



Leaky Gut Syndrome: A Modern Epidemic with an Ancient Solution?

by Douglas A. Wyatt

Center for Nutritional Research

One hundred million Americans suffer from chronic pain, which equates to approximately half of the adult population.¹ These are frightening statistics, but what's even more frightening is that the majority of these same people are suffering from chronic diseases caused by leaky gut syndrome. Taking pain medication, whether over-the-counter NSAIDs or prescription drugs, has unwittingly condemned them to an existence with leaky gut and all of its ramifications. Compounding the problem is the prolific and unnecessary use of antibiotics, which led to the creation of "superbugs," antibiotic-resistant pathogens populating the gastrointestinal tracts of the naïve. This deadly combination of pain medications and antibiotic abuse has created a public health crisis, the likes of which physicians are certainly ill prepared to treat and definitely unable to diagnose responsibly.

That's the bad news about leaky gut syndrome. The good news is that we do have a solution, one that has been around long before penicillin was discovered by Sir Alexander Fleming in 1928 and before Felix Hoffmann first synthesized aspirin for Bayer in 1897. In fact, we have not scientist nor medical doctor nor herbalist but Mother Nature to thank for this amazing gift. This magical, first food of life for humans and all mammals is colostrum, and it's been around since the beginning of mammalian life on this planet.

I discovered bovine colostrum for

my ailing wife more than two and a half decades ago. My wife suffered with no functional immune system after having her thymus gland irradiated as a child. This was common practice in the 1950s, and it demonstrated to me just how important the human immune system is to our healthy existence and just how little physicians really understand about it. Thanks to a colleague who was a naturopathic physician, bovine colostrum turned my wife's life around completely. No longer faced with the absolute certainty of her death, I have vigorously pursued research to reintroduce this biologic nutraceutical back into human use ever since.

Hippocrates said that all disease begins in the gut. Modern medicine is beginning to understand and accept the concept of immune and gastrointestinal health's being interdependent, yet the majority of practitioners are still in the dark about colostrum. A million years of evolution has taught us the importance of passive immunity; it's the reason that all mammals, except humans, can exist at all. This astute conclusion is something my mentor, medical anthropologist Dr. Robert Heinerman taught me. Rather than looking at colostrum as just a substance with a lot of wonderful chemicals in it, Dr. Heinerman gave me a way to view colostrum through the eyes of a sociologist and an anthropologist with all the history of mankind and the origins of the very first mammals.²

What is Leaky Gut Syndrome?

The term *leaky gut syndrome*, or leaky gut identifies an increasingly pervasive health disorder in which the lining of the small intestine is more permeable than it should be and becomes subject to inflammation by various irritants. The abnormally large spaces allow entry of toxic material into the bloodstream that would, in healthier circumstances, be repelled and eliminated. The gut becomes "leaky" in the sense that bacteria, viruses, fungi, parasites and their toxins, and undigested foods such as proteins, nerve and connective tissue, fat and waste normally not absorbed into the bloodstream in the healthy state, pass through a damaged, hyperpermeable, porous or leaky gut. When these foreign substances enter the bloodstream, the immune system goes into reaction mode and begins creating antibodies against its own tissues. Chronic overstimulation of the immune system leads to chronic inflammation and disease.

All newborn mammals have holes in the stomach and small intestines, by design, so that colostrum can freely enter the bloodstream. Every antibody produced against every pathogen the mother has encountered in her lifetime, and her own mother's lifetime, is transferred to her offspring. Humans receive some passive immunity in the womb, yet the transfer continues with early and extended breast-feeding. Colostrum also contains the epithelial and epidermal growth factors that

close the holes within two days after birth, such that the infant no longer has a leaky gut. Without a doubt, this underscores the importance of breastfeeding; and for me, it was the foundation of my hypothesis that if colostrum can heal leaky gut in a 2-day old infant, surely it can do the same for an 80-year-old.

