



Can you really train your brain?

Mental exercises and language classes may help stave off dementia, but *caveat emptor*

There has been a lot of talk lately about how learning a second language may help you avoid dementia and keep your brain healthy.

But, as the French would say, that's just the *commencement*. In fact, language programs are only one part of the new billion-dollar "brain-training" industry.

Why is there suddenly so much interest in mental exercise? Well, in the next 35 years, the World Health Organization estimates about *115 million people* worldwide will develop dementia.¹ Couple that with the fact that some research shows "brain training" may help stave off age-related cognitive impairment, and it's no surprise that a growing number of people are going back to school decades after they last donned a cap and gown.²

Brain training consists of tests, games, and classes designed to improve memory, concentration, processing speed, visual learning, problem solving, and language skills. Online programs or more formal brick-and-mortar "brain schools" offer mental exercises ranging from math problems to puzzles to computer games to reflex tests. Companies promise that these supposedly scientifically designed tests will boost mental function in everyone from preschoolers to octogenarians.

Of course, there's plenty of controversy associated with this or any other "get smart quick" philosophy.

And some new research shows that not all brain-training programs are effective at preserving brain function and preventing dementia.

Don't try this at home

A recent analysis of 52 clinical trials involving about 4,900 healthy people age 60 or older showed that computerized brain training programs carried out in a proper education center really can improve cognition in older adults.⁴ But there are some important exceptions.

First of all, the researchers found that "brain-boosting" products promoted for solitary use at home are gimmicks and just don't work.

The researchers also discovered that while one to three brain-training sessions per week were effective, any more than that actually appeared to neutralize the benefits.

As with physical exercise, there is such a thing as "overkill" in mental exercise. And at a certain point, the law of diminishing returns sets in. Your body and brain need at least one day of rest between exercises for optimum effectiveness.

The study analyzed computer cognitive training (CCT), which consists of standardized mental tasks or games on personal computers, mobile devices, or gaming consoles at home or in a group setting.

Overall, the researchers found that CCT had small but significant effects on study participants' cognition. There

were also small to moderate effects on memory, mental processing speed, and visual-spatial skills.

There was no improvement in attention levels or executive function (making plans, keeping track of time, multitasking, analyzing ideas, etc.). Which does not surprise me. Computers are a useful technology for accessing information, doing work, and being productive, but they may not be the best solution for your overall mental health.

If you feel like spending your days talking to and playing games with a

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computer is a little too reminiscent of the spooky HAL in Stanley Kubrick's film *2001: A Space Odyssey*, there's good news. A variety of studies show there's a simpler way to stay sharp as you age.

Boost your brain with everyday tasks

Research indicates that simply using your brain in everyday tasks is highly effective at keeping you mentally fit.

This is the same sort of principle I believe works best in terms of physical exercise. Instead of getting in your car, driving to a gym, and hopping on an exercise machine, do something really healthy, productive, and useful instead. Use your body for yard work, housework, walking to your destination, and all the other tasks of daily living.

The same is true with your brain. Instead of always forcing your mind to interact with electronic machines, give it a workout with unplugged, everyday tasks.

Do the arithmetic in your head when you're shopping or at a restaurant, instead of using a calculator. Use a map and compass instead of a GPS device to navigate to your destination. Make and keep a list in your head instead of entering it on your handheld device.

And by all means, consider learning another language and incorporating it into your everyday life.

Bilingual is better

You don't necessarily have to have regular conversations in another language to reap the benefits of being bilingual. Don't forget—people who are bilingual can not only speak two languages, but they can also think in two languages. And this mental versatility has been shown to have lifelong benefits.

In fact, researchers have found that if bilinguals do get dementia, it develops

four to five years later than it does in those who speak only one language.⁴

Of course, there has been some speculation regarding whether learning a second language later in life has the same benefits. But a large new Scottish study may answer this question once and for all.⁵

The researchers found that it doesn't appear to make a difference whether you learn a second language as a child or an adult. Being able to speak more than one language at any point in your life may slow down cognitive decline as you age.

The study began in 1947, when researchers gave 853 Scottish 11-year-olds an intelligence test. Between 2008 and 2010, when the participants were in their 70s, they were given another intelligence test.

By the time of the second test, 262 people had learned a second language in addition to English. Most (197) had learned that language before they turned 18. But only 90 people were still actively using their second language in 2008.

