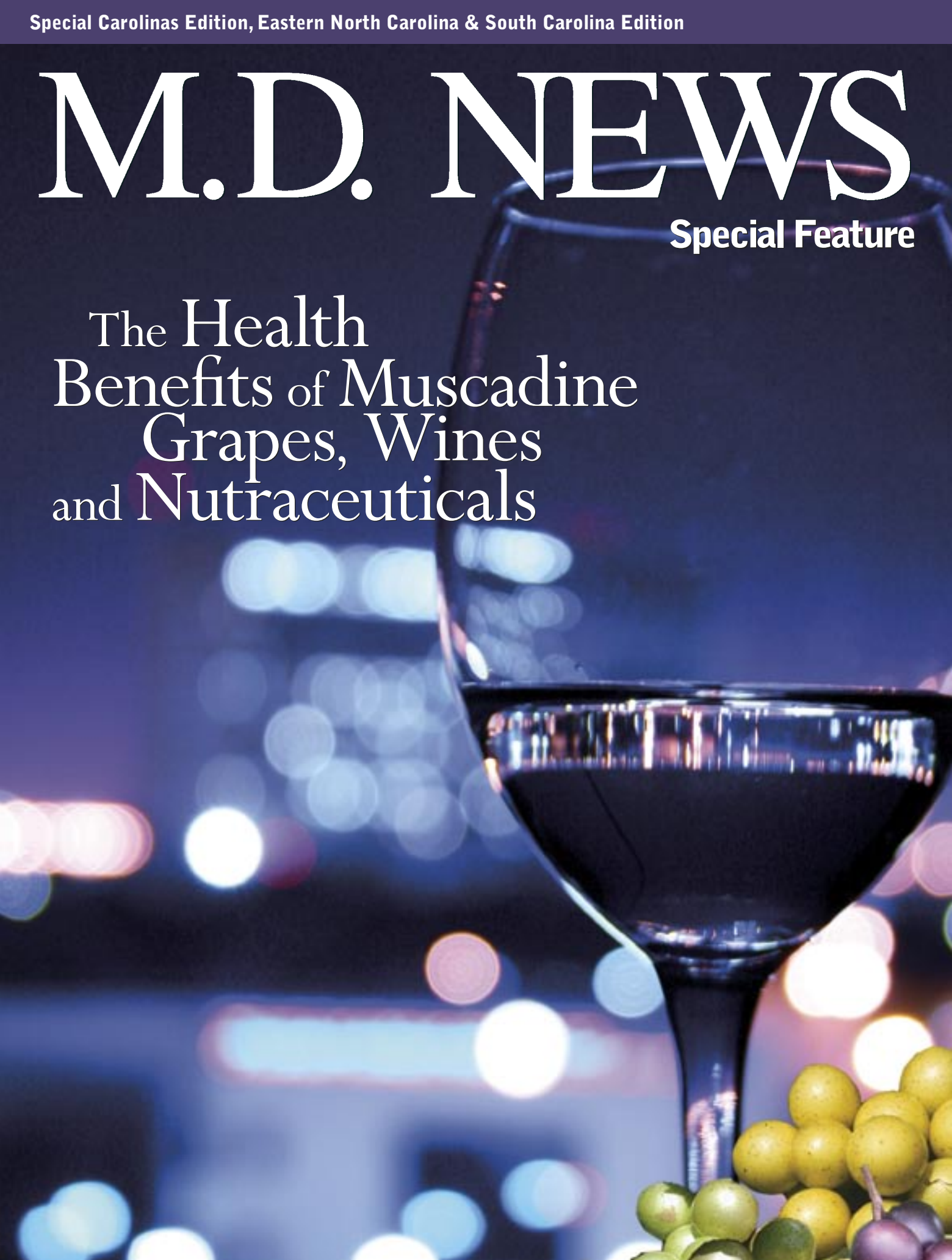


Special Carolinas Edition, Eastern North Carolina & South Carolina Edition

M.D. NEWS

Special Feature

The Health
Benefits of Muscadine
Grapes, Wines
and Nutraceuticals



It's North Carolina's state fruit, it tastes delicious and it's an emerging nutrition superstar. Native to North Carolina, scuppernong and other muscadine grapes are grown in the backyards of many Eastern North Carolina homes. They are among the richest sources of antioxidants found in nature. Muscadine grapes are a leading food source for a potent cancer-fighting substance called resveratrol. A theory about why resveratrol is protective in humans and animals is that our genes respond to plant defensive chemicals in a beneficial way. Plantings of native muscadine grapes, also known as scuppernongs, are relatively pest resistant and thrive in the hot, sandy conditions of the coastal region. The coastal climate necessitates resistance to disease, viruses, bacteria, pests and mold. The plant's adaptation to these conditions has developed unique properties that have significant health benefits for those who consume the muscadine grape.