To further test my hypothesis, I instituted animal trials with pigs. In a double-blind study, we proved that bovine colostrum not only prevented GI damage caused by excess stomach acids but also healed existing damage.³ Additionally, the colostrum-fed pigs had a 20% increase in the surface area of the small intestine as measured by villus height. This correlated to an improvement in the nutritional absorption of beneficial and critical nutrition. Not only did the pigs grow faster and healthier, they had more lean muscle mass, less fat and there was no need for farmers to use antibiotics. This study was a model for ulcers in humans, and the remarkable results led to the undertaking of human trials. My goal was to pioneer colostrum back into human consumption, and so I needed to introduce colostrum into the research arena with the top GI specialists taking the lead. My call was answered, and Dr. Raymond Playford at the Imperial College School of Medicine in London led his team, first with animal models of NSAID-induced gut damage, and later with humans.^{4,6} They found that taking colostrum reduced the acute NSAID-induced increase in small-intestinal permeability. This research began in the late 1990s, and interest was high due to increasing use of NSAIDs among arthritis and chronic pain sufferers. Over the next two decades, our research evolved into other areas related to intestinal permeability, most notably utilizing the proline-rich polypeptides (PRPs) derived from bovine colostrum to eliminate HIV-associated diarrhea caused by opportunistic infections for which antibiotics had no effect.⁷ PRPs are the most powerful modulators of immune response and regulate the cytokine response that causes inflamma-

tion in the body.⁸

The Scourge of Pain Medications and Antibiotics

We know that prescription pain medications, not just the OTC variety, cause bleeding and holes in the stomach and in the intestinal lining. We know that the risk of death in people taking NSAIDs for more than two months is 1 in 1,200.⁹ We also know that abdominal pain is the most common GI symptom that prompts a clinic visit, and in an effort to relieve that pain, physicians prescribe steroids which further exacerbate the destruction of GI tissue.¹⁰ We know that 100 million people are taking pain medications for extended periods, whether they obtain them through legal or illegal means. That's half of all adults in the US, and so I'm confident we can say that a minimum of 100 million people have leaky gut syndrome. There's no consumer warning label on OTC pain relievers that says "Extended use causes leaky gut syndrome." Medical schools aren't teaching physicians about the GI dangers of chronic use of pain medications, so when doctors write a prescription for pain meds, they're unaware that they're writing a prescription for leaky gut syndrome. Sadly, it's a case of a little knowledge being a lot dangerous.

Pain medication is the most utilized drug category in the US and also the most abused, followed closely by GI drugs. It's not surprising at all, since the two are interconnected in a vicious cycle of leaky gut syndrome. The first creates the problem, and the second masks and exacerbates the problem. So, what really needs to be done to stop this epidemic is for physicians and medical practitioners to offset the effects of the flawed rational and flawed treatment of the past. The Hippocratic oath first says, "Do no harm." How can prescribing drugs that create more harm to the gastrointestinal tract possibly provide no harm?

We also know that nearly 80% of all pathogens enter the body through or attached to mucosal surfaces, the largest of which is the gastrointestinal

tract. We know that people are bringing infections into hospitals, and others with compromised immune systems are taking them home. We know that many patients are discharged from the hospital sicker than when they entered and often dying later. Approximately 125,000 Americans die annually from hospital-acquired, gut-based infections, of which *Clostridium difficile* (*C. diff.*) and methicillin resistant *Staphylococcus aureus* (MRSA) are the most prevalent and most difficult to treat. I've calculated the 125,000 figure based on toxicologist John T. James' estimate that 440,000 people die annually from hospital infections and medical mistakes, and by taking the couple of states that actually report hospital-acquired infections (HAIs) and extrapolating across the US.¹¹ Interestingly, *Consumer Reports* has been a champion of requiring states and the federal government to make reporting of HAIs a requirement.¹² We're slowly moving in that direction, but reporting is not readily available to consumers.

Consumers and some physicians are ignorant to the damage that antibiotics cause in the gastrointestinal tract. Prescribing antibiotics for gut-based pathogens creates more problems than it solves; it destroys both good and bad bacteria and leaves the strong and drug-resistant bacteria behind to colonize and exacerbate leaky gut syndrome. The bacterial toxins seep through the permeable gut lining and get into the bloodstream, so what was once a gut infection now becomes a systemic infection, often with deadly consequences. Leaky gut can also create chronic diarrhea, which reduces a patient's ability to fight infections and depletes the body of essential nutrients and fluids. Similar to what we observe in HIV/AIDS patients, chronic diarrhea leads to a wasting process because the body's immune system is essentially overrun and unable to do its normal job.

