An introduction to

environmental medicine

Fullscript

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Environmental medicine: An introduction

According to Dr. Joseph E. Pizzorno, ND, one of the world's leading authorities on evidence-based natural medicine, early patients of the environmental medicine movement could be considered healthcare's canaries in the coal mines. "As the environment became progressively more toxic, more and more of the population started to show damage," he said. "Now, virtually every person in the world is being exposed to environmental toxins at levels known to induce disease," concludes Dr. Pizzorno, who is co-author of the textbook *Clinical Environmental Medicine* and the author of *The Toxin Solution*.

Dr. Pizzorno is not alone in voicing his concern. He is joined by numerous other medical experts, researchers, and scientists from around the world sounding the alarm and shining a light on the importance of environmental medicine.

"Future generations may look back with astonishment and wonder how our culture thought it could stand by and tolerate the poisoning of its people and somehow not anticipate the ravages of widespread disordered biochemistry and ill health," wrote the authors of a 2013 paper foreshadowing the severity of toxin bioaccumulation and the significant need for this issue to be addressed in clinical practice. [13]

What is environmental medicine?

The dictionary defines "environmental medicine" as the branch of medicine that examines how the environment affects physical, mental, and emotional health to prevent, diagnose, and treat diseases related to the environment. [7] This branch of medicine uses an integrative, systems-based approach to toxic chemicals and their impact on the body, specifically looking at how toxic load can increase the risk of a variety of chronic illnesses, such as cancer, endocrine disorders, metabolic diseases, and neurological conditions. [23]

The role of the environmental medicine clinician

Dr. Pizzorno says the role of the environmental medicine practitioner has changed dramatically over the past few decades. Within the field, there is an important expansion that is taking place.

"In the early days of environmental medicine, pioneering clinicians like the late Dr. Bill Rae, MD, and Dr. Walter Crinnion, ND, were amongst the first to recognize that some patients suffering from unexplained or treatment-resistant disease were ill due to environmental metals and toxins," explains Dr. Pizzorno. "Research has now shown that the epidemic of chronic disease is due primarily to the increasing body load of these metabolic poisons."

The emphasis on environmental medicine in clinical practice was born from a lack of knowledge among physicians illustrated by its absence in medical circles in the 1980s. At that time, conventional medical doctors were not involved in environmental health-related issues. In 1985, only half of the medical schools in the United States included environmental health in their curriculum, and the topic only accounted for a total of four hours of training over four years. [15] Not much has changed since then according to Certified Health Coach and environmental toxins expert Lara Adler.

"There is an enormous education gap in this area," explains Adler. "The average number of hours offered in the medical school curriculum that address environmental medicine is only seven, and most programs don't cover this topic at all."

Integrative practitioners, however, are focused on addressing the root cause of health issues and personalizing protocols for their patients, so they are uniquely suited to fill the gap.

"In addition to looking at the full picture of the patient's health, there is also a greater focus on prevention with an integrative approach," explains integrative health expert Dr. Jaquel Patterson, ND. "Naturopathic, integrative, and functional medicine providers may be more progressive in picking up on cues and issues that fall outside of conventional medicine since they aim to get to the core of the problem," says Dr. Patterson, who is the Medical Director at Fairfield Family Health in Fairfield, CT.

As the environmental toxin problem propagates, the need to address this issue in clinical practice expands proportionately.

The first step is awareness

Exposure is ubiquitous as toxins come from a variety of sources including the air we breathe, water we drink, foods we eat, and products we use every day. This is a result of the significant increase in toxic chemicals introduced into the environment over the past few decades.

In 1982, the United States Environmental Protection Agency's (EPA) Chemical Substances Control Inventory listed 62,000 chemicals considered to be toxic. This list now includes more than 86,000 chemicals. Based on the Toxic Substances Control Act (TSCA), chemicals on the list include organic and inorganic substances, as well as polymers and chemical substances of unknown or variable composition, complex reaction products, and biological materials. A number of other potentially harmful chemicals that are regulated by other U.S. Statutes, and therefore not on the EPA's list, include additives, cosmetics, drugs, pesticides, and tobacco. [31]

Further exacerbating the problem, each individual toxic chemical is produced in large quantities and distributed widely through U.S. commerce. For example, in 2014, the Environmental Defense Fund, considered one of the world's leading nonprofit environmental organizations, looked at 120 commonly produced, potentially harmful chemicals and found that:

