MAGAZINE

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Prevention rather than cure should be the watchword of each person for their health care, in order to avoid risk factors that can lead us to suffer from a disease. We must promote a healthy physical and mental lifestyle, and that is the objective of this magazine, that whoever reads it, can know the importance of preventive health.

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Why is wellness important?

Over the past year, we have all experienced new challenges that have affected our physical, mental, and social well-being. Many of us have felt tired and stressed, which is why wellness and self-care are more important than ever. Below, we share some new ideas to achieve your well-being in all its dimensions and you can nourish your mind and body.

1. Do exercises
2. Drink water regularly.
3. Track your fitness.
4. Take multivitamins.
5. At the office, stand up every 30 minutes.
6. Go outside
7. Get enough sleep.
8. Eat organic food if possible.
9. Practice gratitude.
10. Read books
11. Eat more fruits and vegetables.
12. Correct your posture.
13. Take a daily probiotic.
14. Get vaccinated.
15. Minimize sugar intake.
16. Meditate.
17. Listen to music.
18. Share with friends and family.
19. Do not abuse electronic equipment
20. Organize your days.

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IS YOUR WATER BOTTLE MAKING YOU SICK?

Here's what germs could be lurking inside — plus, how to clean it properly

Reusable water bottles are all the rage these days — no doubt a boon for the environment and our hydration levels. But if you're not cleaning your glass, stainless steel or plastic bottle, that must-have accessory could be a potential health hazard.

"Just like any other surface where water accumulates, spores can drop and start forming mold," says Benjamin Turner, an instructor in the Department of Biology at The University of Alabama at Birmingham.

Mold, a type of fungus, spreads by way of microscopic reproductive cells, called spores, that waft through our indoor and outdoor air. They like to settle where there's moisture. "That's where the spores will incubate and start forming those black fuzzy or gray, white areas of mold patches," Turner says.

Some molds are harmless, but others can cause allergic reactions and respiratory problems. Still, S. Wesley Long, M.D., medical director of microbiology at Houston Methodist, says you'll likely be deterred by an off-putting smell or taste before drinking enough to make you sick. "But certainly for some people, especially the immunocompromised, they need to be more careful," Long says.

Bacteria can also grow in your bottle. In fact, your mouth has one of the highest concentrations of microbes — tiny living organisms including bacteria, fungi and viruses — in the body, says Peter Iwen, a professor and microbiologist at the University of Nebraska Medical Center. These various germs can transfer to the bottle and "produce a substance that allows them to clump together," called a biofilm. "And then you have this slimy biofilm that forms on your bottles," Iwen explains.

This biofilm likely won't get you sick since the germs came from your mouth. But it could get someone else sick if they take a swig of your drink — especially if you're harboring a virus like COVID-19, influenza or norovirus. "Sharing it with other people is a risk because your flora [the population of microbes in your body] is not necessarily applicable to that next person that might be drinking from that bottle," Iwen says.

Pouring anything with sugar into your bottle — a sports drink, for example — only adds fuel to the fire by supplying "a rich source to promote bacterial and fungal growth," Long says.

How to wash your water bottle

How do you prevent mold and other microbes from moving in and taking over? Cleaning your water bottle every day — or every couple of days — with hot water and soap is a good place to start. Iwen also recommends sanitizing your bottle every week to 10 days. You can either run it through the dishwasher or soak it in a vinegar solution.

“Take about one part vinegar to about three or four parts water, and just let the bottle soak in that for maybe five minutes,” Iwen says. Rinse it off with hot water and soap, and you’re good to go.

If your bottle is equipped with seals, straws or silicone mouthpieces, you’ll want to disassemble those and give them a good wash and soak, too. “Rubber, for instance, is a good area for bacteria to form these biofilms. So you should be taking it apart,” Iwen says. Inexpensive, specially designed brushes are even sold to help clean the often-neglected inside of straws.

“Pay attention to the nooks and crannies where substances can sort of get lodged and take hold and get missed in a superficial cleaning,” Long says. If a sugary drink was in your bottle, make sure it didn’t leave behind a dried, sticky residue. “That’s just a great medium for bacterial and fungal growth,” Long adds.