Further complicating the problem is the pervasive use of antibiotics in livestock production, for which there is no justifiable use in healthy animals. The antibiotics enter the food in the

animal products we eat and enter the water supply from farm run-off and fertilizers applied to crops.¹³ Human consumption becomes unintentional and unavoidable. Additionally, with prescription and OTC analgesics being some of the most frequently used drugs, these along with antibiotics, antidepressants, antihypertensives, and others end up in downstream water feeding our local municipalities.¹⁴ Infectious disease experts from the US and around the world agree, "We've reached the end of antibiotics, period." (Arjun Srinivasan, MD, associate director at CDC).¹⁵

The Causes of Leaky Gut Syndrome and the Development of Autoimmune Diseases

Even if everyone was breast-fed as infants, poor lifestyle choices can increase intestinal permeability later in life. Extended use of pain medications and repeated courses of antibiotics are the major self-inflicted insults that cause leaky gut syndrome. Other triggers of leaky gut syndrome include parasites; corticosteroids; birth control pills; GMOs; pesticide-contaminated foods; molds, yeast, and bacteria; an excessive intake of refined sugars, caffeine, alcohol, or food additives; surgery; and a decrease in blood supply to the bowel. Although the damage may not be obvious at first and take many years to develop, the major health consequences outside of GI pathogens are autoimmune diseases. Doctors and patients have been slow to make the connection. As the incidence of leaky gut syndrome increased, the incidence of autoimmune diseases skyrocketed, and patients with Leaky Gut syndrome frequently have multiple autoimmune diseases. Five to 8% of Americans has 1 of 80 autoimmune diseases recognized by the National Institutes of Health. Yet, leaky gut syndrome as a diagnosis remains overlooked. The current standard of care paradigm is to treat the symptoms of disease, not the cause of disease, but reversing this paradigm and healing leaky gut syndrome would prevent, reverse, or delay disease.

Leaky gut syndrome is directly associated with many autoimmune diseases including allergies, alopecia areata, Alzheimer's disease, autism, chronic fatigue syndrome, Crohn's disease, depression, diabetes, fibromyalgia, food allergies and sensitivities, heart disease, HIV/AIDS, irritable bowel syndrome, inflammatory bowel disease, multiple sclerosis, polymyalgia rheumatica, Raynaud's disease, rheumatoid arthritis, scleroderma, Sjögren's syndrome, ulcerative colitis, and vasculitis.¹⁷⁻²⁷ The connection between leaky gut syndrome and these autoimmune conditions is the antibodies created by the body in response to the toxic substances and undigested fats and proteins that leak into the bloodstream and attach themselves to various tissues throughout the body, create an allergic response, trigger the destruction of tissues and organs, and create inflammation. As toxicity increases, autoantibodies are created, and the destruction and inflammation becomes chronic. There is a tipping point at which the body cannot recover from chronic inflammation, and pathological diagnosis follows. The specific type of autoimmune disease that develops depends on the predominant location of the inflammation. When inflammation occurs in a joint, rheumatoid arthritis can develop; in the brain, chronic fatigue syndrome (myalgic encephalomyelitis) may be the result; in the blood vessels, vasculitis may be the resulting condition; within the gums, periodontal disease can result; or in the lungs, asthma may be triggered. If the antibodies attack the lining of the gut itself, the result may be irritable bowel syndrome, ulcerative colitis, or Crohn's disease. If the bacteria that causes gingivitis enter the bloodstream and attack the arterial walls, causing inflammation and cholesterol deposition, heart disease and stroke may ensue.