The typical American consumes only two or three servings of fruit and vegetables a day. A single 1-cup serving of muscadine grapes would more than double the average person's antioxidant intake. That positions muscadines and scuppernongs in the elite list of powerful antioxidant foods that includes blueberries, plums, pomegranate, blackberries, cranberries and raspberries.

Muscadine grapes are fat free, high in fiber and they are high in antioxidants, especially ellagic acid and resveratrol. Ellagic acid has demonstrated anticarcinogenic properties in the colon, lungs and liver of mice. Resveratrol is reported to lower cholesterol levels and the risk of coronary heart disease. This article reports on a growing

Muscadine grapes, wines and nutraceuticals may be beneficial in prevention of heart disease and cancer.



body of research on the health benefits of drinking wine or taking the nutraceuticals, but it's important to note that the beneficial effects are also in the grapes themselves. Eating the fruit alone, in desserts, sauces or juice can give health benefits.

MUSCADINES AND HEART DISEASE

Researchers have wondered for years how the French could eat a diet rich in cream, butter and cheese, resulting in a high-fat diet equivalent to the American diet, yet the French have a much lower incidence of heart disease than Americans. France's heart attack rate is one-third that of the U.S. The answer is the French custom of drinking wine with meals. The Copenhagen City Heart Study, published in the *British Medical Journal*, showed that among more than 13,000 men and women aged 30 to 70 who were tracked for 12 years and consumed wine daily, 50% less likely to die during the study than consumers of other alcoholic beverages or nondrinkers. It's important to note that health benefits were greatest with only two or three glasses of wine per day (one for women). Drinking more increased health risks.

DIABETES, METABOLIC SYNDROME AND WEIGHT CONTROL

Metabolic syndrome is a combination of interacting metabolic disorders including impaired glucose tolerance, decreased insulin sensitivity, hyperglycemia, lower HDL cholesterol (known as the "good cholesterol"), high triglycerides and usually elevated total cholesterol. Persons with metabolic syndrome have an increased risk of developing diabetes, heart disease, atherosclerosis and stroke. Metabolic syndrome is an epidemic in populations that consume high-calorie diets and live a sedentary lifestyle (e.g., many Americans).

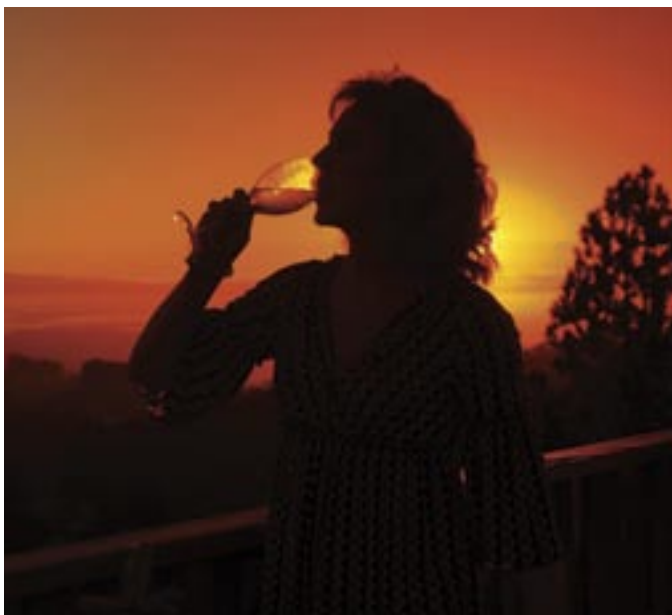
Abdominal obesity and hypertension are often present with metabolic syndrome. A university study examined "central adiposity"—the fat around our midsections in over 12,000 people. "Increases in waist-to-hip ratio," explained University of North Carolina, Chapel Hill researcher Bruce Duncan, "predicted increases in risk of death in the Iowa Women's Health Study." In popular terms, being shaped like an apple increases the risk of heart disease. Several studies have shown that moderate consumption of wine (one or two glasses per day), as part of a healthy diet, did not contribute to weight gain, compared to other types of alcoholic beverages.