Just as important as washing the bottle is drying it properly. Think of what happens to your lawn after a good rain, Turner says. “Mushrooms form, and mold is a fungus, and so it’s just waiting for the right environment. It needs oxygen and water and a little warm temperature. So if you can dry things out, that’s probably the number one thing you can do to avoid mold and mildew growth,” he says.

A few other tips:

Buy easy-to-clean bottles. On the hunt for a new bottle? If you’re looking for a low-maintenance option, Iwen recommends a stainless steel bottle with a wide mouthpiece. They’re easier to clean, plus, he says, biofilms form easier on plastic.

Keep your bottle with you. We’re all guilty of occasionally leaving our coffee mugs and water bottles in the car, but don’t make a habit out of it — especially if it’s warm outside. “Bacteria love to grow in that kind of environment,” Iwen says. The advice is the same for storing your bottle on your desk at work or in your gym bag for your next workout.

Don’t refill disposable bottles. “They weren’t designed to be used over and over again,” Iwen says. The plastic can break down quickly, making it easier for bacteria to take over.

THE SURPRISING DANGERS OF DRINKING TOO MUCH WATER

Going above and beyond the recommended amount can be risky for your health

We're all led to believe that more is better when it comes to drinking water. If eight, 8-ounce glasses per day is the going recommendation, then surely you get bonus health benefits for each and every additional gulp above and beyond the standard 64 ounces — right?

Don't be so sure.

Recent reports of Brooke Shields suffering a generalized tonic-clonic seizure — formerly known as a grand mal seizure — after drinking "too much water" suggests more isn't always better when it comes to hydrating.

"Adequate is always better," says Stavros Kavouras, a professor of nutrition and director of the Hydration Science Lab at Arizona State University. The National Academy of Medicine recommends a total water intake of 3.7 liters per day for men and 2.7 liters per day for women. Since around 20 percent of our overall fluid needs are satisfied through the foods we eat, that comes out to around 12 glasses per day for men and eight for women.

Experts say that's the amount needed to maintain blood pressure, body temperature and various other physiological functions. The kidneys take care of any excess fluid, excreting what the body doesn't need through urine.

Take in more — substantially and dramatically more — fluid than your body needs or wants, and that's when you run the risk of overhydration, also known as water intoxication.

"Overhydration disrupts this chain of events," says Mike Ren, M.D., assistant professor of medicine at Baylor College of Medicine. "Consuming an excessive amount of fluids can result in an imbalance in the body's electrolytes, particularly sodium, leading to a condition known as hyponatremia, which is characterized by low sodium levels in the blood. This can be dangerous and result in symptoms such as confusion, nausea and seizures." All of which Shields said she experienced.

Other complications of hyponatremia can include muscle cramps or weakness, lethargy and headache. If left untreated, it can lead to a coma, even death, according to the Cleveland Clinic.

How common is overhydration?

That's the good news: It's extremely uncommon.

"The possibility of developing a seizure or a major side effect of drinking too much is extremely rare," Kavouras says. "Your body can respond to it."

To become overhydrated to the point of developing hyponatremia, you would have to not only drink double the recommended amount of fluids, but you would need to do so quickly, Kavouras says.

"It doesn't happen easily," he says. Overhydration is often seen in endurance athletes, like marathoners, because they tend to consume large quantities of water during extended physical activities without adequately replacing lost electrolytes like sodium through sweat.

"They're drinking above and beyond what they're sweating out, putting them at high risk of developing hyponatremia," Kavouras says.

A study looking at Boston Marathon runners, published in The New England Journal of Medicine, found that a substantial number of runners had abnormally low serum sodium concentrations at the end of the race. The culprit? Overhydrating.

It's easy to forget that sodium is an essential nutrient that helps to maintain the balance of fluids inside and outside of cells. When sodium levels drop due to excessive water consumption, fluids travel from the outside to the inside of cells, causing them to swell.