Even controlling for early childhood intelligence scores, the people who had learned a second language scored higher on reading, verbal fluency, and general intelligence compared to those who only knew English. And this finding also held true for the 65 people who learned their second language as adults. (Of course, my medical textbook publishers have offices in London and Edinburgh, and many of the Londoners believe the Scottish are already speaking a second language—and vice versa!)

Furthermore, among the smaller number of people who learned third, fourth, and fifth languages, brain health appeared to grow stronger with the more languages acquired.

Uno, dos, tres times as smart?


So why does your brain appear to function better when you speak more

than one language? Noted language researcher Dr. Fergus Craik of the University of Toronto believes “both mental and physical activity throughout life are protective, and learning language is a very good form of brain training.”

However, it's important to note

that learning a second language doesn't improve all mental functions. It mainly affects intelligence and executive functioning. Because while you're communicating in one language, you have to manage and control the other (just picture Peter Sellers as Dr. Strangelove in Stanley

Kubrick's 1963 film of the same name).

So despite the “one-worlders,” when it comes to different languages, I say *tutti quanti* (Italian) should broaden our *weltanschauung* (German) and *vive la difference* (French). 

Citations available online at www.DrMicozzi.com

“Wonder vitamin” reduces lung disease flare-ups by 40 percent

You've probably been subjected to those ridiculous commercials featuring an elephant sitting on top of breathless lung disease sufferers. Aside from the question of whether any animals (or humans) were harmed in the making of these commercials, do you want to know the real elephant in the room?

New drugs like the one featured in this ad really have little to offer (other than the long list of side effects rattled off at the end of those annoying commercials). But the benefits of vitamins are hiding in plain sight.

In fact, a new British study showed that simple vitamin D supplements reduced flare-ups of chronic obstructive pulmonary disease (COPD) by over 40 percent.¹

COPD includes lung conditions like emphysema and chronic bronchitis, and affects more than 12 million people in the U.S. In fact, it's the third leading cause of death in Americans.² So it's no wonder drug companies have gravitated toward this disease like a herd of stampeding elephants.

But, once again, the real results—and relief for patients suffering from COPD—are coming from nature, not big pharma.

Less inflammation, easier breathing

The study included 240 people with COPD. Half were given vitamin D supplements, and the other half received a placebo.

The researchers found that everyone in the vitamin D group had less severe and shorter COPD flare-ups. And among people who started the study with low vitamin D levels, the results were even more dramatic.

Of course, people in darker, colder climates like the U.K. (and much of the U.S.) are generally deficient in vitamin D. In the study, 87 percent of participants had inadequate vitamin D status. The people who had D blood levels lower than 50 nmol/L had the most pronounced reduction in COPD flare-ups.

As you know, vitamin D has many effects in the body. In this case, the researchers believe it suppressed the inflammatory cells that trigger lung disease flare-ups.

How much is enough?

For optimum health, I recommend 5,000 IU of vitamin D3 daily to ensure there's a constant, adequate amount of the vitamin in the body at all times.

This dose is substantially more than the woefully inadequate 600 IU per day the government recommends for people under age 70 (if you're over age 70, you get a “whopping” 800 IU a day). But these outdated recommendations are based on old, inadequate vitamin D research and fearmongering about “excess” vitamin D.

Doctors often worry that fat-


soluble vitamins, like D, can be dangerous because they are stored in the body. But let's look at it the other way around. In the COPD study, participants were given the equivalent of about 120,000 IU of vitamin D *all at once*, and then got another dose of the same size two months later.

Our ability to store high doses of vitamin D actually shows how much this vitamin is needed in the body at all times. Furthermore, it proves that large quantities can be and *are* safely stored in the body.

So a supposed “megadose” of vitamin D is simply safely stored away for later use. What's so dangerous about that, doc?

It's certainly far safer than the anti-inflammatory steroid drugs that many doctors prescribe for COPD. Steroids disrupt the body's metabolism and immune system about as much as vitamin D supports them.

But unfortunately, few people manage to leave a doctor's office without a drug prescription. And these days, vitamins are primarily used and tested in *addition to*, not *instead of*, drugs.

Imagine how healthy our lungs—and our entire bodies—might be in a properly nourished, drug-free world. 

