- Immune system

Understanding the Body's Immune Response

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Boosting the cells of the immune system seems to be the popular goal these days. Many products on store shelves claim to boost or support immunity. But, in fact, attempting to boost the cells of the immune system is especially a complicated matter.

There are so many different kinds of cells in the immune system that respond to so many different microbes in so many ways. Health scientists say that the concept of boosting immunity actually makes little sense scientifically. Instead, boosting the number of cells in your body – immune cells or others – is not necessarily a good thing. The website www.health.harvard.edu gives an example: Athletes who engage in "blood doping" (pumping blood into their systems to boost their number of blood cells and enhance their performance) run the risk of strokes.

Key considerations include which cells should be boosted, and to what number. So far, scientists do not know the answer. What is known is that the body is continually generating immune cells. Certainly, it produces many more lymphocytes than it can possibly use.

The www.health.harvard.edu website explains that the extra cells remove themselves through a natural process of cell death called apoptosis – some before they see any action, some after the battle is won. No one knows how many cells or what the best mix of cells the immune system needs to function at its optimum level.

As a person ages, his immune response capability becomes reduced, which in turn contributes to more infections and more cancer. While life expectancy in developed countries has increased, so too has the incidence of age-related conditions. While some people age healthily, the conclusion of many studies is that, compared with younger people, the elderly are more likely to contract infectious diseases and, even more importantly, more likely to die from them.

Respiratory infections, including, influenza, the Covid-19 virus and particularly pneumonia are a leading cause of death in people over 65 worldwide. No one knows for sure why this happens, but some scientists observe that this increased risk correlates with a decrease in T cells, possibly from the thymus atrophying with age and producing fewer T cells to fight off infection. Whether this decrease in thymus function explains the drop in T cells or whether other changes play a role is not fully understood.

A reduction in immune response to infections has been demonstrated by older people's response to vaccines. For example, studies of influenza vaccines have shown that for people over age 65, the vaccine is less effective compared to healthy children (over age 2). But despite the reduction in efficacy, vaccinations for influenza and S. pneumoniae have significantly lowered the rates of sickness and death in older people when compared with no vaccination.

There appears to be a correlation between diet and immunity. Scientists have long recognized that people who live in poverty and are malnourished are more vulnerable to infectious diseases. It is not known, however, whether any particular dietary factors, such as processed foods or high simple sugar intake, will adversely affect immune function.

There is some evidence that various micronutrient deficiencies – for example, deficiencies of zinc, selenium, iron, copper, folic acid, and vitamins A, B6, C, and E – alter immune responses in animals, as measured in the test tube. However, the impact of these immune system changes on the health of animals is less clear, and the effect of similar deficiencies on the human immune response has yet to be assessed.

Many people try to boost their diets with food supplements, suspecting that their regular food intake is not providing them with all their nutritional needs. Health expert caution that while taking a daily multivitamin and mineral supplement may bring other health benefits, beyond any possibly beneficial effects on the immune system, taking megadoses of a single vitamin does not. More is not necessarily better.

Pills and herbal preparations that claim to "support immunity" or otherwise boost the health of the immune system may alter some components of immune function, but thus far there is no evidence that they actually bolster immunity to the point where a person is better protected against infection and disease. Scientists don't know, for example, whether an herb that seems to raise the levels of antibodies in the blood is actually doing anything beneficial for overall immunity.

Nutrition is by no means the only factor that determines a person's overall health condition. Modern medicine, for instance, has also come to appreciate the closely linked relationship of mind and body. A wide variety of maladies, including stomach upset, hives, and even heart disease, are linked to the effects of emotional stress. Scientists are actively studying the relationship between stress and immune function.

For one thing, stress is difficult to define. What may appear to be a stressful situation for one person is not for another. When people are exposed to situations they regard as stressful, it is difficult for them to measure how much stress they feel, and difficult for the scientist to know if a person's subjective impression of the amount of stress is accurate. The scientist can only measure things that may reflect stress, such as the number of times the heart beats each minute, but such measures may also reflect other factors.

It is hard to perform what scientists call "controlled experiments" in human beings. In a controlled experiment, the scientist can change one and only one factor, such as the amount of a particular chemical, and then measure the effect of that change on some other measurable phenomenon, such as the amount of antibodies produced by a particular type of immune system cell when it is exposed to the chemical. In a living animal, and especially in a human being, that kind of control is just not possible, since there are so many other things happening to the animal or person at the time that measurements are being taken.

But there have been general health guidelines formulated by health experts – mainly proper diet, healthy lifestyle, and physical exercise. These have proven to contribute to general good health and, therefore, to a healthy immune system.