"Sodium has gotten a bad name because most people consume way more sodium than is necessary," Kavouras says. On average, Americans eat more than 3,400 milligrams of sodium each day, the American Heart Association says, which is more than double the recommended 1,500 mg per day.

"It's a very common perception that low-sodium is a healthy diet, but if you are physically active and you lose more sodium via sweating — and in combination with that drink a massive amount of plain water — then that combination could create a mild sodium deficiency," Kavouras says.

Surprisingly, older adults are also at risk of overhydration for a number of reasons, including:

- Reduced kidney function, making it more challenging for the body to efficiently regulate fluid balance.
- Certain medications that can affect fluid and electrolyte balance, such as diuretics.
- Preexisting medical conditions such as heart failure, which can lead to fluid retention and an increased risk of overhydration.
- A decreased thirst perception, which can result, curiously, in dehydration or overhydration if you consume fluids without being adequately thirsty. What's more, the sensation of thirst tends to decline with age.

Far more common than drinking too much? Drinking too little — especially among older adults.

"If you look at the national data, more than 85 percent of older adults don't drink an adequate amount of fluid," Kavouras says.

There are a few clues that can let you know if you're well-hydrated, such as if you're going to the bathroom roughly every two to three hours and your urine is light colored, suggests a study published in 2021 in the European Journal of Clinical Nutrition.

"These are the best predictors that you're well-hydrated," says Kavouras, who was lead author on the study. "If you're going more often, then you're overdoing it. That should guide your fluid intake. If you drink all day and pee every hour, then this is an indication that you're drinking way too much."

6 PLACES MOLD CAN HIDE IN YOUR HOME

Mold can cause health issues ranging from mild to dangerous. Here's what to know

Mold can cause health issues ranging from mild to dangerous. Here's what to know

Outdoor mold plays a crucial role in nature by breaking down dead organic matter. But indoors, it can be a nuisance or even a danger to your health.

How worried should you be? That depends, says forensic scientist and certified mold inspector Joshua Leviton; the answer is complex since mold can affect each person differently.

Here are unexpected places in your house where mold might be hanging out, how dangerous it is to your health and what to do to get rid of it for good.

Hiding in the walls … or behind the wallpaper

Sound like something out of a horror movie? It kind of is. Mold remediator Tal Saar says growth in drywall is a huge issue.

"Ninety percent of the jobs that we do involve drywall," says Saar, the founder of a New York-based mold remediation company. "That's where the majority of the issue is because it's porous. So once you have water damage with the drywall and the porous material, you're going to get mold and it's going to come by fast … within 24 to 48 hours, you can have a mold issue."

According to Saar, water damage in drywall can lead to the growth of black mold. Even though you might not see mold growth when you have water damage, it's crucial to address the problem quickly.

You'll likely notice the water damage right away, Saar says. Unfortunately, there's only one way to effectively address the issue — remove the drywall and fix whatever caused the damage. If you don't address the source of the problem, the mold will just come back.

Mold can also grow behind wallpaper, Leviton says. An easy-to-spot sign is if the paper starts to peel, though that does not necessarily mean you have a mold problem, he adds. It might just be humidity messing with the glue

Lurking inside HVAC systems

Heating, ventilation and air-conditioning systems, or HVAC for short, are another area of the home where mold can live.

You may suspect or know there's mold in your HVAC system if you or a professional has identified a moisture problem in your home, you see mold near the intake to the system, you smell a musty odor coming from the system or a routine check led to the discovery of mold.

The U.S. Environmental Protection Agency (EPA) says, "Many sections of your heating and cooling system may not be accessible for a visible inspection, so ask the service provider to show you any mold they say exists." Be aware that not everything that looks like mold is mold. Only experts can determine that, and a laboratory analysis may be required for final confirmation. "For about $50, some microbiology laboratories can tell you whether a sample sent to them on a clear strip of sticky household tape is mold or simply a substance that resembles it," the EPA states.

The EPA says HVAC systems, along with drain or condensate pans, need to be "checked routinely" to prevent and address any mold growth. Filters for the HVAC system need to be "kept dry and changed frequently," and equipment should be evaluated by a professional HVAC contractor if it is more than 10 years old or failing to keep your house comfortable.