As a secondary consequence, inflammation in the gut damages the body's ability to produce IgA, and without IgA, pathogens can escape into the bloodstream and infect any part of the body. This leads to an in-

crease in infections, an overstimulated immune system, and an abundance of pathogens infecting the liver, thereby creating detoxification failure. Eventually, patients suffer from loss of concentration, impaired mental abilities, decreased energy, skin infections and irritations, such as hives or acne, as the skin organ attempts to detoxify that which the liver is failing to provide.²⁸

Colostrum to the Rescue

The "superbugs" created by decades of antibiotic misuse and our over-reliance and addictions to pain medications need not be our undoing.^{29,30} Mother Nature's gift of colostrum is just waiting to be rediscovered. Colostrum was designed to prevent infections originating in the bowel, to close the leaky gut, and to prevent opportunistic infections from taking over and causing or exacerbating leaky gut syndrome. For individuals who already have an autoimmune disease, colostrum is absolutely essential to the healing process. Unless a permeable gut is healed, the body cannot begin to repair the damage caused by inflammation. As healing begins, the amount of toxins dumped into the bloodstream will decline, nutritional uptake will improve, the cells will have better access to the fuel they need to for repair and replication, organ function will improve, and energy levels will rise.

And unlike the so-called wonder drugs of the pharmaceutical industry, absolutely no harm comes from colostrum.³¹ It has no known side effects and has no known interactions with drugs. Colostrum has been proved in both animal and human trials to prevent and heal leaky gut syndrome, and it's the only substance conclusively proven to provide this kind of result. Food elimination and herbal products can't do the job because they don't contain the antibodies, immunoglobulins, and growth factors necessary to heal the gut lining and provide the nutrition and hormones for cell repair, growth and differentiation. Bio-identical epithelial and epidermal growth factors (skin growth

hormones) are absolutely critical to healing and preventing leaky gut syndrome. According to the book of Sirach, colostrum is ranked alongside wheat, honey, salt, water, fire and iron as being some of the ancient “necessities of life.”³² In modern society, bovine colostrum is the “necessity of life” for healing every chronic disease.

Bovine colostrum is effective against a wide range of pathogens, including bacteria, viruses, and protozoan parasites, that cause diarrhea and other gastrointestinal illnesses.³³⁻³⁶ Even in the worst case of AIDS, colostrum could eliminate chronic diarrhea so that nutritional uptake was restored and patients could reverse their wasting disease and regain a significant measure of health. If this is any indicator of how well colostrum could work, from the occasional tummy bug someone got at the local eatery to the C. diff that they picked up in the hospital, then we have cause to celebrate. And with the CDC reporting that 2 million Americans become infected with antibiotic-resistant bacteria annually, practitioners must advocate strongly for colostrum use.³⁷

Colostrum’s antimicrobial and antiviral activity is due to its antibodies, lactoferrin, lactoperoxidase, lysozyme, and other immune factors which bind to pathogens and destroy their cell membranes or compete for binding sites on the intestinal wall.^{38,39} Initially, many researchers believed that in order for colostrum to be effective against specific diarrhea pathogens, the cows needed to be immunized with those specific pathogens a minimum 24 hours prior to colostrum collection. This was termed *hyperimmune colostrum*. Later, it was discovered that nonhyperimmune colostrum was equally effective in preventing diarrhea.⁴⁰ More good news, and the reason is that cows acquire their immunity from pathogens in the grasses that they eat and from the infected people whom they come in contact with, in addition to all the passive immunity that they received from their maternal lineage. This broad-spectrum defense is what makes

colostrum so beneficial for human use.

High-Efficacy Colostrum Supplements Yield Health Benefits

In order for colostrum to be effective, it must contain high levels the active components, and it must be able to reach the cells with no compromise in bioactivity. A phospholipid coating, such as liposomal delivery, protects the colostrum from digestion and ensures that it can deliver the nutrients, growth factors, and antipathogenic action of colostrum to the cells.⁴¹ Raw fresh colostrum has a liposomal surrounding of the active, sensitive molecules and so, we know that this is critical for processed supplements. Only one processing plant in the world has been designed to process colostrum in a way that maintains integrity of the active components and verifies bioactivity and the presence of antibodies prior to distribution to consumers. If a colostrum supplement can’t heal leaky gut syndrome, it’s no better than powdered milk.