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The shocking source spreading cold and flu viruses

And the back-to-basics way to protect yourself starting TODAY

For years, we've been led to believe that the air-powered, "no-touch" hand dryers found in public restrooms are more hygienic than using old-fashioned paper towels. But new research shows nothing could be further from the truth.¹

In fact, these supposedly "germ-free" hand dryers are very likely spreading cold and flu viruses throughout public restrooms—and *directly onto you.*

Fortunately, there's a simple way to protect yourself. I'll tell you about it in a moment. But first, let's look at this shocking new research.

High-velocity germs

Public restrooms are the most germ-contaminated places you're likely to encounter. So a group of British researchers decided to test just how much the hand dryers in these restrooms contribute to all the bacteria floating around.

The researchers looked at two types of hand dryers: jet dryers, which blow out cold air at high speed, and warm-air dryers, which provide some heat at lower air velocity.

What they found was revealing... and revolting. Both types of dryers not only spread bacteria into the air, but also onto users and anybody else nearby.

Just how bad were the hand dryers? Bacterial counts in the air around high-velocity jet air dryers were about five times higher than they were around lower-velocity warm-air dryers, and nearly *30 times higher* compared to using paper towels.

What's more, germs in the air persisted well beyond the typical 15-second drying time of these

devices. After five minutes, bacteria levels had declined only by half—and were still detected in the air a full *15 minutes* later.

So when you use those annoying air dryers in a public restroom, you're not avoiding the spread of bacteria—you're actually multiplying it.

In fact, these supposedly "germ-free" hand dryers are very likely spreading cold and flu viruses throughout public restrooms—and directly onto you.

Not to mention these dryers use much more energy than taking paper from a mechanical dispenser. They also contribute to air and noise pollution. And to make matters worse, they take more time—and never seem to really work anyway.

Wash off bacteria the right way

The point of hand washing is to reduce the density of bacteria and viruses on your hands. The friction created by rubbing your hands together in plain water pushes off the majority of these germs. Adding regular soap (no need for special antibacterial varieties) takes care of most of what's left.

But a few microbes may still remain on your hands no matter how thoroughly you lather and scrub. The good news is that these microbes aren't likely to make you sick. It generally takes a fairly high dose of bacteria or viruses to get infected with the typical cold or flu.

And usually, you also have to touch a contaminated surface and then touch your eye, nose, or mouth to come down with a cold or the flu. But air-powered hand dryers may be turning the entire restroom into a germ lab. In fact, the last time I got a cold was a day or two after using a few public restrooms at highway gas stations.


As this new research shows, the better option is to use a paper towel to physically wipe off the bacteria left behind after washing. Putting your hands under a dryer just spreads all those germs around in the air, and eventually onto surfaces you touch.

But what if you find yourself in a public restroom that has already "thrown in the towel" and only offers air dryers?

The DIY germ solution

Since I was a child, I have always carried a handkerchief in my back pocket, and often a small package of tissues as well. And a real gentleman carries a spare handkerchief for someone else in need. Another benefit to this practice is that I can use my handkerchief or some of my tissues to dry my hands in public restrooms that don't have paper towels. They do a better, quicker job than an air dryer. And I get out of these often unpleasant places all the sooner.

For optimum protection from other people's germs, I hold the door handle with a tissue (or a paper towel if they have one) when I exit, and then discard the tissue or towel.

If you follow these simple steps, they'll do more to protect you from bacteria and viruses than any flu vaccine promoted by the government (especially this year's). 

Citations available online at www.DrMicozzi.com

A long winter's nap may be just what your brain needs

Scientists are increasingly finding that sleep is a critical component of good health. Lack of shut-eye has been linked to obesity, heart disease, and diabetes in a variety of studies.

And now new research shows that the less older people sleep, the faster their brains age—which can lead to cognitive decline and dementia.

Researchers analyzed the sleep habits of 66 older Chinese adults, and then measured the size of their brain ventricles (a marker for cognitive decline and development of neurodegenerative diseases such as Alzheimer's). The researchers found that the study participants who slept the least had the largest decrease in brain volume and function.¹

According to this research—as well as other studies—seven hours of sleep a day seems to be the “sweet spot” for maintaining optimal brain health.

Of course, we all know this is easier said than done. You probably remember how you were able to sleep all through the night (and sometimes late into the morning) during your teens and 20s. But by age 40, it is increasingly common to wake several times during the night. And the older we get, the lighter our sleep becomes. Waking frequently during the night becomes a fact of life.