According to Leviton, mold can grow in the vents or ducts, as well as on the HVAC coil, which, in his experience, is usually where a more dangerous type of mold grows.

If you suspect or see mold growth on or in the HVAC system, Leviton says it's time for testing. The EPA advises that you refrain from running your HVAC system and consult its guide — "Should You Have the Air Ducts in Your Home Cleaned?" — before moving forward.

"My recommendation would be to first get it tested to find out what species are present, which will then determine whether you need an HVAC company or mold remediation company to do the removal," Leviton says.

Growing on clothing

Another out-of-sight spot for mold to grow is on the clothes in your closet — particularly if you have a tightly packed closet with poor air circulation.

Mold grows best in closets when humidity levels rise above 70 percent, Leviton says, and natural materials, including wool and cotton, are more prone than others.

Should you just throw moldy clothes in the wash? Leviton says his cleaning recommendations for household items harboring mold can vary greatly since some people are very sensitive to mold and others are not. If he was dealing with a slightly moldy piece of clothing, Leviton says, he would “put it in a washing machine with some vinegar” to see if that got rid of visible mold. Saar, on the other hand, recommends taking slightly moldy clothing to a dry cleaner.

Note that simply trying to clean moldy clothing is “totally not enough” for people who are highly sensitive to mold, Leviton says. They might consider just throwing the clothes away.

To get rid of airborne mold spores after you remove the clothing, Leviton suggests running a high-efficiency particulate air (HEPA) filter — especially since anytime you handle something with mold on it, you’re effectively “disturbing it” and sending spores into the air.

The Centers for Disease Control and Prevention says humidity should not go over 50 percent. A dehumidifier might help keep mold at bay and allow the air in your home to flow freely, the CDC says.

The mold monster under your bed

You might have checked for monsters under the bed as a kid; now it might be time to check for mold. Leviton says keeping your mattress on the floor puts your bed at the highest risk of mold growth: “If condensation does happen, then it’s kind of got this nice little petri dish that’s been created by the floor and the mattress. So it’s better to have it off the floor so that air can circulate.”

And frankly, Leviton says, if you do find mold, it’s probably time for a new mattress. He says you could try to clean it but that would be extremely cumbersome and pretty much impossible to completely rid it of mold.

“I don’t know how you would get all of the mold because it would grow inward, and you can’t really get deep enough, I don’t think, with cleaning unless you were able to submerge it in something like vinegar,” he says. “But I don’t know if there’s a way to because it’s such a large object.”

If your mattress is raised off the ground and mold-free, it is still possible for mold to grow under your bed.

“I’ve seen it on the wooden slats under the mattresses before because if the bed is up against the wooden slat, then it creates kind of like a little mini-environment where moisture can just kind of sit,” Leviton says.

If you find mold growing on the slats, Leviton says cleaning them could be effective if the wood is sealed. If it’s not, he says to replace them since the mold has likely “grown into the pores,” which makes them impossible to fully clean.

He adds there are products on the market such as encapsulating paint meant to trap the mold into the wood, but they are not guaranteed to work.

Spinning in your washing machine

It's ironic that a costly home appliance meant to make things clean … can be kind of icky. Mold can grow in your washing machine — particularly on the rubber gasket that prevents water from flowing out of the washer when in use. And that means it can get on your clothes.

"[The gasket] can be replaced, but it's weirdly expensive," Leviton says. "But it's very hard to clean it out … it'll start to discolor and turn black, and it's not usually anything beyond Cladosporium," a common indoor mold.

Energy Star, a program run by the EPA, says to follow your washing machine's manufacturer's maintenance instructions if you're trying to rid it of mold.

"Some manufacturers recommend rinsing the washer each month by running a normal cycle with 1 cup of bleach and wiping down the compartments to help reduce the risk of mold or mildew buildup," the website reads. "Consult the product owner's manual and review other recommendations for regular maintenance."