I’ve been working with physicians for over two decades in leaky gut and gastrointestinal health with phenomenal results. I’ve had some very significant reports from patients and physicians testifying to remission and restoration of damaged tissue in multiple sclerosis, fibromyalgia, scleroderma, and Alzheimer’s disease. We believe this to be the result of the healing of leaky gut syndrome and the ability of colostrum’s growth factors to help repair damaged tissue and organs. I recommend physicians put their chronically ill patients -- anyone with allergies, food sensitivities, autoimmune diseases, immune problems, cancer, heart disease, and so on -- on colostrum as a first mode of treatment. I also suggest a gluten-free diet because gluten coats the villi in the small intestine, thereby trapping any pathogens in the infected area of the bowel. Colostrum can’t destroy the pathogens if it can’t reach them. The bowel needs to be reseeded with probiotics, and again colostrum is needed for the good bacteria to colonize. If

leaky gut was the result of parasites, an anti-parasitic cleanse is necessary, as colostrum does not destroy parasites.

Physicians with gluten-sensitive patients are particularly interested in colostrum. The Institute for Responsible Technology just came out with a report that confirms what I’ve believed for a long time. GMO foods are linked to leaky gut syndrome and may also trigger or exacerbate gluten-related disorders, including celiac disease.⁴² Of the nine GMO food crops grown for human consumption containing high levels of Bt toxin, corn and corn oil are most widely consumed in the US and Mexico. The Bt toxin was designed to puncture holes in insects’ digestive tracts, and studies have demonstrated this in human cells as well.⁴³ Bt toxin may be related to leaky gut syndrome, and as a whole, GM foods may be contributing to the rise in gluten sensitivity.

“Colostrum is the ideal solution for leaky gut syndrome. Its components prevent and heal GI damage. Unless the gut is healed, the body cannot begin the process of repair” (Donald Henderson, MD, MPH, UCLA professor of medicine).³⁰ If you heal the gut, stop the crossover of toxins, and detoxify the body, then you’re going to see a starting point from which you can begin eliminating multiple symptoms and narrowing down a process and a pathway to wellness. Recommended dosing is 1 teaspoon colostrum mixed with water on an empty stomach 30 minutes before meals and before bedtime. Results are typically achieved within 30 days, and regular use is required to maintain benefits.

Common practice dictates that practitioners perform allergy/food sensitivity tests and recommend a food elimination program to heal leaky gut. Foods are not the cause of leaky gut. They’re the symptom of leaky gut. That is the proof that leaky gut exists, and I believe that every patient who walks through your door with a chronic disease complaint has leaky gut syndrome. If you haven’t put colostrum into your practice, or you have put

colostrum in your practice before and you didn't get results, you really need to take a look at the fact that not all colostrum on the market is equal. Not all colostrum is processed to ensure the bioactivity of the beneficial components. And if they're not bioactive, they're not going to provide the kind of results I'm talking about in this article.

Conclusion

Often misunderstood and nearly always undiagnosed, leaky gut syndrome has become an epidemic in modern times, as evidenced by the epidemic of allergies and chronic diseases. The more public attention given to the overuse and abuse of pain medications and antibiotics is sure to drive home the message that physicians need a paradigm shift in treatment of chronically ill patients. When Hippocrates said that all disease begins in the gut, he was far ahead of his time. After 2000 years, we are just beginning to understand and accept this premise in modern medicine. If we understand and appreciate colostrum for the true gift that it is, we can utilize it for the healing and prevention of gastrointestinal distress and therefore, chronic toxicity; and in doing so, we will dramatically increase quality of life and reduce unnecessary death and disability.