- One million pounds each of 81 different toxic chemicals were produced or imported annually in the United States.
- At least 14 of the chemicals exceeded one billion pounds produced or imported annually, and this included known carcinogens such as formaldehyde and benzene and known endocrine disruptors such as bisphenol A (BPA).
- More than 90 of the 120 chemicals were found in commercially-available products, including eight that were in children's products, such as sippy cups and toys. [10]

Additionally, in 2012, the United States produced more than a billion pounds of pesticides, and many of those chemicals are considered carcinogenic and disrupt endocrine function. [30] In 2014, the United States produced more than 28 billion pounds of ethylene dichloride, a possible carcinogen found in automobile parts and upholstery, as well as furniture and houseware products. [10] Styrene, another human carcinogen that can also cause many other health issues, has become ubiquitous and is found in a variety of consumer products (e.g., packing materials, insulation, carpeting), automobile exhaust, and cigarette smoke. [2]

When you add the high production quantities to each of the 86,000 EPA-listed TSCA chemicals—and then add in the pesticides, additives, and other chemicals not on the list—it becomes apparent as to why toxin exposure is so prevalent. But what are all of these chemicals doing to human health?

Troublesome toxins and health implications

"Regular exposure to metals and chemicals now contributes to virtually every chronic disease," explains Dr. Pizzorno. There are several key mechanisms of action that environmental toxins use to exert their negative health effects, including:

- Heavy metals causing dysbiosis
- Persistent organic pollutants (POPs), such as non-stick compounds and flame retardants, as well as heavy metals and pesticides contributing to endocrine disruption
- POPs, heavy metals, formaldehyde, and fragrances leading to genotoxicity caused by epigenetic alterations
- Pesticides and heavy metals inhibiting enzyme function
- Most chemicals contributing to oxidative stress [27]

Toxic chemicals can be found in many products that are commonly used on a daily basis. "Common chemicals that we are all exposed to regularly include bisphenols—BPA, BPS, BPF, etc.—found in cash register receipts, hard and shatterproof plastics, and the lining of most canned foods," says Lara Adler. She also reminds individuals that toxic "phthalates can be found in all manner of scented products from household cleaners and personal care products to scented candles and air fresheners."

These two common chemicals are only the tip of the iceberg when it comes to the potentially harmful chemicals to which we are constantly exposed.

The following chart describes a variety of toxic substances and their potential negative health outcomes. [27]

Category	Sources	Outcomes
Natural substances	Mold; allergens from animals, plants, and foods	Acute and chronic inflammatory conditions and reduced immunity that may result from exposure to these substances play a role in diseases such as autism, as well as cause a variety of allergic symptoms.
Persistent organic pollutants	Herbicides, flame retardants, stain repellents, anti-wrinkle and non-stick material, and organochlorine chemicals	Accumulate in adipose tissue Carcinogenic Endocrine disruption Metabolic syndrome, diabetes, obesity
Pesticides (e.g., insecticides, herbicides, and fungicides)	Agriculture, household use (e.g., gardens), food, water	Carcinogenic Developmental, endocrine, immunological, neurological, reproductive, and respiratory disorders
Polymers	Plastics	Endocrine disruption Carcinogenic
Heavy metals (e.g., arsenic, cadmium, lead, mercury)	Water, food, dust, fish, dental amalgams, consumer products, old pesticides	Carcinogenic Endocrine disruption Organ damage Neurological dysfunction Immune system impairment
Volatile organic compounds	Formaldehyde, benzene, fragrances, fuels, solvents	May interfere with cellular membranes and cause diverse neurological effects

In addition to those included in the table above, potentially harmful chemicals can also be found in commonly consumed processed foods. For example, acrylamides are formed when starchy foods such as potatoes are cooked at very high temperatures (e.g., French fries). A 2018 report by the Centers for Disease Control and Prevention found measurable acrylamide levels in the blood in 99.9% of the 14,000 participants studied. This is significant as acrylamide exposure can contribute to reproductive issues, nerve damage, and even cancer. [4] Food can also be a source of exposure to pesticides, heavy metals, and other harmful chemicals. [25]

Exposure to commonly encountered heavy metals in both food and the environment, such as aluminum, arsenic, cadmium, iron, lead, and mercury, can accumulate over time causing a variety of serious health issues, including:

- Allergic reactions
- Cancer
- Dyslipidemia
- Endocrine disruption
- Endothelial dysfunction
- Genetic mutations
- Increased inflammation
- Kidney damage
- Mitochondrial dysfunction
- Oxidative stress
- Progressive physical, muscular, and neurological degeneration
- Reduced immunity [9]

Besides the long list of health issues outlined, there are even more health effects to consider from a clinical perspective.

