

Caring *for the Ages*



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Good Nutrition Becoming a Potent Tool to Boost Immune System in Elderly

Christine Kilgore

Few nursing home residents have escaped the process of immunosenescence. With age comes a sweeping and well-studied decline in immune responsiveness that leaves older individuals increasingly susceptible to developing infections and more likely to have prolonged and difficult recoveries.

T-cell mediated activity is significantly altered, and a host of other changes occur in the composition and functioning of immune system components. Even “healthy aging,” researchers believe, is accompanied by some level of impaired immune response.

The role of nutrition in reversing or diminishing this impaired immune function has also been studied for decades, and in recent years its umbrella has increasingly covered micronutrients as well as probiotics and prebiotics. Today, as nursing homes work to improve antibiotic stewardship, decrease hospital transfers, and strengthen their approaches to infection prevention and control, nutrition has increasing relevance, sources say.

“We need to appreciate that there is significant change in the immune system with aging, both in terms of reductions in the parts of the immune system



Photo courtesy of Simin Meydani, PhD

Dr. Simin Meydani's study on nutrition found nursing home residents were deficient in zinc, and subsequent supplementation improved the number and function of T cells.

that are involved in fighting bacteria and viruses, and increases in the formation of inflammatory products that can have an impact on other parts of the immune system,” said Simin Meydani, PhD, director of the Jean Mayer U.S. Department of Agriculture Human

Nutrition Research Center on Aging at Tufts University in Boston, and of the Center's Nutritional Immunology Lab.

“And we also need to appreciate that changes in the nutritional status of older

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CMS Releases Final Rule Revising Nursing Home Regulations

Carey Cowles

The Centers for Medicare & Medicaid Services has issued the long-awaited final rule that will revise the requirements that long-term care facilities must meet to participate in Medicare and Medicaid programs. This is the first change in the nursing home regulations since the Omnibus Budget Reconciliation Act that was implemented in 1990. According to CMS, these changes reflect advances that have been made in

the theory and practice of how care is administered to residents in these facilities, as well as address safety issues. “These revisions are also an integral part of our efforts to achieve broad-based improvements both in the quality of health care furnished through federal programs and in patient safety, while at the same time reducing procedural burdens on providers,” CMS stated in the final rule.

The first phase of regulations will be implemented Nov. 28 of this year, while subsequent phases must be implemented by the same date in 2017 and 2019.

Resident Services

Facilities will be required to investigate and report allegations of abuse of residents and patients. In addition,

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Good Nutrition

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individuals are important contributors to the dysregulation of the immune system,” she said. “If you have less than adequate levels of essential nutrients, the immune system is not going to function well.”

Older adults are at increased risk for deficiencies of various nutrients, and nursing home dietary assessments aren’t necessarily enough, Dr. Meydani maintained, to counter this risk and ensure that residents have an “adequate nutrient status.”

More than 10 years ago, she and her colleagues found that approximately 30% of nursing home elderly enrolled in a 33-facility study of vitamin E supplementation had low serum zinc levels. When they looked more closely at zinc levels and at the incidence and duration of pneumonia, they found that residents with normal serum zinc concentrations had a lower incidence of pneumonia — as well as reduced antibiotic use (by almost 50%) and a shorter duration of pneumonia and antibiotic therapy — compared with those who had low serum zinc levels (*Am J Clin Nutr* 2007;86:1167–73).

More recently, Dr. Meydani’s research team randomly assigned a small group of zinc-deficient nursing home residents to receive zinc supplementation (30 mg/d) or placebo for 3 months. In addition to improving serum zinc levels — largely to levels considered adequate — supplementation improved the number and functioning of T cells (*Am J Clin Nutr* 2016;103:942–51).

“Offering an adequate diet isn’t enough. What’s offered might be adequate, but it might not translate into adequate nutritional status,” she said. “If we hadn’t checked serum zinc levels [as part of the original study] we would have never known that a significant number of nursing home residents were deficient.”

Probiotics, Gut Microbiome

Dr. Meydani is not the only investigator who has reported low zinc status in the elderly or who considers zinc deficiency to be a risk factor for susceptibility to infection in the elderly.

