

AHCC —

a Powerful Aid in Fighting Viruses and Infections

by Fred Pescatore, M.D., MPH and Barry Ritz, Ph.D.

The strongest case for the use of nutritional supplements can be made, even to the typically skeptical mainstream medical community, when traditional pharmaceuticals have shown to be of limited efficacy. In such cases, the use of nutraceuticals as both preventive and therapeutic agents becomes very compelling. The need to consider and employ natural bioactive compounds is particularly strong in the field of infectious diseases.

Infectious diseases remain a significant public health threat in the U.S. and throughout the world. The Centers for Disease Control and Prevention (CDC) reports that 5-20% percent of U.S. residents get the flu, more than 200,000 are hospitalized and about 36,000 die on average from flu complications every year. This year the ineffectiveness of the flu vaccine was associated with an even more severe flu season. Furthermore, the pandemic threat from mutating influenza viruses such as the H5N1 virus, better known as “avian flu” or “bird flu,” is particularly worrisome given that the virus strain which caused human illness and death in Asia was found to be resistant to two antiviral medications most commonly used to treat influenza infections. Likewise, there is currently no specific treatment for the West Nile virus, although cases were reported in 43 states last year. Another health risk relates to opportunistic and often-drug-resistant infections. Such infections tend to occur at health care facilities and among immunocompromised patients but also

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occasionally affect healthy patients. (As was the case with “community-associated MRSA” that made the headlines in 2007.) So in this era of continued emergence of new or increasingly common infectious agents, not to mention the increasing threat of bioterrorism in which infectious agents could be used as weapons, natural compounds that have the potential to modify the body’s response to acute infection must be considered.

While there are plenty of nutritional supplements claiming immune boosting properties, very few compounds have undergone rigorous research and rarely are products studied in response to actual infectious diseases. Furthermore, studies on the most popular immune ingredients, such as vitamin C, ginseng or echinacea for the prevention and treatment of the common cold, have produced mixed results. Finally, the mechanism of action of most of the ingredients is still unclear, making it difficult to infer their efficacy for conditions more serious than

One exceptional ingredient in this respect is **AHCC** (an acronym for Active Hexose Correlated Compound), a novel bionutraceutical developed in Japan that has been extensively studied and used as a countermeasure to infectious disease. Studies on the effects of AHCC on **influenza, avian flu, West Nile virus, MRSA and opportunistic infections** suggest that AHCC can stimulate immune response and help protect against viruses and infections. Manufactured using a proprietary process that entails enzymatic fermentation of hybridized subspecies of cultivated medicinal mushrooms, AHCC is rich in oligosaccharides (74 percent by dry weight). While most medicinal mushroom extracts tend to contain mostly beta-glucans, AHCC is rich with alpha-glucans (a different type of a complex sugar molecule) which have a low molecular weight of under 5,000 Daltons (as compared to >200,000 for most other well-known immune support ingredients).

The body of research supporting the immunomodulating properties of AHCC is vast and growing. Supported by over 80 studies, AHCC has been extensively studied by researchers at the Harvard Medical School and the affiliated Faulkner Hospital, Yale University School of Medicine, Drexel University Department of Bioscience and Biotechnology, and SUNY Binghamton’s Department of Biological Sciences, among many others.

In addition to drawing significant interest in the academic community, AHCC has gained an impressive level of adoption in the medical community. Over 700 hospitals and medical clinics throughout Asia prescribe AHCC to patients as part of an immune enhancement maintenance regimen. Hundreds of doctors throughout the world have also used AHCC as an adjunct alternative therapy for cancer, hepatitis C and other chronic conditions. Consequently, AHCC has become the number one selling specialty immune supplement in Japan and has gained broad acceptance in the U.S., where it is available as therapy for cancer, hepatitis C and other chronic conditions. Consequently, AHCC has become the number one selling specialty immune supplement in Japan and has gained broad acceptance in the U.S., where it is available in most health food stores nationwide.

Both human and animal studies have pointed to AHCC’s ability to enhance the activity of natural killer cells (“NK cells”). These cells provide a crucial first defense for the body, launching a rapid attack while the other cells of the immune system are still mobilizing. Researchers believe that although the ability of NK cells to destroy tumors and virus-infected cells is present at birth, NK cells have to be activated. Thus, agents that stimulate NK cell activity might be expected to enhance the control of tumors and virus replication.

Activated NK cells are believed to help the body through two modes of action. First, they promptly secrete cytokines—chemical messenger proteins that “awaken the artillery” of the body’s immune system. Second, NK cells secrete substances that directly induce the destruction of tumors and virus-infected cells.

