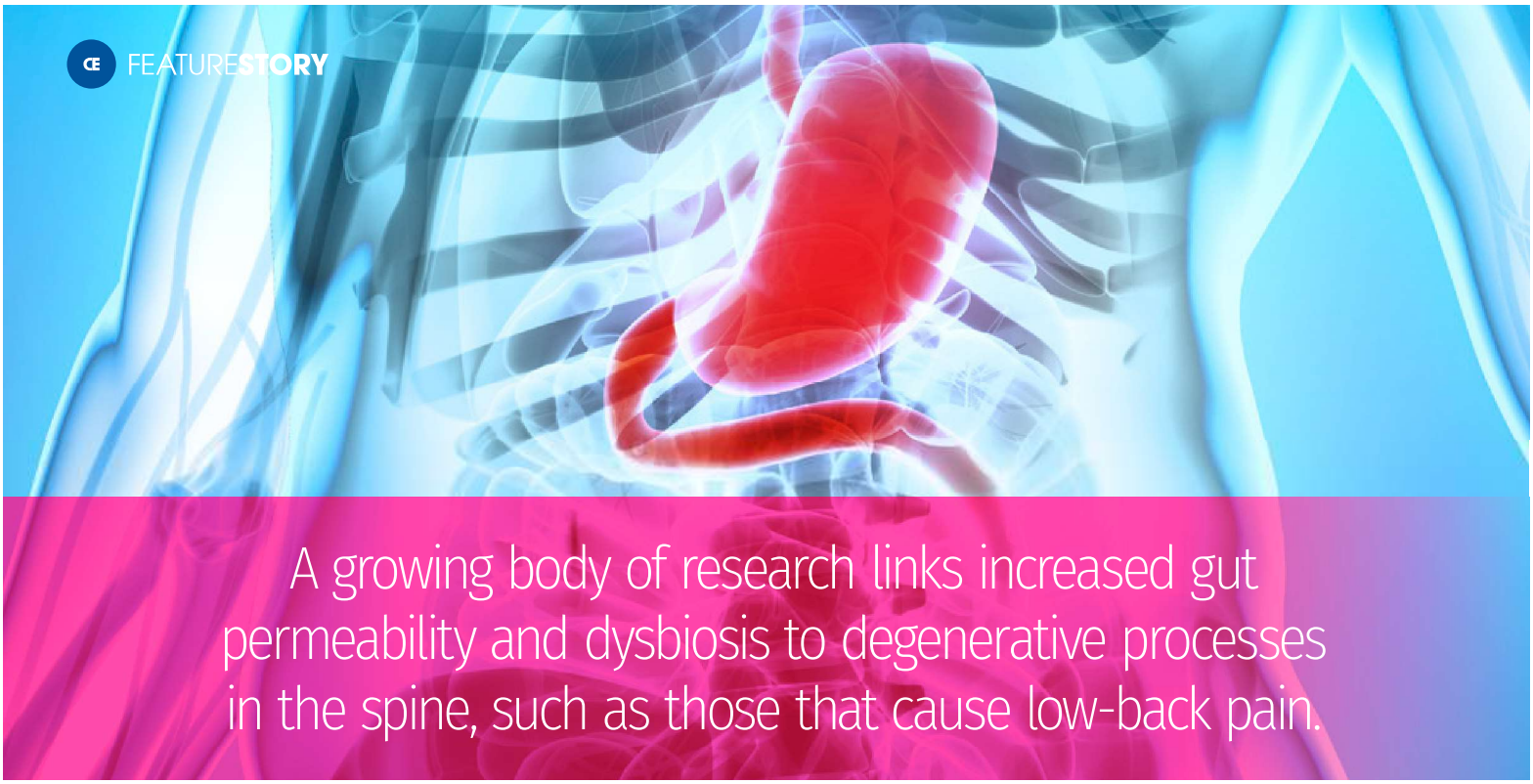


A growing body of research links increased gut permeability and dysbiosis to degenerative processes in the spine, such as those that cause low-back pain.

Two factors that trigger zonulin release are exposure to pathogenic bacteria and exposure to gluten. By increasing intestinal permeability when pathogenic bacteria are present, zonulin may help flush them from the system. However, the damage this does to the intestinal barrier may lead to leaky gut syndrome and may be an underlying cause of allergies, inflammation and autoimmune disease.[1]

People with celiac disease have been shown to have elevated zonulin levels. Because modern wheat has been bred to contain high levels of gliadin, one of the proteins in gluten, today many people are sensitive to gluten when in earlier times they would have had no problem. By some estimates, between 30-50% of the population is affected by non-celiac gluten sensitivity.[2]

Zonulin is also elevated in individuals with non-celiac gluten sensitivity. Elevated zonulin is also found in several autoimmune diseases and is a contributing cause of type 1 diabetes.[3]

Other food sensitivities can damage the intestinal barrier and cause leaky gut syndrome. Conversely, leaky gut syndrome can lead to multiple gut issues, especially food sensitivities. Damage to the gut epithelial barrier from the SAD and exposure to the many environmental toxins and chemicals in use today may be the primary reason for the sharp increase in allergies, autoimmunity and other chronic conditions over the past few decades.[4]

When undigested food particles, bacteria, toxins and other substances escape the small intestine, they encounter the immune system in the gut-associated lymphoid tissue (GALT) that surrounds the gut. Some bacteria and other substances routinely escape the small intestine, and the GALT efficiently neutralizes them. When the tight junctions are compromised, they may allow large amounts of these substances to enter into the circulation, activating the rest of the immune system. The result is localized and systemic inflammation.

