentation helped solidify the germ theory of disease. We gained tremendous health benefits from these pioneers. And the bugs were about to start losing.

Contemporary science built upon this research and brought us 70 plus years of antibiotics that have decreased morbidity and mortality for many in the developed and developing world. Yet I see two conflict-

ing issues arising at this time. Number one: More and more of our chronic diseases appear to have an infectious etiology – everything from ulcer disease to cancer seems to be associated with a germ or microorganism. And the infectious diseases keep coming: HIV, HPV, Lyme and other tick spread infections, now Ebola... Number two: We are running out of treatments. The golden age of antibiotics appears to be coming to a close with the era of Antibiotic Resistance accelerating. Uh-oh. The widespread global “overuse” of antibiotics in humans, livestock, agriculture, beekeeping and fish farming has created a crisis just as serious as climate change.

According to the Centers for Disease Control (CDC), every year at least 2 million people in the US acquire serious infections with bacteria that are resistant to one or more of the antibiotics designed to treat those infections. These antibiotic-resistant infections are the cause of at least 23,000 deaths annually. Complications arising from these antibiotic-resistant infections cause other conditions with high mortality.

Clostridium difficile (C diff) gastrointestinal infections are commonly caused by the use of antibiotics. About 250,000 people in the US require hospitalization each year for C diff infection and at least 14,000 people die from it annually.

Antibiotic resistance refers to bacteria acquiring resistance to antibiotics. Some experts prefer the term antimicrobial resistance since viruses, parasites and other microorganisms have also become resistant to our chemical arsenals. We now have pan-resistant bacteria (including *Mycobacterium tuberculosis*, *Klebsiella*, and *Acinetobacter*), which can overcome virtually any antibiotic used. We are seeing resistance emerge in HIV, influenza, malaria, C. diff, *Staph aureus*, gonorrhea and many others. In the past decade many major pharmaceutical companies have discontinued their antibiotic development programs due to low return on investment compared to other, more profitable drugs.

Antimicrobial drugs target certain vulnerabilities that

differ among strains of bugs. Microorganisms can be naturally resistant based on their lack of a certain vulnerable target. But vulnerable microorganisms are “acquiring” resistance in their fight for survival. They do that by pumping the drugs out of their cells, neutralizing the drugs, or altering their structure in a way that removes their vulnerable attack site. The instructions for being able to do these tasks are in their genes – but how did they get there? Amazingly, bugs will swap genes with each other in an attempt to give “resistance” instructions to their fellow bugs that have not yet been exposed. Each time antibiotics are used, susceptible bacteria are killed and resistant bugs grow and multiply.

Contributors to antibiotic resistance are global and include: hospitals (with high bacterial population density), areas of human population density, poor hygiene, poor sanitation, globalization/travel, high risk patients taking frequent and long term antibiotics, environmentally stable/persistent antibiotics, overprescribed and inappropriately prescribed antibiotics (for acne, for viral infections...), and antibiotics used in agriculture. I was amazed to read that three quarters of the antibiotics used in the US are given to animals.

Antibiotics are given to sick animals but in modern farming, they are also given to well animals to keep them from becoming sick. This is similar to using the antimicrobial heartworm, flea and tick killers for prevention in our companion animals. In farming, small doses of antibiotics have been used since the 1950s to stimulate growth in livestock animals without increasing their food. Resistant bacteria, made in the animals’ intestines are excreted into the watershed, food supplies and human hosts through fertilizer run-off, polluted water, farm workers, wind, birds, flies etc. Supermarket meat is tested annually by the National Antimicrobial Resistance Monitoring System (NARMS). In 2011 they found 12 – 66% of chicken, turkey, beef and pork samples containing pathogenic bacteria. Checking those bacteria

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**Concerned about
Antimicrobial Resistance?
Then DON’T:**

- * overuse antibiotics – especially if your symptoms are mild or caused by a virus
- * use someone else’s antibiotics
- * stop your antibiotic early because you feel better
- * use antibacterial soaps and dish detergents – especially don’t use triclosan (it is a potential carcinogen)
- * support the overuse of antibiotics in agriculture.
 - ✧ Instead buy USDA Certified Organic or American Grassfed Certified meats, poultry.
 - ✧ Check out www.realtimfarm.com/fixantibiotics

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for antibiotic resistance found 20 – 75% resistant to at least 1 antibiotic and between 1 and 25% resistant to 5 or more antibiotics.

It is time to think more holistically about infectious disease – because we have to. Infection is a result of a germ and a host. Antibiotics target the germs. Maybe it is time to strengthen the host by correcting nutritional deficiencies, balancing beneficial bacteria in the intestines, enhancing the immune system, improving quantity and quality of sleep, and lowering stress. The research agenda at the National Institutes for Allergy and Infectious Disease at the NIH includes more holistic and innovative strategies for managing infectious disease in an era of antibiotic resistance. FYI: the FDA has approved fecal transplants via colonoscopy for recalcitrant C Diff intestinal infections. This procedure of transferred “donated poop” works over 90% of the time. A Boston start-up, Open

Biome, has developed a product of fecal microbiota available for transfer. Talk about an innovative approach!!!!

In 2011, the World Health Organization (WHO) held its annual World Health Day with the theme “Antimicrobial resistance: no action today, no cure tomorrow”. Do what you can now. You may wish you had in the future.

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