More detrimental health examples

"Currently there is an enormous body of research suggesting that environmental toxins—in many cases, chronic, low-dose exposures—are linked to the vast majority of chronic diseases," explains Adler. "Toxin exposure may not be the primary cause of these conditions, but very likely play a secondary role in causing or contributing to their development."

Many chemicals, including glyphosate, the most widely used herbicide in the United States, are considered to be either known or probable carcinogens. [16]

Specific to women's health, exposure to endocrine-disrupting chemicals such as BPA and phthalates can lead to many serious health issues, including:

- Endometriosis
- Hormone-dependent cancers
- Infertility
- Menstrual irregularities
- Polycystic ovary syndrome [24]

The commonly used industrial chemical BPA is not only problematic to women; exposure to BPA has become a major public health concern for all individuals. According to a 2020 national cohort study of 3,883 adults aged 20 years or older, higher BPA levels in urine were associated with a significant increased risk of all-cause mortality, including cancer and heart disease mortality. [3]

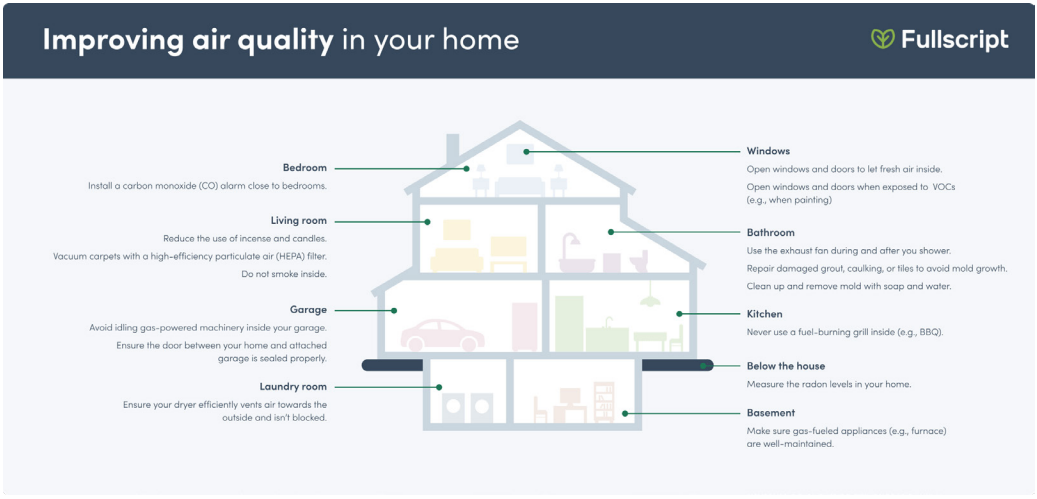
Furthermore, the research indicates that exposure to a variety of toxic compounds can lead to loss of tolerance, causing multisystem symptoms involving several organs at the same time. [27] Known as toxicant-induced loss of tolerance, this is especially true in cases of allergy, food intolerance, and chemical sensitivity. [12]

Air pollution and global warming

The health of the environment and the health of the world's population are inextricably linked. Excess pollution and greenhouse gasses are prime examples of toxins in our environment that can negatively impact health. According to the World Health Organization (WHO), air pollution is responsible for seven million deaths worldwide each year, and nine out of ten people in the world are presently breathing air that contains high levels of pollutants exceeding WHO guidelines. [33]

As a result of the 2018 Intergovernmental Panel on Climate Change (IPCC), we now also know that global warming is negatively impacting food quality and nutrient content, which can be directly linked to poor health. [17] Increased greenhouse gas emissions, in particular carbon dioxide (CO2), contributes to decreased nutrient content of foods. [11] Researchers have found that increased CO2 is linked to reduced concentrations of zinc, iron, protein, and some B vitamins. [8, 37] Also, according to a 2019 meta-analysis of 37 studies, CO2 decreased plant carotenoid concentrations by 15%. [21]

For a shareable copy of the following resource, refer to the "Patient resources" section.



Environmental medicine in action

Two important aspects of applying environmental medicine to clinical practice are proactive prevention and personalized treatment. Prevention involves building awareness with a comprehensive patient education plan.