In addition to a systemic inflammatory response, food sensitivities can cause or exacerbate musculoskeletal conditions, including joint pain, low-back pain, muscle pain and tightness. Gastrointestinal symptoms include gas, abdominal cramps, bloating and constipation. Rashes, fatigue and brain fog are other common symptoms.

The gut microbiome and inflammation

The hundred trillion or so of bacteria and other microorganisms typically found in the gut are collectively known as the gut microbiome. The bacteria in the gut are essential for breaking down fiber and undigested food particles when they arrive in the colon.

22 FEET

THE SMALL INTESTINE IS ON AVERAGE ABOUT 22 FEET LONG, ONLY AN INCH IN DIAMETER, AND HAS A LINING WITH THE THICKNESS OF A WET PAPER TOWEL

Gut bacteria's metabolic byproducts (metabolites) include short-chain fatty acids (SCFAs), particularly butyrate. In addition to fueling the epithelial cells that line the colon, SCFAs play an essential role in modulating systemic inflammation and autoimmunity.

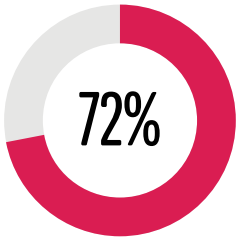
The low-fiber Standard American Diet, antibiotic use, illness, alcohol use and several other factors can lead to dysbiosis

Tracing food sensitivity symptoms back to a specific food can be frustratingly difficult. The link between an aching joint three days after eating a reactive food isn't usually obvious.

or an imbalance in the gut microbiome. In addition to the digestive problems dysbiosis can cause, an unbalanced microbiome means bacterial metabolites include more inflammatory cytokines such as TNF-alpha, IL-1 and IL-6. These enter the circulation and contribute to systemic inflammation.

In addition, leaky gut syndrome and/or gut dysbiosis leads to the overexpression of matrix metalloproteinases (MMPs), a group of enzymes that degrade most extracellular matrix proteins during normal tissue turnover. When MMPs' production is upregulated, it damages the collagen and causes tissue remodeling associated with cartilage degradation, arthritis and intervertebral disc degeneration.

AMERICANS WHO REPORT THEY HAVE EXPERIENCED GI SYMPTOMS SUCH AS HEARTBURN, NAUSEA, GAS, BLOATING OR DIARRHEA A FEW TIMES A MONTH OR MORE



The gut-bone axis

The role of leaky gut and dysbiosis in musculoskeletal problems is being increasingly recognized. The crosstalk between the gut microbiome and the joints, for example, can be an underlying cause of osteoarthritis. In people inflamed for other reasons, including obesity, age and poor diet, inflammation from dysbiosis may be the final factor that causes joint inflammation. Dietary changes to improve dysbiosis and resolve leaky gut are often helpful for reducing joint inflammation.[5]

Another excellent example of the gut-bone axis is the role of the gut in intervertebral disc degeneration and low-back pain. A growing body of research links increased gut permeability and dysbiosis to degenerative processes in the spine, such as those that cause low-back pain. For example, in the case of intervertebral disc disease, one potential mechanism is the translocation of bacteria across the gut epithelial barrier and into the intervertebral disc, where they cause inflammation and degenerative damage. Another possible mechanism is systemic inflammation from increased gut permeability and dysbiosis added to existing inflammation from older age, obesity and poor diet. Yet another potential mechanism is diffusion of inflammatory gut metabolites into the intervertebral disc.[6]

As a final example, about half of all people with spondylarthritis, a group of related disorders that includes ankylosing spondylitis and psoriatic arthritis, have gut inflammation. Chronic gut inflammation predicts a higher risk of worsening disease among these patients. Reducing their gut inflammation leads to remission of joint disease — and vice versa. Therapies that simultaneously target inflammation in the gut and the joints are often beneficial.[7] CE

Part II of this article will appear in issue #8.

ROBERT G. SILVERMAN, DC, DACBN, DCBCN, MS, CCN, CNS, CSCS, CIISN, CKTP, CES, HKC, FAKTR, is a chiropractic doctor, clinical nutritionist, national/international speaker, author of Amazon's #1 bestseller "Inside-Out Health," and founder and CEO of Westchester Integrative Health Center. He graduated magna cum laude from the University of Bridgeport College of Chiropractic and has a Master of Science degree in human nutrition. The ACA Sports Council named him "Sports Chiropractor of the Year" in 2015. He is on the advisory board for Functional Medicine University and is a seasoned health and wellness expert on the speaking circuits and in the media. A frequently published author in peer-reviewed journals and other mainstream publications, he is a thought leader in his field and practice. His new book, "Superhighway to Health," was published in June 2021. He can be reached at drrobertsilverman.com.

References can be found online at chiroeco.com