To prevent mold growth, Leviton wholeheartedly recommends leaving the washing machine door open after use for a while, "so then the moisture can evaporate."

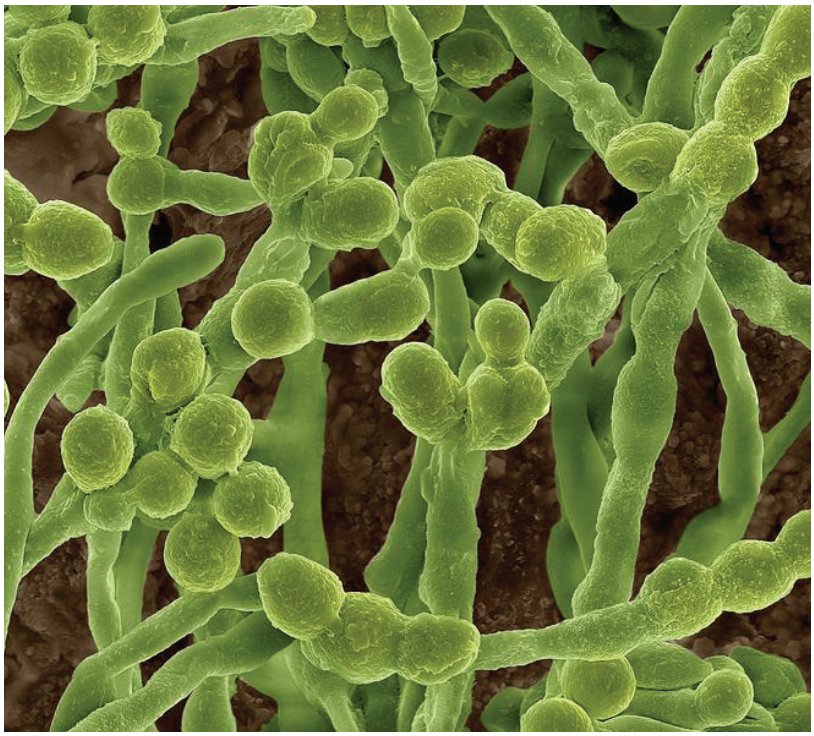
Where there is water, there can be mold.

Who is more likely to be affected by mold?

People with preexisting conditions might react more strongly to mold, including those who are sick or have respiratory issues, allergies or asthma, according to the American Industrial Hygiene Association website. Infants and children, older people and those who are pregnant also could have more adverse reactions.

Leviton says some of his clients have exhibited brain fog — though research on this symptom is limited.

You can get tested for mold allergies. But it's important for everyone to try to avoid mold growth in their homes because even less sensitive people can react to mold — anything from an increased risk of allergic and upper-respiratory disease to bothersome symptoms such as coughing and wheezing, according to the CDC.



Which molds are the most dangerous?

Again, that depends, Leviton says. Just like people react differently to molds, they react differently to different kinds of molds. One type of mold can be relatively benign to one person and seriously harmful to another.

The most common types of mold you might find in your home, according to the CDC, are Cladosporium, penicillium and aspergillus. Stachybotrys chartarum — referred to as black mold — can be found in the home, but it is less common.

Can you clean mold yourself?

Leviton says that's not the best idea. The first thing you need to know before you clean mold is the type you're dealing with. You can hire a professional to test the mold, or you can purchase an at-home test. Leviton says to be wary of doing it yourself since that often ends up costing the same as hiring a professional after sending samples to a lab and potentially needing a professional to interpret the results anyway. If you hire a professional, they should be able to tell you what steps need to be taken to address the mold issue effectively.

7 SUPERFOODS TO LIVE LONGER

These superfoods can help you stave off disease and remain healthier as you age

There's a reason the Mediterranean diet has been dubbed the longevity diet. Research shows that people who follow the eating plan — which favors fresh foods over processed — tend to live not just long lives, but long, healthy lives. Not coincidentally, it's also the one most followed by people who live in the Blue Zones, those five regions of the world with the highest concentration of healthy centenarians.