An ounce of prevention

Given the magnitude of the problem, this topic can be overwhelming for some patients. "I initially focus on areas that my patients have the most control over, which include food, water, and their home and work environments," explains Dr. Patterson. "Because many personal care products can contain harmful chemicals, I also recommend that my patients be mindful of those choices and choose more natural products when they can."

Refer to the "Patient resources" section for a handout on finding non-toxic personal care products.

Clinicians may also want to refer patients to the Environmental Working Group (EWG) website. Known for their popular "dirty dozen" and "clean 15" lists, the EWG also has many other resources to help patients reduce their exposure to toxic chemicals. Similar to the guidelines from the EWG, Dr. Patterson recommends the consumption of organic foods whenever possible.

"I recommend that my patients consume organic foods to avoid or reduce exposure to harmful pesticides and other chemicals," says Dr. Patterson, who is an active member of the American Academy of Environmental Medicine. If buying organic is not an option, patients can take additional steps to reduce exposure by peeling some vegetables or washing them in an acid or alkaline solution.

Refer to the "Patient resources" section for a shareable copy of the 2021 Dirty Dozen and Clean Fifteen lists.

To reduce exposure of pollutants in the home, patients can consider the following:

- Control dust by periodically cleaning HVAC ducts and replacing HVAC filters.
- Invest in a high-quality high-efficiency particulate air (HEPA) and charcoal air purifier.
- Purchase indoor plants, such as peace lily or bamboo, that are known to clear volatile organic compounds from the air.
- Remove carpeting and eliminate other off-gassing sources such as paint and paneling. [6]

The U.S. EPA provides more great tips on how to improve indoor air quality, as well as other resources to help patients reduce toxin exposure.

The health of the environment

Besides helping patients reduce their exposure to environmental toxins, clinicians may want to also consider the role patients can play in protecting the environment.

The planetary health movement launched in 2015 by the Rockefeller Foundation-Lancet Commission on Planetary Health merges public health and environmental health with the goal of reducing chronic illness while preventing further environmental damage from excess pollution and toxic chemicals. [32] Practitioners embracing planetary health concepts are in a unique position to spread the word among their patients, especially those impacted by environmental toxins. This also helps in reducing exposure to harmful toxins. More information about the planetary health movement can be found here.

In addition to pollution, educating patients about global warming will help heal the environment and our population in the process. Three key strategies can be employed to help address micronutrient deficiencies that are a result of global warming include biofortification, food fortification, and dietary supplementation. [26] Educating patients will help them understand that the choices they make regarding global warming will not only benefit themselves, but will also benefit the planet and our food supply by reducing greenhouse gas emissions.

Beyond prevention, for those patients who are experiencing symptoms that may be related to environmental toxins, the environmental medicine practitioner can create an individualized treatment protocol.

Environmental medicine is personalized medicine

Successful clinical outcomes in environmental medicine require an individualized approach that considers a patient's specific exposure, existing body burden, genomics, internal detoxifying system strength, and ability to desensitize and deactivate toxins. [6] Environmental medicine is in line with the personalized medical approach presently being discussed in scientific literature that includes the delivery of effective, tailored therapeutic protocols that take into consideration the genomic, epigenomic, proteomic, and individual circumstances of each patient. [22] This type of approach begins with a thoughtful and thorough assessment of the individual patient.

Therapeutic interventions

There are many interventions, tools, and strategies available to the environmental medicine practitioner that can help ensure successful clinical outcomes, including:

- Chelation therapy (oral and intravenous)
- Gastrointestinal and renal elimination
- Microbiome interventions especially focused on endotoxemia
- Nutritional supplements
- Sauna sessions [6]

Many of these therapeutic interventions modulate phases of internal detoxification. There are also many foods, components of foods, and dietary supplement ingredients that have been shown to influence detoxification, including allium and cruciferous vegetables, daidzein from soybeans and legumes, fish oil, lycopene from tomatoes, and resveratrol from red grapes. [14]

Dietary supplements

Glutathione, considered the master antioxidant, is a nutrient that can be taken in dietary supplement form to support detoxification pathways. Glutathione is a major detoxification agent within the cells and is critical to maintaining redox homeostasis via redox signaling. [36]