And she is not the only expert concerned about a range of age-related nutrient deficiencies. In recent review articles from the field of nutritional immunology, experts say that older adults are at increased risk for deficiencies of various micronutrients; vitamins A, C, B₆, and B₁₂, as well as folate, zinc, and selenium, are among those listed (*Aging Dis* 2012;3(1):91–129/*Nutr Aging (Amst)*2012;1:151–65/*Mech Ageing Dev* 2014;136–7:116–28).

It is possible, moreover, that elderly residents require some micronutrients in higher amounts than the currently recommended levels. Dr. Meydani’s research on vitamin E supplementation and immune response “strongly suggests,” she said, that older individuals “need

to have a higher-than-recommended level of vitamin E intake” for improved immune function and increased resistance to influenza and upper respiratory infections.

But more research is needed, she said. Like the research on vitamin E supplementation, knowledge in the field of nutritional immunology has been driven much more by observational studies, as well as cell culture and animal-model studies, than by the large randomized controlled trials, including dose-response studies, that many believe are necessary to develop specific nutritional recommendations and strategies.

Even in the area of probiotics, research on supplementation and the prevention and treatment of infection is still in its infancy, said Connie Rogers, PhD, MPH, associate professor of nutrition and physiology at the Pennsylvania State University, University Park.

The number of studies focusing on the impact of probiotics on immune responses in the elderly has grown in recent years, and there are “promising data from animal studies, observational human studies and some clinical trials,” said Dr. Rogers, who teaches courses on nutritional immunology. “But part of the conundrum with interpreting



Connie Rogers

the literature is that ‘probiotics’ just means you’re taking in a bacterium that has positive health benefits, and there are so many different kinds of probiotics and combinations of organisms.” There’s little doubt, however, about the overall importance of the gut microbiome to immunity. In their 2012 article “Clinical Update on Nursing Home Medicine,” John Morley, MB, BCh, and his co-authors wrote that “the mass of intestinal bacteria constitute the largest immune organ of the body.” Although the mechanisms of benefit are not completely understood, it seems clear that beneficial gut bacteria can prevent the growth of harmful pathogenic bacteria, produce vitamins (such as biotin and vitamin K) and augment the immune system to tolerate antigens (*J Am Med Dir Assoc* 2012;13:581–94).

Others point out that gut microbiota may also affect the absorption of key minerals and nutrients important for immunity. All told, it’s likely that probiotics can improve the nutritional and immune status of elderly patients who, through the aging process, have experienced shifts in their gut microbiota. Aging is associated with increasing numbers of harmful bacteria, such as *Escherichia coli* and *Clostridium difficile*, as well as decreasing



Yogurt enhanced with probiotics is becoming a staple in nursing homes to optimize gastrointestinal health and ultimately help fight illness.

numbers of beneficial bacteria, such as *Bifidobacterium*.

A systematic review and meta-analysis on the effectiveness of probiotics for preventing infections in the elderly (including *C. difficile*-associated diarrhea, upper respiratory tract infections, and antibiotic-associated diarrhea) is now underway by a group of researchers in Brazil who said there have been contradictory findings from the randomized controlled trials reported thus far.

However, Mikhail Kogan, MD, assistant professor of medicine and associate director of the geriatric fellowship at George Washington University, and medical director of the GW Center for Integrative Medicine, in Washington, DC, said he is already convinced of the benefits of probiotics against *C. difficile* infection.

“We do know for sure that if you provide probiotics for a person at risk of *C. difficile* infection, you’ll cut that risk in certain situations by 90%,” he told *Caring*. “Overall, we have a general sense that a combination of a variety of different strains is probably better [than single strains] ... but we don’t know which commercial preparations are best.”

According to several literature reviews, among the most widely studied probiotics are *Saccharomyces boulardii* and the *Bifidobacterium* species.

In his integrative medicine practice, Dr. Kogan sometimes recommends commercial probiotic formulations, and he frequently suggests that patients consume kefir, a drink made from fermented

cow’s milk, that he calls “one of the most probiotic-rich foods” available.

In nursing homes, according to several dietician-nutritionists, probiotic-supplemented yogurt is playing a more prominent role — both therapeutically for residents undergoing antibiotic regimens, and more broadly in meals and snacks for all residents.

Suzanne Cryst, RD, CSG, LD, dietician nutritionist at the 170-bed Hickory Ridge Nursing & Rehabilitation Centers, said she sees more physicians ordering probiotic capsules for the duration of an antibiotic course, or yogurt twice a day for 30 days when patients start an antibiotic regimen. “If you don’t have good gut health, you won’t have an optimal level of nutrition,” she said. “That’s where our focus is today.”

