

Home Turf Disadvantage

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As a former soccer player well acquainted with the hazards of sand-based soccer fields in the rainy Northwest, I can appreciate a soccer club's frustration and desire to do something to improve playing conditions for its members. I know only too well the taste of a mouthful of muddy water and the sinking feeling of seeing a perfectly timed pass floating in a small pond halfway to its intended destination.

All across the nation, more and more high schools, colleges, and park districts are installing artificial turf fields with the hope that they will be spared skid marks, puddles, and mudbaths. While improving upon some aspects of the situation, their choice creates other far more serious negative consequences, including potentially adverse health effects. Specifically, artificial turf exposes players, park users, and neighborhood residents to known inhaled carcinogens and dangerous bacteria and introduces the threat of aquifer and water supply contamination to the area.

The Problem with the Pellets

Synthetic Turf, often referred to by brand name FieldTurf, is made up in part of recycled rubber pellets. According to FieldTurf's product information, "FieldTurf's grass fibers are surrounded and stabilized by a special blend of 'synthetic earth'—FieldTurf's patented mixture of smooth, rounded silica sand, rubber granules, and NIKE GRIND made of re-ground athletic shoe material."

The little pellets get around. They turn up in players' shoes and are visible on the field surfaces. The manufacturer of FieldTurf readily acknowledges that the pellets might be transported on shoes especially after rainfall. The pellets have also been observed in stormwater drains by Marcos Island city officials in Florida.

So what's the problem with the pellets? A study conducted last year by Dr. William Crane of the City College of New York and Dr. Junfeng Zhang of Rutgers University determined that a FieldTurf surface in Manhattan's Riverside Park contained polycyclic aromatic hydrocarbons (PAHs) and toxic metals. PAH's are chemicals created during the partial burning of, among other things, oil and gas.

In the study, the levels of 6 PAHs found in the rubber pellets were above concentrations allowed by the New York State Department of Environmental Conservation (DEC). DEC requires removal of these substances at these levels from contaminated soils because the DEC considers them hazardous to public health.

The Department of Health and Human Services Agency for Toxic Substances & Disease Registry (ATSDR) summarizes the danger: "Some people who have breathed or touched

mixtures of PAHs and other chemicals for long periods of time have developed cancer. Some PAHs have caused cancer in laboratory animals when they breathed air containing them (lung cancer), ingested them in food (stomach cancer), or had them applied to their skin (skin cancer).”

The PAH of greatest concern is benzopyrene, which was found on the artificial turf in levels 8 times greater than the DEC limit. Two researchers at the Department of Biochemistry of the University of Western Ontario have found that exposure to benzopyrene increases the incidence of breast cancer. Benzopyrene is known to be mutagenic and highly carcinogenic and has been tracked crossing the placenta and attacking DNA. It also suppresses the gene that controls cell growth and, according to Dr. William M. Bennett, M.D., Professor of Medicine at Oregon Health Sciences University, has been linked to half of all human cancers and up to 70 percent of lung cancers. Dr. Patrick Kinney, a professor of environmental health sciences at Columbia University, succinctly acknowledges the potential health risk: “PAHs, if you breathe them, have been associated with lung cancer.”

Crane and Zhang also discovered levels of zinc in excess of DEC cap guidelines and the presence of lead and cadmium. Because of the pellets’ zinc content, Rufus Cheney, an environmental chemist for the Federal Department of Agriculture, has warned people not to use ground rubber “casually dispersed on agricultural or garden soils.”

But What Happens If I Don’t Inhale?

It’s clear that the presence of lead or zinc in artificial turf “soil” is unwelcome and a potential health threat. But why should the presence of PAHs in artificial turf be of concern if the hazards associated with PAHs result from inhalation?

The FieldTurf website describes its product as having “Guaranteed resistance to sunlight (Ultra Violet radiation degradation). Resistant to rot, mold, mildew, foot traffic, hydrolysis, airborne contaminants and microbial attack.” But in her report *The Myth of Rubberized Landscapes*, Linda Chalker-Scott, Extension Horticulturist and Associate Professor at Washington State University, cautions against optimistic assessment of the permanence of rubber pellets: “Far from being permanent, rubber is broken down by microbes like any other organic product.”

Chalker-Scott adds that “Many bacterial species have been isolated and identified that are capable of utilizing rubber as their sole energy source.” Such bacteria, she explains, have been found in the cavity water of discarded tires, and some white-rot and brown-rot fungal species can detoxify the additives used in tire manufacture to kill rubber-degrading bacteria.

If the rubber can be degraded, it can enter the water supply. According to the ATSDR, it also can readily evaporate into the air from soil or surface waters. And that means it can be inhaled.

It's in the Air, It's in the Water

Although Nike contributes rubber soles to artificial turf fill, most of the rubber comes from recycled tires. The process of preparing the tires for use in artificial turf fill involves treating them with solvents to soften them or freezing them so they can more easily be broken up. Tires contain, in addition to rubber, lead, arsenic, benzene, toluene, cadmium, copper, oil, and carbon and, as a result, so does artificial turf fill.

Alison J. Draper, an assistant professor of chemistry at Bucknell University in Pennsylvania, studied the effects of tire decomposition. In her study, Draper left finely ground tire particles in water samples for ten days. All the aquatic organisms in her water samples died, including algae, suggesting strongly that aquatic communities could be gravely affected by tire runoff. The ATSDR agrees that certain PAHs can leach from the soil to contaminate underground water.

Draper believes there is also the potential for asthmatic and/or allergic reactions to rubber pellets. She explains, "We're only at the very beginning of that investigation. But, given the chemicals in tire rubber and given how readily they leach out, we can expect a respiratory response [in human beings]."

Chalker-Scott brings up still another concern: "Compared to a dozen other mulch types, ground rubber is more likely to ignite and more difficult to extinguish. In areas where the possibility of natural or man-made fires is significant, rubber mulches should not be used." When a tire burns, it generates a runoff of two gallons of oil and produces 32 toxic gases. It is hard to say exactly what would be generated by a fire on two fields full of rubber fill.

The Ick Factor

If the threats of cancer and more toxic runoff into waterways are not enough reason to get people to reject artificial turf, perhaps a flesh-eating bacteria known as MRSA will do the trick. MRSA is a drug-resistant bacteria that can infect healthy people as well as hospital patients. It infects the skin and even the heart and central nervous system. MRSA begins as a lesion on the skin and can quickly lead to serious illness and death. Unfortunately, MRSA is becoming more prevalent among college and high school athletes and can be harbored on athletic equipment.

A recent study by the Centers for Disease Control found that athletes who had suffered artificial turf burns were seven times more likely to develop MRSA infection. The reason is partly that the burns open the skin to the opportunity for infection. But many studies, most notably the study conducted by the Journal of Clinical Microbiology in 2000, have found that MRSA survives better on artificial turf than on other surfaces. Specifically, the staphylococcus survives longest, up to 90 days, on polyethylene plastic, which is a plastic used in synthetic turf fibers.

One solution to this problem is, of course, to spray disinfectant. But that introduces yet another toxin to play areas and to open wounds. With natural grass, which has inherent antibacterial properties, no spraying and no MRSA concern would even be necessary.

The Danger of Topsy Turfy Thinking

So you don't want to breathe it and you don't want to drink it. You certainly don't want it on your skin. And you don't want to be anywhere near it on a hot day because of the elevated surface temperature of artificial turf (a significant concern for a playfield used by children who are far more susceptible than adults to the dangers of heatstroke). But, despite these drawbacks and hazards, a lot of you still want to play on it.

This may be in part due to the support from a few vocal and powerful organizations. One of these is FIFA (the International Fútbol Federation), which recently endorsed the use of artificial turf for soccer. Some may take FIFA's approval as a sign that artificial turf is not hazardous.

Another powerful support for artificial turf comes from the makers and distributors of the product and their lobbyists. Their websites ignore the many scientific studies that expose the concerns about artificial turf fields and tout the use by and tacit endorsement of professional sports leagues as evidence that their products are great for children, animals, and the planet. One site, EasyTurf.com calls its product "environmentally friendly" and says, "FieldTurf is the same product being used by numerous National Football League, Professional Baseball and college sports teams for their playing surfaces. These organizations have done the research on the best turf for their stringent requirements and they have selected FieldTurf. If it is good enough for them, don't you think that it would be good enough for YOUR landscape needs?"

But the answer should, with any logic applied, be a resounding *No*. Why would professional athletic organization endorsement mean anything other than the fact that these organizations believed that the product would be good for their sports—specifically that the fields would be durable, be easy to maintain, not lead to an excessive amount of during-game injury, and be cost effective? A professional sports organization is not created to pursue the goal of safeguarding the environment and protecting human health. FIFA's primary concern is the health of soccer, and, although artificial turf may indeed be good for the health of soccer, it is clearly not good for the health of my children.

In our country, we continually fall prey to the pitfalls of our own muddled thinking about the proclamations made by figures of authority. We fail to consider what authority they actually have, in what arena and for what purpose. Time and again we apply the judicial model of *innocent until proven guilty* in non-legal contexts, such as those involving human and environmental health. We hold that a product is not hazardous to our health until scientific evidence definitively shows that it is. The pitfalls of this way of thinking are obvious. When it comes to certain substances, such as those that contain known carcinogens, I prefer to follow a different model: that of assuming something involving chemicals *is* hazardous until scientific evidence proves that it is not.

In the case of artificial turf, plenty of scientific evidence has, to the contrary, shown that it (artificial turf) is hazardous in at least three significant ways: it harbors bacterial infection, it exposes humans and animals to carcinogens, and it contaminates aquifers and drinking water. Any one of those three reasons should be more than enough to convince everyday lobbyless citizens to oppose the installation of artificial turf fields in their communities.

As far as alternatives go, the last time I checked, a field of natural grass made for a great game of soccer.