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Shoring Up Vaccine Efficacy

A solid vaccination program is lifesaving, essential, and insufficient. Vaccines have greatly reduced the risk of severe infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and reduce viral transmission. However, some individuals mount a weak response to vaccination, leaving them vulnerable and increasing the risk they present to others.

Part of the problem, of course, is the Delta variant, a wily creature whose arrival has coincided with a reduction in vaccine efficacy. Immune response is also affected by malignancies, organ and stem cell transplants, immunosuppressive medications, HIV infection, and primary immunodeficiencies.¹

However, there is a much larger group of individuals who fail to respond adequately to vaccination and to whom none of these classic immunosuppression conditions apply. Recent research has provided important new clues about how to help them. In an Italian study of health care workers, immune response to the Pfizer vaccine was inversely associated with waist circumference ($R = -0.324$, $P = .004$).² An overlooked consequence of excess adiposity is a low-grade inflammation that interferes with immune response,³ not to mention the simple added distance between skin surface and muscle tissue that can cause an injection to be subcutaneous, rather than intramuscular and, therefore, less effective.⁴ Immune response was also impaired by elevated plasma cholesterol levels, high blood pressure, and smoking.

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What this suggests, perhaps surprisingly, is that a key but neglected part of our immunization strategy should be shoring up the cardiometabolic health of the patient to the extent possible. Notably, these same vaccine-disrupting conditions are also associated with higher risk of severe coronavirus disease 2019 (COVID-19). Of 906,849 COVID-19 hospitalizations in the United States as of November 18, 2020, more than 60% were attributable to obesity, hypertension, diabetes, or heart failure.⁵

Tackling these conditions will sound like an impossibly tall order, given that obesity and other cardiometabolic conditions are in large measure driven by food choices over which the medical profession and public health officials have seemingly no control.

But there is reason for hope. It should be remembered that the anti-smoking efforts of a generation ago were immensely successful at changing attitudes and habits. Similarly, much of the battle against COVID-19 so far has been on the behavioral battlefield, aiming to change habits related to hygiene, masks, social behavior, and willingness to be vaccinated.

We can indeed find ways to help our patients address obesity, lipid disorders, blood pressure, and diabetes with newfound urgency. Luckily, doctors do not need to be nutrition experts, any more than they need to be smoking cessation experts. They simply need to refer patients to those who are.

Evidence suggests that such efforts will be rewarded. The smartphone-based COVID Symptom Study, including 592,571 participants of whom 31,815 developed COVID-19, found that dietary patterns that were highest in fruits, vegetables, and plant-based foods in general were associated with a 41% lower risk of severe COVID-19 and a 9% reduction of COVID-19 infection of any severity, compared with diets lowest in these foods.⁶

Similarly, a 2021 case-control study of health care workers in 6 countries revealed that those following largely plant-based diets had 73% lower odds of developing moderate to severe COVID-19, compared with those following other diets. Participants following low-carbohydrate, high-protein diets did worse, with a nearly 4 times greater odds of moderate to severe COVID-19 than those following plant-based diets.⁷ Biological plausibility for this benefit comes from the fact that such diets are associated with

significantly lower body weight, lower risk of hypertension, lower plasma lipid levels, and lower risk of diabetes.

Here are reasonable steps forward:

1. In June 2021, the American Medical Association adopted a strong policy urging governmental leaders to encourage individuals with underlying health conditions associated with COVID-19 morbidity and mortality to see their doctors to institute (or resume) appropriate treatment for those underlying conditions. That treatment should include information about healthful dietary habits, particularly a renewed emphasis on vegetables, fruits, whole grains, and legumes, and plant-based diets.
2. Medical practitioners should refer appropriate patients to registered dietitians as a matter of medical urgency. They should provide nutrition information and code nutrition messaging into their electronic medical records to be automatically given to patients at check out.
3. Hospitals should provide information about good nutrition to patients, families, visitors, and staff and should model it with the foods they serve.

To make an immunization program work, convincing people to roll up their sleeves for initial immunization and boosters as necessary is one key step. Improving their ability to respond to the vaccine is another. Evidence strongly suggests that urgently addressing underlying health conditions with, for starters, a healthier diet would not only reduce the likelihood of severe infection, but over time it may also help vaccines to work better.

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