Dr. Meydani urged all nursing home residents to have one to two servings of yogurt a day to meet not only their probiotic needs, but also their requirements for calcium, protein, and some micronutrients. Moreover, Dr. Rogers noted, probiotics can also help alleviate various forms of gastrointestinal distress like bloating and constipation.

“They can help regulate GI health and control gut transit,” Dr. Rogers said. For residents who do not have a fragile intestinal tract or disrupted gastrointestinal barrier (as do patients who have been treated for colon cancer, for instance) “probiotics can have some very positive beneficial effects, and very little negative effects.”

A Holistic Approach

Ensuring gut health and optimal nutritional status for her facility’s residents is a holistic and resident-specific process for Ms. Cryst. She’ll look at a resident’s skin, hands, nails and eyes as a barometer of nutritional status as part of her dietary assessments, for instance. When individual nutrients are in question, she will suggest lab work to obtain blood serum levels.

For new immunocompromised residents admitted from the hospital, she focuses first on maximizing their nutritional intake — on figuring out what they'll eat and “providing functional food so their gut starts working again and creating positive flora.” After “food first,” Ms. Cryst and other team members will then “consider whether some type of supplementation is needed — for calories, for protein, or for vitamins and minerals,” all of which are needed to respond to infectious challenges.

It's also important to minimize the use of proton-pump inhibitors, which negatively affect the absorption of nutrients. “Sometimes [the drugs] are administered in the hospital to help keep stress down and stomachs from getting upset, and residents become so focused on them. But if you can convince the resident that they [no longer] need them,” their nutrient status and immunity may well benefit, she said.

(The Society's 2012 “Clinical Update on Nursing Home Medicine” notes that *C. difficile* infection is occurring in individuals with no health care exposure or prior antibiotic use, and that a major emerging risk factor is the use of proton-pump inhibitors.)

For Dr. Kogan, boosting resistance in older patients who are susceptible to infections means trying to find the “core reasons why immunity is low.” Stress, low protein intake, high sugar intake, deficiencies in zinc and/or selenium, and lack of sufficient movement to enable the muscles and tissue to be “nourished,” are among the factors to investigate. To prevent urinary tract infections in his older patients who have had recurrences, Dr. Kogan has had success with a combination of D-Mannose powder and cranberry concentrate. (He reported on his experience and reviewed the evidence in a poster at this year's meeting of the American Geriatrics Society.)

Dr. Meydani awaits the day when geriatricians more frequently incorporate “nutrition physicals” to detect deficiencies and then monitor the effects of dietary changes and supplementation — something that is already a part of many integrative medicine practices. Because the research findings are inconclusive on the effectiveness of multivitamins and mineral supplements in the geriatric and nursing home populations, she hopes to help fill the gaps and address the conundrum that physicians and nursing home caregivers face in not having clear recommendations on strategies such as micronutrient supplementation.

“We have growing supportive evidence [in many areas], and we need a change in attitude...support for more randomized trials to demonstrate [with more specifics and clarity] the efficacy of nutrition in optimizing the immune system and the preventive value it has,” she said.

“Nutrition is complex, because there are other factors, such the presence of disease, the drugs that you take, or your genetic factors, that can influence how nutrition will interact with the immune

system,” she said. “But I don't think the complexity should distract us from realizing that you need to have adequate levels of nutrients for the immune system to function properly, regardless of what else is going on.”

Dr. Rogers sees opportunities in the meantime to improve the immune response by addressing chronic inflammation — a problem that has gained significant attention in recent years for its role in exacerbating cardiovascular disease and other age-related disorders.

“If we can intervene in the inflammatory process, we might also have beneficial effects on the immune response,” she said.

There is research underway to learn which molecular pathways of chronic inflammation can be effectively targeted by dietary approaches, but for now, maintaining normal physiological weight appears to be important. There are also emerging data that probiotics — particularly the *Bifidobacterium* species — can have an anti-inflammatory effect.

And although few studies of the Mediterranean diet have looked specifically at its effects on the immune system, its positive impact on diseases with an inflammatory component provide reason to believe that the diet could be a valuable part of maintaining a robust immune response, Dr. Rogers said.

Christine Kilgore is a freelance writer based in Falls Church, VA.



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