"People who live in the Blue Zones aren't looking for the latest fad diet or magical elixir to wellness," says Kristin Kirkpatrick, a registered dietitian nutritionist at Cleveland Clinic. "They're eating real food," meaning fresh, minimally processed whole foods. "They also eat to 80 percent fullness," she adds. "So instead of measuring their food, they are tapping into their hunger and fullness cues." These seven Blue Zone-worthy superfoods may help you stave off all the biggies — cancer, cardiovascular disease, diabetes, dementia, obesity — and live well into the triple digits.

NUTS

It's easy to see why nuts land on every list of superfoods. "They're a dense source of nutrients that can support our immune system and metabolism, balance inflammation and gut health, promote brain and heart health, as well as offer cancer preventive properties," says Stacy Kennedy, a registered dietitian in Wellesley, Massachusetts. No wonder they promote longevity.

In a study published in BMC Medicine, researchers enlisted more than 7,000 adults between the ages of 55 and 80 who were at high risk for cardiovascular disease and asked them to follow one of three diets: a Mediterranean diet supplemented with extra nuts, the same diet but with additional extra virgin olive oil instead of nuts, or a low-fat diet. After five years, those who consumed more than three one-ounce servings of nuts per week had a 39 percent lower overall mortality risk than the non-nut eaters. In fact, over the course of the study, the nut eaters had the lowest total death risk. "Nuts give us fiber, protein, healthy fats and key vitamins and minerals like omega-3s, vitamin E, calcium and selenium," Kennedy says.

OLIVE OIL

Wondering why olive oil gets star billing on the Mediterranean diet? Researchers think the heart-healthy monounsaturated fats in olive oil — particularly the virgin and extra virgin variety — are a major factor. Olive oil is also loaded with polyphenols, potent antioxidants that may help protect against several age-associated ailments, including Alzheimer's, Parkinson's, cardiovascular disease and cancer.

Obviously, both olive oil and nuts are calorie dense. How can you reap the benefits of these superfoods without gaining weight? "You don't need to eat large portions of nuts or olive oil to get the benefits," Kennedy says. She suggests adding a tablespoon of olive oil to sauces or as a dressing, or reaching for a small handful of nuts as a snack with fruit or to sprinkle over a salad or into oatmeal.

DARK LEAFY GREENS

Not that you need another reason to fill your plate with leafy green vegetables, but here it is: Eating spinach, kale, chard, collards, lettuce and the like on a regular basis may slow age-related cognitive decline, according to a study in the journal Neurology. Researchers compared study participants who ate around 1½ servings of greens a day with those who ate less than a serving a day and found that the rate of cognitive decline among those who consumed the most was the equivalent of being 11 years younger (in terms of brain health)

WHOLE GRAINS

Eating more whole grains — think brown rice, bran, oatmeal, popcorn, couscous, quinoa — may reduce the risk of early death, according to a large review of studies published in Circulation. The researchers found that people who ate about four servings of whole grains per day had a lower risk of dying during the 40-year study period, compared with those who ate little or none at all. The health benefits are believed to be a result of the high fiber found in whole grain foods, which may lower cholesterol production. In addition, says Kirkpatrick, “whole grains can replace white, refined grains, which have a negative impact on insulin, blood sugar and satiation.”

FRUITS

There’s no such thing as a bad fruit (unless, of course, it’s bathed in syrup and comes from a can). They all offer a variety of immune-supportive, anti-inflammatory and anti-aging properties like vitamin C, potassium and phytochemicals, those good-for-you compounds found in plants, Kennedy says. But “berries are particularly beneficial, as they are low in sugars, high in fiber and rich in nutrients,” she adds. “The vibrant color is one way you can tell they are good for you. The blue-purple family of nutrients, like in many berries, have unique properties for immunity, brain health and cardiovascular health.” In a study published in Applied Psychology, Nutrition and Metabolism, healthy people between the ages of 66 and 70 who drank concentrated blueberry juice every day showed improvements in brain activity. The study suggests their memory also improved.