NK cells play a significant role in controlling virus infections, and the correlation between NK cell activity and the frequency of the common cold has been well established. So the clinical evidence that AHCC increases NK cell activity and the fact that NK cell activity helps the immune system fight viral infections suggests that AHCC is a potential agent to boost the NK cell response to viral infections. However, while this inference is compelling, direct research on the effect of AHCC on viral infections is required.



And fortunately such research exists. AHCC has been the subject of several studies, which investigated its potential as a countermeasure to various infectious diseases, including the H1N1 influenza (flu) virus, the H5N1 avian influenza (bird flu) virus, West Nile virus, methicillin-resistant *Staphylococcus aureus* (MRSA) and several other opportunistic infections (*Klebsiella pneumoniae*, *Candida albicans* and *Pseudomonas aeruginosa*).

The challenge of researching infectious diseases is there are no ethical, practical or reliable means of evaluating the human response to infectious agents, forcing researchers to rely on animal models. Therefore, the research strategy for AHCC has been to show efficacy in infectious diseases using animal models while conducting human clinical trials to demonstrate its ability to stimulate NK cell activity in immune compromised patients.

Two published peer-reviewed human clinical studies (on 269 and 40 subjects respectively) evaluating advanced liver cancer showed extended survival, lower recurrence and improved quality of life among patients taking AHCC. Several other studies demonstrated the ability of AHCC to significantly increase NK cell activity in immune compromised patients.

While these clinical studies support the efficacy of AHCC in humans, animal studies have been used to examine whether AHCC can be effective in fighting specific viruses and explore the mechanism or mechanisms for the observed effects. The most recent study published in the prestigious *Journal of Nutrition* examined the effect of AHCC on the **influenza (flu) virus**. The research found that mice supplemented with AHCC showed increased survival and maintained body weight during the infection compared to controls (indicative of a less severe infection). Supplementation with AHCC also resulted in enhanced NK cell activity in the lungs and spleen and rapid virus clearance from lungs. So the data clearly suggested that AHCC supplementation enhanced NK cell activity in response to influenza infection, which was associated

Another study looked at the effect of AHCC supplementation against infection with **H5N1 avian influenza virus (bird flu)**. Mice were infected with 100 times the 50% lethal dose of the H5N1 influenza virus. The control mice that did not receive AHCC demonstrated 100% mortality at 12 days post-infection. In contrast, the group that was fed AHCC prior to infection demonstrated a 30% survival through 28 days post-infection. In a second study utilizing the same protocol, the effects of AHCC supplementation alone were compared to H5N1 vaccination (the flu vaccine) alone as well as the combination of AHCC supplementation and the flu vaccine administered together. Vaccination alone resulted in approximately 80% survival, while AHCC supplementation combined with vaccination resulted in 100% survival. This data suggests while AHCC supplementation alone offers some protection against mortality associated with highly-virulent avian influenza virus infection in mice, **supplementation with AHCC may be even more effective as an addition to the flu vaccine.**

In another study, mice infected with a lethal dose of **West Nile Virus** showed that mice supplemented with AHCC prior to the infection exhibited an increase in survival and a decrease in virus load in the blood at four days post-infection.

Looking at “opportunistic” or hospital-acquired infections, the effects of AHCC supplementation on the resistance to *Klebsiella pneumoniae* (principally associated with **bacterial pneumonia** and **urinary tract infections**) was studied in both infected and stress-induced mice. Again, the AHCC-supplemented mice demonstrated increased survival, increased mean time until death, decreased susceptibility to infection and increased bacterial clearance from the blood. Studies on other types of opportunistic infections including methicillin-resistant *Staphylococcus aureus* (MRSA), *Candida albicans* and *Pseudomonas aeruginosa* provided similar results: AHCC overwhelmingly increased survival in immune compromised mice in response to infectious challenge.

Given the abundance of preliminary positive results across different infections, AHCC supplementation demonstrates valuable and clinically-relevant potential as an immune-enhancing compound. Furthermore, since AHCC supplementation was shown in one study to be even more beneficial when used in conjunction with the flu vaccine, studies are underway to further evaluate the use of AHCC as a preventive during flu season. Finally, AHCC boasts a strong safety profile supported by a Phase I study conducted at Harvard, a 20-year history of use in Japan, its adoption by over 700 clinics and use by an estimated 70,000 people worldwide (including 20,000 in the U.S.). Thus, there is a strong case to be made for adding AHCC to a daily supplement regimen to support the body’s immune system, not only during the apparent times of increased infectious threat such as the flu season, but also all year long.

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