

### *Vitamin C and the Immune System*

The body's immune system is a medical marvel still not fully understood by man. But we know that when it operates properly, it keeps us well. Now, research done by four South African doctors has revealed some important new data on the beneficial effect of vitamin C on certain parts of the immune system. The research showed that vitamin C supplementation raised the concentration in the blood of IgA (Ig is an abbreviation for immunoglobulin), IgM, and the C3 complement component—three key members of the immune system.

To understand the importance of these results, some background in the functions of the immune system may be useful. This system is the body's self-defense force. It patrols the body like a mobile army, protecting against foreign invaders such as bacteria and viruses. It will either attack these invaders directly or utilize "mercenary troops" to aid in their disposal.

There are several parts to the immune system, each with a different function. Three of the most important immunoglobulins are IgA, IgM, and IgG. IgA antibodies are found mainly at the surfaces of the openings of the body. Moist surfaces, such as the mouth, are covered with IgA antibodies ready to attack invading bacteria or viruses and prevent them from entering our system through these openings.

IgM antibodies are the first to respond to the intrusion of antigens (the enemy cells which trigger the antibody response) and serve as the means of activating additional parts of the immune system to join in the fight.

IgG antibodies make up the largest percentage of antibodies in the blood, about 70%, and they are very effective in protecting the body from viral infections. IgG is the most important class of antibodies that crosses the placenta from an immunized mother to her fetus and thus provides early antibody protection for the newborn infant until the baby can produce his own antibodies.

The complement system, with nine

components labeled C1 through C9, is activated by the presence of other immunoglobulins and is very important in the destruction of antigens. C3 is one of the most important of the complement components.

The experiment in South Africa was conducted to determine if quantitative evidence could be found to support the theories of Linus Pauling and others about the benefits of vitamin C in preventing colds. Since the nature and severity of colds is so subjective, it was felt that stronger and more valid evidence would come from the measurement of certain parts of the body's immune system, which could be done objectively.

The study was conducted with 45 volunteers, all of whom were healthy nonvegetarians who had not previously been exposed to extraordinary doses of vitamin C. They were divided into two sections, 20 in the control group and 25 in the experimental group (five extra experimental subjects were chosen in anticipation of dropouts which did not occur). The test period extended over 11 weeks, during which time all subjects adhered to their regular diet and the members of the experimental group ingested 1,000 milligrams of vitamin C daily. Blood samples were taken from all participants before the study began and again at the end of the test period.

The blood samples were given a blind coding to avoid any influence of investigator bias, and the serum levels of the various antibodies were determined. The positive results of the study were as follows:

The experimental group showed an increase of 20% in serum IgM levels relative to the control group. In the case of C3, the experimental group levels increased 15% as opposed to a slight decline in those of the control group. Those receiving vitamin C supplementation had a rise in their IgG levels, but the degree of increase was not statistically significant. The vitamin C group showed no change in their serum IgA levels, but the control group showed a decline of 15% in theirs. This result was unexpected and hard for the researchers to explain, but they thought possibly that the IgA levels of the experimental group would have declined like those of the control group, had they not received vitamin C.

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It is important to note that the study began on July 2 (early winter in the southern hemisphere) and, since IgA is the principal immunoglobulin in mucous secretions, the secretory drain of IgA may be subject to seasonal variation. It is implicit in this reasoning that vitamin C acts in some way to counteract a potential net decrease in serum levels in the winter.

The decline in IgA levels in the control group during the period from early winter to early spring points out that you may be wise to increase the amount of vitamin C in your diet during these months to combat this potential decline (as discussed in the article that follows). The lowering of IgA levels may also explain why there are so many more viral infections during the winter and spring.

In summary, the study found that vitamin C supplementation had a beneficial impact on the serum levels of IgA, IgM, and C3—in effect, strengthening some important parts of the body's immunological system.