LEGUMES

People who live in the Blue Zones — whether it's Okinawa, Japan; Sardinia, Italy; Nicoya, Costa Rica; Ikaria, Greece; or Loma Linda, California — have a thing for plant-based foods, especially the many peas, beans and lentils that are part of the legume family. These centenarians eat at least four times as many beans as Americans do on average. "Legumes are low in fat and high in protein, folate, iron, potassium and magnesium," Kirkpatrick says. That's not all. A review published in the journal Critical Reviews in Food Science and Nutrition found that beans are closely linked to a reduced risk of chronic diseases such as cardiovascular disease, cancer and diabetes.

GREEN TEA

If you didn't know better, you might think the secret to turning back the clock on aging can be found in a pot of green tea. You wouldn't be far off. Research has linked green tea to a lower risk of heart disease, cancer, type 2 diabetes, Alzheimer's and obesity. No surprise, then, that one study of older Japanese adults found that those who drank the most green tea — five or more cups a day — were 26 percent less likely to die during the seven-year study period than those who drank one cup a day. What is it about green tea? Nutrient-rich foods that are high in antioxidants — like green tea — have been linked with longer telomeres. Like the plastic tips of a shoelace, telomeres can be found at the end of chromosomes and protect DNA. They naturally shorten as we age, but the process can be accelerated by things like smoking, stress and poor diet.

HEALTHY FOOD

Mediterranean Baked Haddock

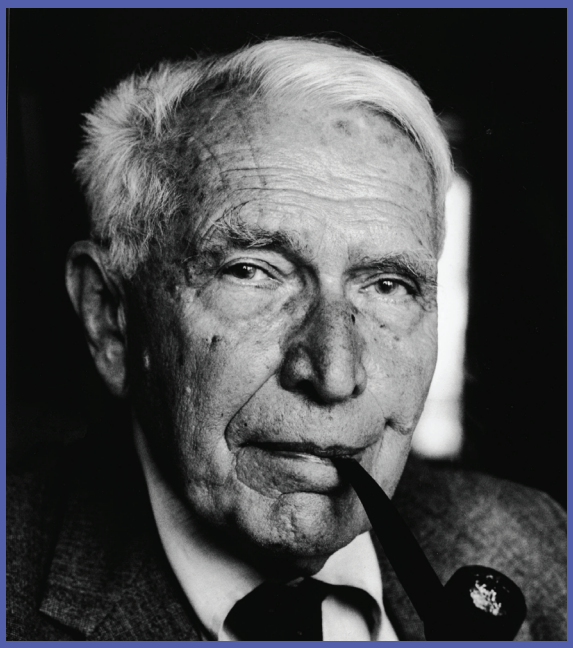
YIELDS:	PREP TIME:	COOK TIME	TOTAL TIME:
4	15 min	15 min	30 min

Ingredients

- Two 14-ounce cans cherry tomatoes
- 1/2 cup dry white wine
- 1/2 cup pitted Kalamata olives, sliced in half
- 4 cloves garlic, minced
- 2 tablespoons capers, drained
- 1 tablespoon honey
- Kosher salt and freshly ground black pepper
- Four 6-ounce haddock fillets, skin removed
- 1/2 teaspoon Italian seasoning
- 1/2 teaspoon sweet paprika
- 2 tablespoons olive oil
- 4 slices crusty bread

Directions

1. Preheat the oven to 425 degrees F. Combine the cherry tomatoes, white wine, olives, 3 of the garlic cloves, capers, honey, 1/2 teaspoon salt and a few grinds of pepper in a 9-by-13-inch baking dish.
2. Pat the haddock fillets dry with a paper towel and season the flesh side with the Italian seasoning, paprika, 1 teaspoon salt and a few grinds of pepper. Nestle the fillets into the sauce in the baking dish. Bake until the sauce is bubbling around the edges and the fillets are cooked through and easily flaked with a fork, 15 to 20 minutes.
3. Meanwhile, mix the remaining 1 garlic clove with the olive oil, 1/4 teaspoon salt and a few grinds of pepper in a small bowl. Brush both sides of each slice of bread with the oil mixture and place onto a baking sheet. Bake until the bread is toasted, 5 to 7 minutes.
4. Serve the fish on plates with the sauce and bread on the side.