Drinking wine with meals is shown to have greater health benefits than drinking wine by itself, according to research done in Italy on 70,000 subjects.

Wine is traditionally consumed at mealtimes and for centuries has occupied a prominent place on the dinner table in many cultures around the world. Drinking with dinner assures that the protective effects of alcohol are strongest in the evening, when fats from the dinner meal circulate through the bloodstream, and carry over to the next morning when most heart attacks take place. Recent research shows that muscadine juice and muscadine wine have a positive effect on type 2 diabetes by decreasing blood-glucose levels, improving cholesterol status, lowering triglycerides and prevention of blood clotting.

Muscadine wines have significantly more resveratrol than wines from other grape varieties. If you don't want to drink muscadine wine, however, you can get the health benefits by taking an antioxidant dietary supplement containing resveratrol.

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CANCER PREVENTION

Recent tests show that resveratrol from muscadine grapes can block cancer cells from attacking organs, thus preventing spread of the disease once it starts. Andrew Dannenberg, Director of Clinical Programs at the Strang Cancer Prevention Center in New York City, showed that resveratrol was very effective as an inhibitor of the growth of COX, a compound present in breast cancer and other cancers. Compounds that inhibit COX are considered very promising agents in preventing cancer by making cancer cells vulnerable to the body's natural defenses. Initial studies showed that resveratrol inhibits tumor growth at three different stages —initiation, promotion and progression.

Prostate cancer patients received information about muscadine grape-skin extract (MKSE), reported in *Cancer Research* in September 2007. Using a series of human prostate cancer cells representing different stages of prostate cancer progression, the researchers showed MSKE significantly inhibited tumor cell growth in all prostate cancer cell lines, exhibiting high rates of apoptosis (programmed cell death). Results showed that MSKE and resveratrol target distinct pathways to inhibit prostate cancer cell growth and the unique properties of MSKE suggest that it may be an important source for further development of chemopreventive or therapeutic agents against prostate cancer.

Anthocyanins, which produce the red and purple colors of the grapes, have strong antioxidant activity and have shown several anti-tumor effects, including inhibition of DNA synthesis in breast cancer cells, of blood-vessel growth in some tumors and of enzymes involved in tumor spread. Tests in cell culture have shown that berry extracts including muscadine (which is a berry) reduce cancer cell growth (or cause increased cancer cell death) in colon cancer, breast cancer, prostate cancer and leukemia models.

Resveratrol taken orally also protects the skin from damage that leads to skin cancer. A review of 70 published studies concluded that resveratrol treatment helped prevent damage to skin and stopped the development of cancer cells.

Ellagic acid, which is abundant in muscadines, raspberries, black raspberries, strawberries and walnuts, is powerful in chemoprevention of cancer. Chemoprevention eliminates the need for chemotherapy

because the cancer does not occur. Ellagic acid is being aggressively investigated for chemoprevention.

LONGEVITY

Subjects fed resveratrol were healthier, leaner and lived up to 30% longer, even though they were on high-calorie, high-fat diets, according to an ongoing Harvard study. Researchers believe that resveratrol activates the same genetic longevity pathways as calorie restriction, the only diet known to extend lifespan.

LONGEVITY AND MENTAL FUNCTION

New studies at the Harvard Medical School and the Institute of Genetics and Molecular and Cellular Biology have found that resveratrol, a natural antioxidant found in red wine grapes, may radically reduce the risk not only of heart disease, but also of age-related illnesses such as Alzheimer's disease. It may also counteract the effects of a high-fat diet and even prolong life. "This could arguably be the biggest medical discovery since antibiotics," says Joseph Baur, Ph.D., an author of the Harvard study. It is believed that the assortment of antioxidants found in muscadine grapes and the seeds slow the effects of aging and possibly extend life. Coupled with smart dietary choices, avoidance of risk factors and physical activity, plus eating of muscadine grapes or taking grape supplement can add 10 years to your life. In the Harvard study, mice that were fed the substance resveratrol were healthier, leaner and lived up to 30% longer, even though they were on high-calorie, high-fat diets. Dr. Baur believes that resveratrol activates the same genetic longevity pathways as calorie restriction, the only diet known to extend life span.