Furthermore, influencing detoxification often requires additional liver support. One of the most widely used medicinal herbs to enhance liver health is milk thistle (*Silybum marianum*), which contains a key phytochemical called silymarin. Milk thistle has been used for hundreds of years to treat a wide range of liver pathologies and protect the liver from environmental toxins. [1]

Sulforaphane from broccoli is another natural substance showing promise in the area of environmental medicine. Sulforaphane, which has been shown to protect the liver, is one of the most potent naturally-occurring inducers of phase II detoxification enzymes. [35]

Vitamin C is also a valuable nutrient. Research demonstrates that vitamin C can help clear heavy metal toxicity. [5] Endotoxemia can deplete vitamin C levels in the body, whereas higher vitamin C intake can help restore gut-liver function, an important therapeutic goal for the environmental medicine practitioner as it relates to optimal detoxification. [29]

These are just some of the targeted nutrients available to environmental medicine clinicians to help enhance patient outcomes.

Diet

Dietary interventions can also play an important role. In fact, eating a healthy diet can enhance detoxification and toxin elimination. A 2020 randomized three-arm trial demonstrated that participants who ate a primarily organic plant-based diet focused on vegetables, fruits, whole grains, nuts, and phytonutrients had lower levels of toxic heavy metals via hair analysis compared to participants who ate a calorie-restricted diet or those who maintained the standard American diet. [18]

Dietary fiber is a very important component of a healthy diet as it helps support detoxification organs including the gut, liver, and kidneys. Fiber also binds to metabolized toxins so those toxins can safely be removed from the body. [19]

Hydration is also key. Water is critical to virtually all functions in the human body, including to detoxification as it supports optimal liver and kidney function. [20]

Lifestyle

From a lifestyle perspective, environmental medicine clinicians will often focus on improving a patient's sleep patterns. One of the restorative functions of sleep is to enhance the removal of potentially toxic waste products that can accumulate in the brain, including beta-amyloid, which is linked to the development of Alzheimer's disease. [34]

Sweating induced by sauna use or exercise can also help encourage the release of toxins. A 2012 systematic review showed that heavy metals such as arsenic, cadmium, lead, and mercury are released via sweat from sauna heat and/or exercise. The review also concluded that these interventions are considered a safe and effective cleansing protocol. [28]

Additional resources

In addition to the therapeutic interventions listed above, there are numerous others that are beyond the scope of this guide. Fortunately, there are professional and patient resources that provide a wealth of information to clinicians who would like to incorporate environmental medicine techniques into their clinical practice.

- American Academy of Environmental Medicine
- Clinical Environmental Medicine by Walter Crinnion, ND, and Joseph Pizzorno, ND
- Environmental Working Group
- National Association of Environmental Medicine
- Planetary Health 101
- United States Environmental Protection Agency

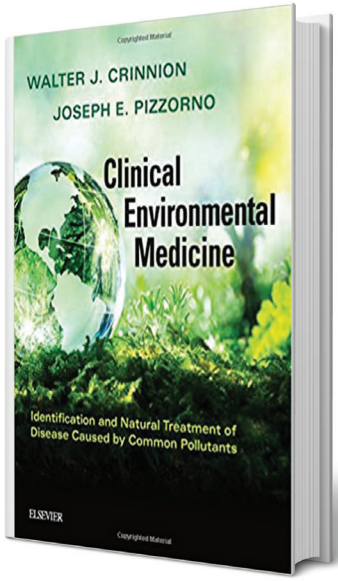
The future is here

To reverse the present environmental illness epidemic, Dr. Pizzorno states that every clinician should be able to recognize when a patient is suffering from toxic damage, assess toxin body load, and competently create protocols that decrease exposure, as well as increase detoxification and excretion.

Environmental medicine clinicians can also continue to embrace their expanding role in supporting the variety of factors that can negatively impact the body's ability to clear toxins. The following issues are covered in great detail in Dr. Pizzorno and Dr. Crinnion's *Clinical Environmental Medicine* textbook:

- Addressing overall health and wellness issues
- Assessing general organ function
- Correcting nutrient deficiencies for enhanced biotransformation, excretion, and protection
- Developing strategies to protect and enhance the gut microbiome, especially overcoming endotoxicity
- Encouraging healthy lifestyle activities such as sleep, exercise, and leisure time
- Helping patients address emotional, mental, and spiritual stressors that can impact health
- Identifying genetic polymorphisms that can inhibit detoxification
- Recommending healthy dietary choices to support optimal detoxification
- Reducing exposure to electromagnetic fields [6]

The world of environmental medicine is evolving, expanding, and becoming more important than ever before. While some clinical cases can be especially challenging, the integrative practitioner's focus on addressing the root cause of a patient's health concerns is ideally suited to this type of medicine that requires patience and persistence.