Notes

1. Foreman J. Why Women Are Living in the Discomfort Zone. *The Wall Street Journal*. January 31, 2014.
2. Heinerman J. Fascinating Colostrum: An Ancient Food for Modern Times. [blog entry]. <http://www.icnr.org/blog/13-home-page/43-fascinating-colostrum-an-ancient-food-for-modern-times> accessed January 31, 2014.
3. Borissenko M. Malaysia Colostrum Piglet Clinical Trial. Unpublished Research. October 2004.
4. Playford RJ, et al. Bovine colostrum is a health food supplement which prevents NSAID induced gut damage. *Gut*. 1999;44:653-658.
5. Playford RJ, et al. Co-administration of the health food supplement, bovine colostrum, reduces the acute non-steroidal anti-inflammatory drug-induced increase in intestinal permeability. *Clin Sci (London)*. 2001 Jun;100(6):627-633.
6. Playford RJ, et al. Colostrum and milk-derived peptide growth factors for the treatment of gastrointestinal disorders. *Am J Clin Nutr*. 2000;72:5-14.
7. Floren CH, et al. ColoPlus, a new product based on bovine colostrum, alleviates HIV-associated diarrhea. *Scand J Gastroenterol*. 2006;41(6):682-686.
8. Keech AM. *Peptide Immunotherapy – Colostrum: A Physicians Reference Guide*. AKS Publishing; 2010.
9. Tramèr MR, et al. Quantitative estimation of rare adverse events which follow a biological progression: a new model applied to chronic NSAID use. *Pain*. 2000 Mar; 85(1-2):169-182.