Maintaining good mental function as we age is important. Oxidative stress (i.e. free radical damage) is part of what makes the brain age and cause degenerative conditions, such as dementia and Alzheimer's. The *American Journal of Epidemiology* reported on a French study, called the Paquid study, wherein 1,640 subjects aged 65 years or older and free from dementia at baseline, were tested over a 10-year period. Subjects with higher antioxidant flavonoid intake had better cognitive evolution than other subjects. The researchers also determined that antioxidant flavonoid intake was inversely related to risk of dementia. Quercetin, which was cited in the study, is a flavonoid that is found in high concentration in muscadine grapes and grape seeds.

ANTIOXIDANTS FIGHT FREE RADICAL DAMAGE

Your real age can be thought of in two ways: your biological age or the amount of free radical damage that has occurred within your body. A free radical assaults cells in the body to find a partner for its unpaired electron. The highly charged, highly unstable molecular fragment punctures cell membranes, destroys enzymes and even breaks down DNA to steal an electron from another molecule. Some free radicals occur naturally, as cells burn food for energy. Other free radicals derive from exposure to ultraviolet radiation (sunlight), radon, X-rays, pollutants, pesticides, food additives, alcohol and other toxins. An antioxidant can neutralize a free radical by donating one of its electrons without jeopardizing its own chemical stability. Left unchecked, free radicals start chain reactions that damage cells. Antioxidants terminate these chain reactions by being oxidized themselves.

Antioxidants are a class of molecules that includes polyphenols, flavonoids and isoflavones. The family of antioxidants found in muscadine grapes, seeds and skins includes resveratrol, ellagic acid, quercetin,

daidzein, genistein and several others. The use of antioxidants has been intensively studied because free radicals have been implicated in many diseases and many symptoms of aging. Antioxidants are used as dietary supplements in the hope of maintaining health and preventing diseases.

Antioxidants can make a difference in how quickly and how well we age. As we grow older, we begin to show the side effects of our decreasing supply of antioxidants. It is estimated that by age 40 our antioxidant level is at 50%, and by age 60 is down to 10%. Free radicals can damage important cellular molecules such as DNA or other parts of the cell, and may be responsible for numerous age-related diseases, including cancer, LDL (bad) cholesterol, premature aging, Alzheimer's disease, diabetes, symptoms of menopause, cardiovascular disease, hypertension, cataracts, Crohn's disease, Parkinson's disease, irritable bowel syndrome, osteoarthritis and rheumatoid arthritis, pancreatitis and many others.

SKIN CARE, INSIDE AND OUT

Truly beautiful skin is a result of healthy skin that is cared for both on the surface and from within, with proper care of the whole body. The body utilizes antioxidants to battle the damaging effects of free radicals. As we age, the body produces fewer antioxidants and skin begins to show the cumulative damage. Damage to collagen and microcapillaries in the skin causes a decrease in nutrients that get to the skin, which leads to the loss of youthful appearance. Microcapillaries are the smallest of a body's blood vessels and enable the interchange of nutrients between blood and the surrounding tissues. Antioxidants strengthen capillary walls and keep them flexible and unobstructed. Both nutraceuticals and cosmeceuticals from the muscadine grape can play a role in maintaining healthy, youthful-looking skin.

NUTRACEUTICALS FROM THE MUSCADINE GRAPE

As research continues to show the health benefits of the muscadine grape, there is growing interest in finding easy sources of resveratrol and the other antioxidants so plentiful in the fruit. Grape growers have developed the technology to harness the goodness of the grape in grape-seed or grape-skin capsules and food supplements. It's important for consumers to know that muscadine is the only grape that contains



Drinking wine with dinner provides more protective effects than drinking wine by itself.

resveratrol in the seed. (Other grape varieties contain resveratrol only in the skin.) When buying grape-seed capsules or food supplements, look for products made from the muscadine to be sure you're getting all the goodness that nature can give. Capturing the goodness of the grape in a capsule ensures a concentration of phytochemicals and the synergy that those compounds produce for the maximum benefit without consuming the alcohol or calories. ■

For more information, research articles, a list of the 75 North Carolina wineries, and product sources, contact:

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