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Patient resources

Improving air quality in your home

Fullscript

Bedroom

Install a carbon monoxide (CO) alarm close to bedrooms.

Living room

Reduce the use of incense and candles.

Vacuum carpets with a high-efficiency particulate air (HEPA) filter.

Do not smoke inside.

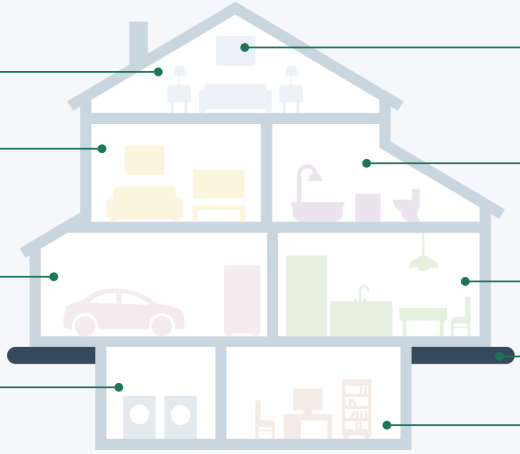
Garage

Avoid idling gas-powered machinery inside your garage.

Ensure the door between your home and attached garage is sealed properly.

Laundry room

Ensure your dryer efficiently vents air towards the outside and isn't blocked.



Windows

Open windows and doors to let fresh air inside.

Open windows and doors when exposed to VOCs (e.g., when painting)

Bathroom

Use the exhaust fan during and after you shower.

Repair damaged grout, caulking, or tiles to avoid mold growth.

Clean up and remove mold with soap and water.

Kitchen

Never use a fuel-burning grill inside (e.g., BBQ).

Below the house

Measure the radon levels in your home.

Basement

Make sure gas-fueled appliances (e.g., furnace) are well-maintained.

6 steps to finding **non-toxic personal care products**

Consult environmental organizations for guidance

Certain organizations, such as the Environmental Working Group (EWG) and the David Suzuki Foundation, offer education and free resources for consumers interested in non-toxic, environmentally-friendly personal care products.

Recognize harmful ingredients & chemicals

Inspect the ingredients list for harmful ingredients. Common ingredients to avoid include bisphenols (e.g., BPA), color additives (e.g., FD&C Blue No. 1), fragrances/perfumes, parabens, and phthalates.

Watch out for 'greenwashing' marketing tactics

Certain companies may use misleading terms such as "all-natural", "eco-friendly", and "sustainable", or include unsubstantiated claims to give the impression that their products are healthier for the consumer and the environment.

Read ingredient labels

Personal care products are required to list their ingredients in descending order of concentration. Organic ingredients are typically identified by an asterisk in the ingredients list, and seed oils and plant extracts are often indicated by their common name and scientific name.

Shop at specialized retailers

Health food stores and specialized online retailers often have high product quality standards, making them great places to shop for personal care products. Due to increased consumer demand, many major brands are also offering more non-toxic products.

Look for third-party certified products

Many third-party organizations independently analyze personal care products to ensure they meet specific manufacturing and/or ingredient quality standards. Examples include Fair Trade Certified, USDA Organic, Certified Vegan, and Non-GMO Project Verified.

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EWG's dirty dozen & clean fifteen 2021

Buying organic produce can help decrease your exposure to herbicides and pesticides. Consulting the 2021 Dirty Dozen and Clean Fifteen list can help you make healthier choices when choosing your produce. This list, released annually by the Environmental Working Group (EWG), identifies fruits and vegetables with the highest and lowest pesticide residue.

EWG's **dirty dozen**
Buy organic

Strawberries
Spinach
Kale, collard, and mustard greens

Nectarines
Apples
Grapes
Cherries
Peaches

Pears
Bell and hot peppers
Celery
Tomatoes

EWG's **clean fifteen**
Buy conventional or organic

Avocados
Sweet corn
Pineapple
Onions
Papaya

Sweet peas
Eggplant
Asparagus
Broccoli
Cabbage

Kiwi
Cauliflower
Mushrooms
Honeydew melon
Cantaloupe

✂ Cut me out and stick me on the fridge!

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