10. Peery AF, et al. Burden of Gastrointestinal Disease in the United States: 2012 Update. *Gastroenterol* 2012;143(5):1179-1187.
11. James JT. A New, Evidence-based Estimate of Patient Harms Associated with Hospital Care. *J Patient Safety*. 2013;9(3):122-128.
12. Deadly Infections: How good is your hospital at preventing them? *Consumer Reports*. June 2011. <http://www.consumerreports.org/cro/2012/12/deadly-infections/index.htm>. Retrieved February 10, 2014.
13. Casey JA, et al. High-density livestock operations, crop field application of manure, and risk of community-associated methicillin-resistant *Staphylococcus aureus* infection in Pennsylvania. *JAMA Intern Med*. 2013 Nov 25;173(21):1980-1990.
14. Kostich MS. Concentrations of prioritized pharmaceuticals in effluents from 50 large wastewater treatment plants in the US and implications for risk estimation. *Environ Pollution*. 2014 Jan;184:354-9.
15. Srinivasan A. Hunting the Nightmare Bacteria: PBS Frontline interview with Dr. Arjun Srinivasan. June 28, 2013.
16. Frequently asked questions [Web page]. John Hopkins Medical Institutions Autoimmune Disease Research Center. <http://autoimmune.pathology.jhmi.edu/faqs.cfm>. Accessed January 30, 2014.
17. Szaniszlo P, et al. New insights into clinical trial for Colostrin in Alzheimer's disease. *J Nutr Health Aging*. 2009;13(3):235-241.
18. Liu Z, et al. Tight junctions, leaky intestines, and pediatric diseases. *Acta Paediatrica*. 2005;94(4):386-393.
19. Maes M, Leunis JC. Normalization of leaky gut in chronic fatigue syndrome (CFS) is accompanied by a clinical improvement: effects of age, duration of illness and the translocation of LPS from gram-negative bacteria. *Neurol Endocrinol Lett*. 2008;29(6):902-910.
20. Katz KD, et al. Intestinal permeability in patients with Crohn's disease and their healthy relatives. *Gastroenterology*. 1989 Oct;97(4):927-931.
21. Maes M, et al. The gut-brain barrier in major depression: intestinal mucosal dysfunction with an increased translocation of LPS from gram negative enterobacteria (leaky gut) plays a role in the inflammatory pathophysiology of depression. *Neuro Endocrinol Lett*. 2008 Feb;29(1):117-124.
22. Vaarala O. The gut immune system and type 1 diabetes. *Ann NY Acad of Sci*. 2002 Apr;958:39-46.
23. Jackson PG, et al. Intestinal permeability in patients with eczema and food allergy. *Lancet*. 1981 June 13;1(8233):1285-1286.
24. Sharpstone D, et al. Small intestinal transit, absorption, and permeability in patients with AIDS with and without diarrhoea. *Gut*. 1999 Jul;45(1):70-76.
25. Gece K, et al. Leaky gut in patients with diarrheal-predominant irritable bowel syndrome and inactive ulcerative colitis. *Digestion*. 2012;85(1):40-46.
26. Smith MD, et al. Abnormal bowel permeability in ankylosing spondylitis and rheumatoid arthritis. *J Rheumatol*. 1985 Apr;12(2):299-305.
27. Munkholm P et al. Intestinal permeability in patients with Crohn's disease and ulcerative colitis and their first degree relatives. *Gut*. 1994 Jan;35(1):68-72.
28. Hamilton I, et al. Small intestinal permeability in dermatological disease. *Q J Med* 1985;56(221):559-567.
29. Kelly CP, et al. Anti-Clostridium difficile bovine immunoglobulin concentrate inhibits cytotoxicity and enterotoxicity of *C. difficile* toxins. *Antimicrobi Agents Chemother*. 1996;40:373-379.
30. Kim JW, et al. Protective effects of bovine colostrum on non-steroidal anti-inflammatory drug induced intestinal damage in rats. *Asia Pac J Clin Nutr*. 2005;14(1): 103-107.
31. Henderson DR. *Colostrum: Nature's Healing Miracle*. CNR Publications; 2000.
32. Heinerman. Op cit.
33. Xu LB, et al. Bovine immune colostrum against 17 strains of diarrhea bacteria and in vitro and in vivo effects of its specific IgG. *Vaccine*. 2006;24(12):2131-2140.
34. Van der Strate BW, et al. Antiviral activities of lactoferrin. *Antivir Res*. 2001;52(3):225-239.
35. Acosta-Altamirano G, et al. Anti-amoebic properties of human colostrum. *Adv Exp Med Bio*. 1987;216B:1347-1352.
36. Korhonen H, et al. Bovine milk antibodies for health. *Br J Nutr*. 2000;84(Suppl.1):S135-S146.
37. Centers for Disease Control and Prevention. *Antibiotic Resistance Threats in the United States, 2013*. Available at <http://www.cdc.gov/drugresistance/threat-report-2013>.
38. Van Hooijdonk AC, Kussendrager KD, Steijns JM. In vivo antimicrobial and antiviral activity of components in bovine milk and colostrum involved in non-specific defence. *Br J Nutr*. 2000;84 Suppl 1:S127-5134.
39. Ellison RT III, Giehl TJ. Killing of gram-negative bacteria by lactoferrin and lysozyme. *J Clin Invest*. 1991;88(4):1080-1091.
40. McConnell MA, et al. A comparison of IgG ad IgA activity in an early milk concentrate from non-immunized cows and a milk from hyperimmunized animals. *Food Res Int*. 2001;34:255-261.
41. Chrai SS, et al. Liposomes (a review) part two: drug delivery systems. *BioPharm*. 2002 Jan:40-43. Drug targeting using liposomes as carriers holds promise for reducing toxicity and targeting delivery to disease sites.
42. Smith JM. Can genetically engineered foods explain the exploding gluten sensitivity? [online article]. Institute for Responsible Technology. <http://responsibletechnology.org/glutenintroduction> Accessed February 10, 2014.
43. Mesnage R, et al. Cytotoxicity on human cells of Cry1Ab and Cry1Ac Bt insecticidal toxins alone or with a glyphosate-based herbicide. *Journal of Applied Toxicology*. 2013;33(7):695-699.

Douglas Wyatt is the founder of Sovereign Laboratories LLC, a Sedona-based company dedicated to developing natural products that provide the public with the best solutions for optimal health. He is honoured to be listed as the leading expert in colostrum and is credited with reintroducing bovine colostrum into human use. Additionally, he serves as the research director of the International Center for Nutritional Research, a not-for-profit institute dedicated to nutritional health, and is one of the leading figures in the natural products industry. Doug is a leader in the research and a proponent of colostrum's unique and powerful healing compounds that show incredible promise for turning the tide on the prevention and treatment of the world's increasing chronic disease epidemic. As a publisher, author, writer, scientist, and public speaker, Doug has appeared nationwide on television and radio shows and at health conventions worldwide. He is dedicated to the prevention of chronic disease through natural nutritional intervention and is working with the WHO (World Health Organization) and other internationally recognized research organizations on clinical trials on HIV/AIDS, other infectious diseases, autoimmune diseases, and bowel health issues.