But surprisingly, a new study shows this may not necessarily be harmful in the long run. It all comes down to what scientists call “sleep efficiency.” Basically, this is the time you spend actually sleeping versus the time you spend tossing and turning in bed.

For years, experts believed sleep efficiency declined with age. But this new research shows it actually

increases in your 60s and 70s.² Read on and I'll tell you how.

Why some of your most important sleep may not happen at night

The new research is based on data from the NHK Japanese Time Use Survey, which has been carried out since 1960. Of course, the average

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lifespan in Japan is the longest in the world, so that provides plenty of data regarding how sleep patterns change with aging.

The survey found that as people get older, the amount of time they dedicate to sleeping steadily *increases*. Why? Because unlike other sleep data, this survey counts all slumber during a 24-hour period, rather than just nighttime snoozing.

That means naps are considered valid—and valuable—sleep time.

The study author used survey data to calculate how much time different age groups spend actually sleeping versus trying to sleep. He found that both sleep efficiency and sleep time are highest in a person's teens, then steadily decline through their 20s and 30s. By the time they reach their 40s and 50s, people actually have both the lowest average sleep time and the lowest sleep efficiency.

But according to this study, once people reach their 60s and 70s, both sleep time and sleep efficiency increase again. The study author attributed this growth, in part, to napping.

Indeed, napping often becomes more common as we age. In fact, it may be what nature actually intends us to do.

Don't refuse an afternoon snooze

One change that accompanies older age is the tendency to go to bed earlier and wake up earlier. Accordingly, taking daytime naps should also become more common.

Both science and tradition show that coordinating our sleep schedules with the daily pattern of the sun is healthy. In *Poor Richard's Almanac*, Benjamin Franklin famously said, “Early to bed and early to rise, makes a man healthy, wealthy and wise.”

But there is also a natural cycle during the day of wakefulness and sleepiness, which is recognized in the practice of traditional Indian Ayurvedic medicine, for example.

Drowsiness sets in after the noontime meal and again after the sun begins to decline in the sky. In school and at work we learn to fight off this natural sleep cycle. But as we retire or cut back on work, we have more control over our daily lives and schedule—meaning we can lie down for an afternoon nap if so inclined.

Other cultures have learned to accommodate this natural cycle by taking time off after the noon meal for the traditional siesta. When I was young, restaurants, shops, museums, and workplaces throughout southern Europe would shut down for several

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hours after lunchtime. While this practice has recently fallen out of favor in some places, it was still common well into the 1990s. (I can personally vouch for the fact that as recently as 1996 in Aix-en-Provence, France, one could have starved in the street just as soon as find a restaurant

that was actually open during mid-afternoon.)

Of course, napping has never been a common practice for American adults. But perhaps it should be. After all, while some computerized “brain training” approaches may provide cognitive benefits (see page 1 this

issue), it seems like the best results may come from shutting down the computer and getting some shuteye.

So this time of year, when it is cold and dark outside anyway, don't hesitate to get in that long winter's nap. **IC**

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NEWS BRIEF

An apple a day can keep obesity away

By now, winter may seem endless. But you can capture some warmth and sunshine (and all the nutrition that goes with it) by eating plenty of fresh fruits. In fact, one common fruit might actually help you accomplish one of those New Year's resolutions you may or may not be struggling to keep up with by now...

New research suggests apples may help you lose weight.¹

How? Well, most foods found in nature have constituents that are not digestible. Fiber, for instance. But that doesn't mean these ingredients don't play a role in nutrition and health. Researchers have found that the non-digestible compounds in apples can improve the health of your gastrointestinal tract—which helps fight obesity.

The researchers analyzed the contents of Braeburn, Fuji, Gala, Golden Delicious, Granny Smith, McIntosh, and Red Delicious apples. They found the non-digestible fiber, polyphenols, and other compounds in Granny Smith apples influenced the bacteria in the gastrointestinal tract. These compounds were actually able to alter the microbiome of obese lab animals to be similar to those of lean animals.

Researchers have already discovered that gut bacteria in obese people is different than that of lean people. And now this research shows something as simple as an apple can, in essence, help you fight obesity from the inside out.

