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Synthetic Turf and Crumb Rubber

Investigation of Reported Cancer among Soccer Players in Washington State

In 2009, the University of Washington Women's Associate Head Soccer Coach, Amy Griffin, became concerned that several soccer goalies had developed blood cancers at around the same time. By 2014, the coach had compiled a list of soccer players with cancer. The initial information included 30 current or former Washington residents who played soccer and developed a variety of cancer types between the mid-1990s and 2015. By 2016, the number on the coach's list had grown to 53 people.

In light of this, public health officials at the Department of Health and researchers at the University of Washington School of Public Health formed a project team to investigate issues related to soccer playing and cancer. The overall purpose of the investigation was to explore whether the information from Coach Griffin's list warranted further public health response. The primary goals of the investigation were to:

1. Determine whether the number of cancer diagnoses among the soccer players on Coach Griffin's list was higher than would be expected if rates of cancer among these soccer players were similar to rates among all Washington residents of the same ages.
2. Describe individuals on the list in terms of their demographics, factors related to cancer and history of playing soccer and other sports.

Note: The investigation was not designed to determine if soccer players in general were at increased risk of cancer due to exposures from crumb rubber in artificial turf.

Report: [Investigation of Reported Cancer Among Soccer Players in Washington State \(PDF\)](#)

Frequently Asked Questions

Can you explain the type of study conducted? What did it consist of?

We conducted a cluster investigation of reported soccer players with cancer in Washington. Generally, cancer cluster investigations are within a geographic area, and look at whether that area has an increased rate of a specific cancer compared to the rest of Washington. This investigation wasn't only geographically defined, but also defined by those who had played soccer in Washington. In that way, it's more similar to an investigation among a particular occupation group. The concern was that too many cancer diagnoses were being seen among soccer players on Coach Griffin's list so we looked to see whether the number of cancers on her lists was higher than we would expect based on Washington state rates.

Is it safe for my kids to play on synthetic fields made with crumb rubber?

Based on what we know today, the Washington State Department of Health recommends that people who enjoy soccer continue to play regardless of the type of field surface. Our recommendation is based on our investigation and the available research on crumb rubber which currently does not suggest it poses a significant public health risk. Assurances of the safety of artificial turf with crumb rubber are limited by the lack of adequate information on potential toxicity and exposure.

What about carcinogens or substances in the crumb rubber that are known to cause cancer? Should parents be concerned?

Parents should be aware, but not concerned. We know that crumb rubber is made from tires that contain chemicals that have been shown to cause cancer. However, what is critical to consider are the routes of exposure and potential dose someone receives. The available research suggests exposures from crumb rubber are very low and will not cause cancer among soccer players. The Washington State Department of Health recommends that people who enjoy soccer continue to play regardless of the type of field surface.

How can I continue to reduce my kid's exposure to chemicals in crumb rubber?

While the available research does not indicate a significant health risk, there are several ways to minimize any potential exposures to chemicals from synthetic turf fields.

- Always wash hands after playing on the field and before eating.
- Take off shoes/cleats, sports equipment and soiled uniforms outside or in the garage to prevent tracking crumb rubber into the house.
- Shower after play, and quickly clean any cuts or scrapes to help prevent infection.
- Athletes who accidentally get crumb rubber in their mouths should spit it out; don't swallow it.

Will my child get cancer if he/she plays on these crumb rubber fields?

With very few exceptions, no one knows if someone will develop cancer in their lifetime. That being said, our investigation did not find the number of cancers on Coach Griffin's list to be concerning, and the available research does not suggest that playing soccer on

artificial turf causes cancer.

Can you rule out, with 100 percent certainty, that there is nothing in the synthetic turf that can cause cancer?

No, synthetic turf fields made with crumb rubber infill do contain chemicals that have been shown to cause cancer. However, what is critical to consider are the routes of exposure and potential dose someone receives. The available research suggests exposures from crumb rubber are very low and will not cause cancer among soccer players. The Washington State Department of Health recommends that people who enjoy soccer continue to play regardless of the type of field surface.

Who did you interview for this study?

For this study, we interviewed people or parents of people on Coach Griffin's list to obtain information on demographics, cancer-related factors, and history of playing soccer and other sports.

Why did you only look at soccer players?

We focused on soccer players, because this was the original group of concern, and most of the individuals on Coach Griffin's list played soccer. A relatively small number of people played a variety of other field sports. Because cancer takes time to develop and be diagnosed, we also required a time lapse of about five months (0.4 years) between first playing soccer and diagnosis.

What would you tell communities who are considering installing a synthetic field? Or deciding not to install a synthetic field?

It is important for Washington communities to build and support environments that make it easier for adults and youth to be physically active. Physical activity can slow the increase in the proportion of adults who are obese, reduce rates of chronic disease, and improve the quality of life. The currently available research does not suggest that crumb rubber presents a significant public health risk.