GREATEST SCIENTISTS

Erwin Chargaff

Erwin Chargaff was born in August 11, 1905, in Chernivtsi, a provincial capital of the Austro-Hungarian Empire. At the outbreak of World War I, his family moved to Vienna, where he attended the Maximiliansgymnasium (now the Gymnasium Wasagasse). He then went on to the Vienna University of Technology (Technische Universität Wien) where he met his future wife Vera Broido and received a doctorate in chemistry in 1928.

After graduation he completed a one-year fellowship at Yale University before returning to Europe, where he became an assistant at the University of Berlin in 1930. Chargaff was, however, Jewish, and new Nazi policies, put in place when Hitler came to power in 1933, excluded Jews from academic positions. As a result, he left Germany for France. After a brief stint at the Pasteur Institute, he went back to the United States, and in 1935 started his lifelong career at Columbia University. He became a U.S. citizen in 1940.

While Chargaff was growing up, his family had been fairly well off, but the Great Inflation after World War I brought financial ruin, and his father, the owner of a small bank, lost his business. His mother survived her husband, who passed away in 1934, but she ended a victim of the Holocaust. Chargaff later wrote that she died, "only God knows where and when, having been deported into nothingness from Vienna in 1943."

Chargaff's Rules. In 1944 Chargaff began his investigations into the composition of DNA. By 1950 he had experimentally determined — and published — certain crucial facts that led directly to the correct elucidation of its molecular structure. In particular, he demonstrated three rules, now known as Chargaff's Rules, which state that in DNA:

1. the number of adenine (A) residues always equals the number of thymine (T) residues;
2. the number of guanine (G) residues always equals the number of cytosine (C) residues;
3. the number of purines (A+G) always equals the number of pyrimidines (T+C) — this rule is an obvious consequence of rules 1 and 2.

He also showed that these rules hold true even though the ratio (G+C):(A+T) varies from one type of organism to another.

Chargaff's findings, along with those of Rosalind Franklin's X-ray diffraction studies of DNA, strongly suggested that base-pairing existed within DNA between adenine and thymine, and between guanine and cytosine (see figures at right above), and that other possible pairings such as (A-C, G-T, A-A, T-T, C-C, or G-G) do not occur. These are the basic facts you have to know to construct an accurate model of the DNA double helix.

Two years later, he explained these findings to James Watson and Francis Crick, who were then able quickly to elucidate the double-helix structure of DNA. As Chargaff himself later put it, "I told them all I knew. If they had heard before about the pairing rules, they concealed it. But as they did not seem to know much about anything, I was not unduly surprised. I mentioned our early attempts to explain the complementarity relationships by the assumption that, in the nucleic acid chain, adenylic was always next to thymidylic acid and cytidylic next to guanylic acid...I believe that the double-stranded model of DNA came about as a consequence of our conversation.*

During the 1950s, Chargaff took controversial and outspoken stances that antagonized many of his colleagues. For example, he claimed that the "technology of genetic engineering poses a greater threat to the world than the advent of nuclear technology." Such comments probably contributed to his not being included among those awarded the Nobel Prize for discovery of the structure of DNA. Instead, Francis Crick, James Watson and Maurice Wilkins were recognized (1962).

In the course of his career he authored over 500 essays and publications in academic journals.

Chargaff retired from Columbia University in 1974, aged 69; he remained a faculty member until 1982. He then relocated his laboratory to the Roosevelt Hospital and worked there until finally truly retiring from active research in 1992, aged 86.

Vera, his wife, died in 1995. In his final years Chargaff enjoyed spending time in his apartment's library, perhaps remembering his blissful early childhood days at home in his father's library in Czernowitz.

Erwin Chargaff died, aged 96, on June 20, 2002 in New York. He was buried in New York's Mount Carmel Cemetery, where Vera and his sister Greta had also been laid to rest. He was survived by his son, Thomas.

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