The scientists believe there are two main reasons why Granny Smith apples were the most effective of all of the apple varieties at altering the microbiome: The tart, green apples have a high content of non-digestible compounds, along with a low content of digestible carbohydrates.

Don't be afraid of fruit sugar

These observations provide another example of the intricate influences apples and other fruits have on human health. But what about the concern that eating fruit—and the fructose sugar it contains—contributes to metabolic disorders like diabetes?

As I noted in the July 2013 *Daily Dispatch* “Sweet news about fructose,” this fear is most likely misplaced. Research shows the fructose found in fruits appears to be digested and metabolized differently than the sucrose found in table sugar (sugarcane).

Botanists believe sugarcane originated in New Guinea. Due to the human propensity for a “sweet tooth,” it rapidly spread throughout the world—first through Chinese and Indian traders in the 16th century, and then by Europeans.

Growers in the western hemisphere also began cultivating their own sugarcane, bringing in foreign workers to harvest this labor-intensive crop. (Of course, this “advancement” contributed to some terrible conditions other than diabetes—namely, slavery and diseases like malaria and yellow fever.)

By contrast, fruits are widespread in nature and were available to most humans long before sugarcane. Which means our bodies are more adept at processing the natural sugar they contain. And unlike sugarcane, fruits provide a natural matrix of other healthy nutrients.

But it is important to opt for organic versions of fruits in which you eat the skin—like the mighty, obesity-fighting apple.

Citations available online at www.DrMicozzi.com

ASK *the* INSIDER

Simple dietary ways to combat polyneuropathy

Q. I live in the Netherlands and was recently diagnosed with polyneuropathy in my legs and arm. Is there anything I can do to keep my body in shape and my muscles from getting weaker?

A. Yes, there are several things you can do in terms of diet and dietary supplementation.

As I reported in the September 2014 issue of *Insiders' Cures*, a simple but typically overlooked cause of polyneuropathy (also known as peripheral neuropathy) is vitamin B deficiency. Despite all the attention given to recommended daily allowances for nutrients in Europe and the U.S., there can still be frank deficiencies of this and other vitamins hiding in plain sight.

Consequently, I recommend taking a vitamin B complex every day—look for one that has at least 50 mg each of thiamine (B1), riboflavin (B2), niacin (B3), pantothenic acid (B5), and pyridoxine (B6); along with 400 mcg of folic acid or folate (B9), 12 mcg of B12, and 100 mcg of biotin (B7). It should also contain nutrients that work with B vitamins, including choline, inositol, and para-amino-benzoic acid (PABA).

Don't be alarmed if your urine turns a deeper yellow color after you start taking a daily B complex. B vitamins are water soluble, so anything your body doesn't use is excreted in your urine. But if you're concerned that you're literally flushing the money you spend on vitamins down the toilet, try this simple test. Once you have been

taking a B complex for a couple months, skip it for a day. You will find on the day after you skipped your dose, your urine is no longer deep yellow. That's because your body has used all of its B vitamin stores over the prior 24 hours, and doesn't have any "extra" by the second day. That's the way it works with water-soluble vitamins. Better a little extra sometimes than never getting enough.

Vitamin D is also very important for brain and nervous tissue, and thus is a critical nutrient for people with peripheral neuropathy (or anyone else, for that matter). As I've often written, there is an epidemic of vitamin D deficiency, especially in cooler, darker climates like the Netherlands. Take 5,000 IU of vitamin D3 per day, along with 4 to 16 mg daily of the anti-inflammatory carotenoid astaxanthin. And make sure to ask your doctor to measure the vitamin D levels in your blood to ensure you don't have a deficiency.

In terms of your diet, make sure you are getting enough essential fatty acids from fish or daily fish oil supplements. And for your muscles, take 50 mg per day of coenzyme Q10 (ubiquinol) and add South African rooibos extract (I recommend Red Joe brand) to your hot or cold beverages. Rooibos, which is Afrikaans Dutch for "red bush," helps nourish the muscles and keep them healthy.

Metformin works on both sides of the Atlantic

Q. Your articles on metformin have shocked me. I was diagnosed with diabetes six years ago, and now I'm having serious problems with blood sugar control.

I was recently prescribed insulin and Trajenta (linagliptin), but there has been no change. I am 76 and up to now have had none of the usual side effects associated with diabetes medications. My diet is top class and I am very alert to what I need to eat. I am retired and have no stress, panic, or worries. I am not married and only have cats and dogs to look after. I take it that metformin is probably available in Ireland (where I live), but it has never been mentioned to me. Should I ask my doctor about it?

A. Thank you for contacting me. I too am shocked. When it comes to metformin, I guess it's like the old World War I song, "It's a long, long way to Tipperary!"

Metformin is based on the ancient herbal remedy French lilac. The French developed the herb into a drug during the 1920s, and after World War II it was introduced as a prescription drug in the U.S. under the name glucophage, which literally means "glucose eater." Glucophage was later named metformin and is now available in many countries as an inexpensive generic drug. Considering that quite a few French drug companies are headquartered in Ireland for tax reasons, it's ironic that none of your doctors have told you about metformin.

Many millions of people worldwide manage their blood sugar effectively with metformin. In fact, it's considered the first-line drug treatment for high blood sugar in the U.S.

And as I discussed in the


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September 2014 issue of *Insiders' Cures*, research shows metformin also may lower the risk of several cancers, including the deadly, often-untreatable pancreatic cancer. Metformin is also the only medication that has been shown

to reduce all the cardiovascular complications of high blood sugar, including eye, heart, kidney, and peripheral nerve problems.

One important note: Metformin may interfere with B vitamin absorption, so make sure to take a

high-quality B complex like the one I mentioned above. (This is also good advice for everyone under all circumstances.)

Please do ask your doctor about this safe and effective drug, and good health to you. 

NEWS BRIEF

New research sheds light on selenium's cancer-fighting abilities

We have known for several decades that the mineral selenium has anti-cancer effects. But how it helps our bodies fight cancer is a bit of a mystery.

For instance, reams of research shows that broccoli and garlic—both of which contain selenium—are protective against cancer, as well having many other health benefits.

In addition, selenium is in the soil, and thus the amounts in drinking water, foods, and animal feed are determined by where you live. My own and other research shows that people who live in areas that have higher selenium content in the soil generally have lower cancer rates than people in lower-selenium areas.

In China 25 years ago, my colleagues and I designed an experiment to test the effectiveness of selenium at preventing liver cancer.

In the mouth of the great Yangtze River, new islands had formed in the delta from low-selenium soil that had washed down from a thousand miles away. During the Cultural Revolution, people were re-settled on these islands. As time progressed, these new settlers were found to have higher cancer rates than people living on either side of the river, where the selenium levels were higher.

My colleagues and I planned to supplement the island dwellers' diets with selenium in order to lower cancer rates. Unfortunately, despite successful pilot studies using selenized salt and the amino acid selenomethionine, the U.S. government shut down our study, and all studies in China, following the protests at Tiananmen Square.

Early ideas about selenium's cancer-fighting capabilities centered (as with most dietary constituents) on its role as an antioxidant, especially in combination with vitamin E. Now, more emphasis is being directed to selenium's role in the immune system. After all, our immune systems are designed to remove cells not normally found in the body, including bacteria, viruses—and cancer cells.

But some cancer cells can actually overstimulate the immune system, making it impotent against those cells. Researchers have found that certain selenium compounds, such as those found in broccoli and garlic, block these cells from exhausting the immune system and causing it to collapse.

But while research into how selenium works is interesting, it doesn't usually translate into real-world, practical advice. In other words, it doesn't typically uncover the daily dose of selenium you should take to treat or reduce your risk of cancer.

Furthermore, these types of laboratory studies keep doctors guessing about how and why selenium really works. When what these doctors really should be doing is accepting that it does work. And, in turn, recommending it (along with other vitamins and minerals) in the right dosages and forms to their patients to help prevent or manage cancer.

Ideally, eating foods that contain many nutrients can help prevent cancer and many other health conditions.

But we also know that most people do not follow optimal diets, and that most foods no longer have optimal nutrient content.

That's where the modern science of dietary supplementation comes in.

I recommend taking 100 mcg of selenium each day for optimal health. In addition, take 200 mg of magnesium, 5,000 IU of vitamin D3, 200 IU of vitamin E, and a high-quality B complex daily, along with 500 mg of vitamin C twice a day. And since most people don't eat anti-cancer foods like broccoli and garlic every day, it's also a good idea to supplement with some of the nutrients you get from these foods, including the carotenoids lycopene, lutein, and astaxanthin.