How many soccer fields did you include in your study?

We did not do any testing of soccer fields. We did interview people on Coach Griffin's list reported to us as having cancer and having played soccer. The interviews revealed that the 35 people interviewed had practiced on about 110 soccer fields in Washington.

How does Washington compare with the other states regarding rates of cancer in ages five through 24?

During 2009–2013, the age-adjusted cancer incidence rate for all types of cancer combined among people ages five to 24 years was statistically significantly higher in Washington than in the United States (23.6 and 22.4 per 100,000 people, respectively), so our age adjusted rate has about 1.2 more cancers per 100,000 than nationally.

Why did you limit the time period for people meeting the case definition to 2002–2015?

We limited the time period for people meeting the case definition to 2002–2015 because reports of people with cancer on the coach's list were more likely to be complete during this time period than in earlier time periods. The only person who was diagnosed with cancer before 2002 was diagnosed in the mid-1990s before artificial turf fields with crumb rubber fields were installed in Washington.

Why did you limit the case definition to people who were ages six to 24 years?

We limited the case definition to people who were ages six to 24 years when diagnosed because processes leading to the development of cancer are often different for children and adults. Most cancer investigations and research focus on children and adults separately, with children defined as under ages 15 or 20 years old. We opted to include people diagnosed up to age 24 years because we wanted to include as many people as possible in the case definition without becoming so inclusive that it would lessen the potential to find a problem if one existed. This age group included about 70 percent of people reported to our team.

Did you find that any one position, e.g., goalies, had an increased number of cancer diagnoses?

Our investigation explored whether there was an increased number of cancer diagnoses among soccer players on Coach Griffin's list compared to what we would expect if soccer players experienced the same cancer rates as Washington residents of the same ages. We were able to look at all people on the list with a history of playing soccer, as well as goalkeepers on the list and neither group had an increased number of cancer diagnoses.

Why didn't you look at expected cancers among players on crumb rubber turf fields?



To be able to look at the expected cancers among players on crumb rubber turf fields, we would have had to be able to identify who the soccer players were overall who had played on turf fields. We had no way to assess this. We did look at select and premier players on Coach Griffin's list to see if they had an increased number of cancer diagnoses compared to what we would expect, but they did not. We hypothesized that they likely had longer playing experience and would have greater exposure to crumb rubber.

Resources




Research on crumb rubber synthetic turf fields is ongoing. Several national agencies are coordinating [Federal Research on Recycled Tire Crumbs Used on Playing Fields](#) ↗ .

The following research are some of the key studies that we have reviewed.




U.S. Environmental Protection Agency

- [A Scoping-Level Field Monitoring Study of Synthetic Turf Fields and Playgrounds \(PDF\)](#) 
- [Federal Research on Recycled Tire Crumb Used on Playing Fields](#) 



California

- [Evaluation of Health Effects of Recycled Waste Tires in Playground and Track Products \(PDF\)](#) 
- [Chemicals and Particulates in the Air Above the New Generation of Artificial Turf Playing Fields, and Artificial Turf as a Risk Factor for Infection by Methicillin-Resistant Staphylococcus Aureus \(MRSA\) \(PDF\)](#) 
- [Safety Study of Artificial Turf Containing Crumb Rubber Infill Made from Recycled Tires: Measurements of Chemicals and particulates in the Air, Bacteria in the Turf, and Skin Abrasions Caused by Contact with the Surface \(PDF\)](#) 



Connecticut

- [Examination of Crumb Rubber Produced from Recycled Tires \(PDF\)](#) 
- [Human Health Risk Assessment of Artificial Turf Fields Based Upon Results from Five Fields in Connecticut \(PDF\)](#) 
- [Artificial Turf Field Investigation in Connecticut \(PDF\)](#) 




New York

- [Air Quality Survey Of Synthetic Turf Fields Containing Crumb Rubber Infill \(PDF\)](#) 
- [An Assessment of Chemical Leaching, Releases to Air and Temperature at Crumb-Rubber Infilled Synthetic Turf Fields \(PDF\)](#) 

Netherlands

- [Nitrosamines released from rubber crumb \(PDF\)](#) 
- [Evaluation of health risks of playing sports on synthetic turf pitches with rubber granulate \(PDF\)](#) 

Norway

- [Measurement of air pollution in indoor artificial turf sports halls \(PDF\)](#)  
- [Artificial turf pitches – An assessment of the health risks for football players \(PDF\)](#) 

Other Studies

- [Environmental and Health Impacts of Artificial Turf: A Review. *Environmental Science & Technology*](#) [↗](#) . An article abstract (not open access), 48(4):2114-29, Cheng H, Hu Y, Reinhard M. 2014.
- [Review of the Human Health & