



Anti-Aging and Anti-Cancer Properties of Avemar: A Review

by Donielle Wilson, ND

A substantial decline in immune system function with increasing age – known as immune senescence – raises the risk of serious disease and premature death in middle years and beyond. Immune senescence results in less antibody production in response to immunization shots and to disease-causing organisms, lowering the usefulness of vaccines and raising the chances of prolonged illness.

In recent years, scientists have achieved notable medical successes by developing compounds aimed at key molecules that cause or allow specific diseases to develop. In some instances, the compounds have been derived from natural food components and targeted at improving immune system function. One such compound is a dried extract of fermented wheat germ (trade name Avemar in Europe). Avemar has proven effective

at supporting optimal immune system function and has produced substantial clinical effects in a wide range of conditions such as cancer and autoimmune disorders.

Aging Population Focuses on Quality of Life Via Improved Health

During the last century, the median age and the life expectancy of people in developed nations have been increasing steadily.¹ Today, one in every five Americans is expected to be age 65 or over by the year 2030.² People aged 100 and over are now the fastest-growing portion of the US population, numbering over 60,000 – a very substantial increase from 3,700 in 1940.³ The US Census Bureau expects almost ten percent of those born 1946-1965 to live into their 90s, with almost four percent – a total of three million – reaching the age of 100.⁴ Increasingly, however, the focus of educated, aging populations is not on longevity alone but on maintaining excellent health so that a high quality of life is enjoyed even as age advances.

Immune System Function Is the Key to Health

Impairment of immunity plays a key role in the increase of cancer incidence with advancing age. Today, cancer is the leading cause of death in those aged 45 to 85.

Of the current top ten causes of death in those 45 and older, only one cause – accidents – is unrelated to either immunity or metabolism.⁵ Almost as feared among an aging population as a shortened lifespan is the pain and decreased mobility and loss of independence that can come with the age-related increase in the prevalence of autoimmune diseases such as rheumatoid arthritis (RA).

Nobel Laureate Dr. Albert Szent-Gyorgyi and Avemar

The 1937 Nobel Prize in Physiology and Medicine was awarded to Dr. Albert Szent-Gyorgyi, the Hungarian biochemist famous for first isolating vitamin C and for groundbreaking work in the biochemistry of cell metabolism. In the later years of his career, Dr. Szent-Gyorgyi turned his focus to

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➤ cancer, which had taken the life of his first wife and of other family members. Aware that populations eating whole grains had less cancer than those that didn't, Dr. Szent-Gyorgyi investigated the wheat plant for its anti-cancer properties and soon isolated compounds called methoxy-substituted benzoquinones, which data from his early experiments suggested would demonstrate anti-cancer properties if taken in supplemental quantities. Dr. Szent-Gyorgyi, an expert in fermentation, concentrated the wheat quinones by fermenting the wheat germ, but was unable to perfect processes for large-scale fermentation and standardization of quinone content in the extract before his death in 1986.

Dr. Szent-Gyorgyi's work was taken up by a new generation of Hungarian scientists led by Professor Maté Hidvegi, PhD, of the Department of Biochemistry and Food Technology at the Technical University of Budapest. Analysis of data from successes in cell, animal, and human clinical trials revealed that many of the observed anti-cancer effects were due not to direct killing of cancer cells, but to improved immune system function triggered by a myriad of natural components in the concentrate.

Today, Avemar is approved in Hungary and other parts of Europe as a medical nutriment for support of cancer patients undergoing therapy. Recently, the Hungarian Association of Maxillary, Face, and Oral Surgeons recommended that

nutritional support with Avemar be considered part of the standard of care for cancers of the head and neck.⁶

As the medical significance of Avemar's stimulation of immunity and regulation of metabolism became clear, Avemar's use broadened from support of cancer therapy to other conditions in which support of normal immunity and optimal metabolic function play key therapeutic roles.

Avemar Improves Natural Killer Cell Response to Cancer Cells and Pathogens

The immune system's first line of defense against cancer cells, and invading viruses and bacteria are its natural killer (NK) cells, which directly attack unwanted organisms. But cancer cells have "password" proteins on their surfaces (called major histocompatibility complex-I, or MHC-I proteins) that identify cancer cells as native – not foreign – to the body, shielding them from attack. Avemar reduces MHC-I proteins on cancer cells, exposing them to recognition, attack, and destruction by NK cells.⁷ Investigators cited this mechanism as the main action through which Avemar improved survival in a clinical trial among 170 colorectal cancer patients.⁸

Macrophages produce cytokines, the hormone-like substances that help activate other immune system cells. Avemar has been shown to improve immune system activity by increasing the amount of the cytokine tumor necrosis factor alpha (TNF- α) released by macrophages.⁹

Naïve T lymphocytes are part of the front-line defense against foreign organisms and infection along with NK cells. They decline in number with advancing age, but researchers investigating how Avemar kills cancer cells – while leaving normal cells unaffected – found Avemar increases T lymphocyte activity.¹⁰ Avemar restored immune system function in mice whose immune systems had been impaired by radiation and/or chemotherapy.¹¹

Normal B cells usually decline in number with advancing age, and fewer of them produce antibodies in response to foreign and abnormal organisms in the body. Avemar has been shown in animal studies to improve B-cells' responses to activation and their production of appropriate antibodies.¹²

Decline of Helpful Cytokine Production Reversed

Production of helpful cytokines – the hormone-like substances cells release to accomplish a multitude of benefits for the body – typically declines with age. ICAM-1 is a cytokine that helps immune system cells pass through blood vessel walls to invade and attack tumors. ICAM-1 also increases activity of the genes that produce other helpful cytokines: interleukin-1-alpha, interleukin-1-beta, interleukin-5, and interleukin-6, which increase the numbers and the activity of immune system cells. Avemar has been shown to increase levels of ICAM-1.¹³

While beneficial cytokines typically decline with age, levels of disease-related cytokines, such as IL-6 (linked to inflammation and increased risk of death from some cancers)¹⁴ go up. IL-10 typically rises with age as well; it suppresses immune system activity against tumor cells.¹⁵ Avemar has been shown to reduce levels of IL-10 and help achieve a re-balancing of lymphocyte subclasses Th-1 and Th-2, important in ameliorating symptoms of systemic lupus

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erythematosus (SLE). Researchers believe that Avemar's inhibition of IL-10 production may be another reason for its observed anti-cancer properties.¹⁶

Metabolism-Regulating Effects: Inhibition of the Warburg Effect

Cancer cells use between ten and 50 times more glucose (blood sugar) than normal cells, a phenomenon known as the Warburg effect.¹⁷ Using extra glucose and an enzyme called transketolase (TK) lets cancer cells divide much more rapidly than normal cells and much more rapidly than they could otherwise. Avemar inhibits TK activity, denying cancer cells the ability to grow and divide rapidly, but leaving unblocked the metabolic pathways used by normal cells.¹⁸ Unable to grow rapidly and divide, many cancer cells are forced by default into programmed cell death (apoptosis). This is one of the mechanisms of action through which the extract kills cancer cells, while leaving normal cells unharmed.

Effects of Avemar on Autoimmune Conditions and Inflammation in RA and SLE

At the same time that populations of normal B-cells and T-cells helpful in fighting cancer and infectious diseases decline with age, the number of B lymphocytes and T lymphocytes that aberrantly attack normal body cells goes up, exacerbating autoimmune responses in diseases such as rheumatoid arthritis (RA) and systemic lupus erythematosus (SLE).

In animal studies, Avemar has been shown to improve both clinical symptoms and laboratory parameters of SLE, partly by reducing production of inflammatory cytokines.¹⁹ Clinical studies of Avemar in these conditions are underway in Europe and others are planned for the US and Europe.

Inflammation caused by the inflammatory cyclooxygenase enzymes (COX-1 and COX-2) plays a major causal role in autoimmune diseases such as RA and SLE and is widely suspected of a role in the initiation and progression of some cancers, e.g., colorectal cancer. Avemar has been shown to substantially reduce production of COX-1 and COX-2 in human colorectal cancer cells.²⁰

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Cancer Clinical Trials Show Benefits of Stimulating Immunity and Regulating Metabolism

The inhibition by Avemar of the ribose synthesis pathway supportive of proliferation plays an important role in the improvements in disease-free and overall survival

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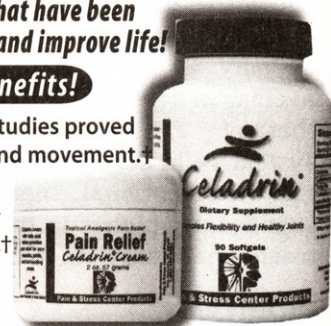
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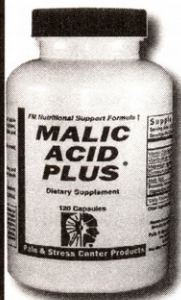
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rate seen in the clinical trial of Avemar in patients with colorectal cancer. In that study of 170 colorectal cancer patients, 17.3% of the control group experienced new recurrences in a six-month period, compared to three percent of the Avemar group. During the study, 7.6% of the Avemar group developed new metastases, compared to 23.1% of controls. Within the Avemar-treated group, 12.1% of the patients died during the study, compared to 31.7% in the control group.²¹

In a study conducted to learn whether benefits seen in earlier experiments would translate to humans, Avemar was tested in pediatric patients undergoing cytotoxic chemotherapy for solid tumors. In that study, febrile neutropenia—dangerously low white blood cell counts and high fever that often occur during or following conventional cancer therapies—occurred following 43.4% of chemotherapy cycles for patients not getting Avemar, but occurred in only 24.8% of those getting Avemar in addition to conventional therapy.²² The numbers of immune system cells surviving during and after conventional therapy were significantly higher in the Avemar-treated patients than in controls.

Summary

The very large volume of controlled experimental and clinical evidence of immunostimulatory effects and the metabolism-normalizing effects of Avemar are clear in their implications beyond

the disease states in which Avemar initially was studied.

Natural and integrative health practitioners familiar with the experimental and clinical evidence of the utility of natural compounds such as Avemar can help their patients reduce the risk of immune senescence and related medical conditions far beyond what historically has been typical among those in the later decades of life.

For those health practitioners interested in assisting older adults seeking to maintain a very high quality of health as they age, the research results outlined here suggest Avemar is a very effective tool. Improved quality of life, over what might earlier have been expected, is likely to be met with sound appreciation by both clinician and patient.

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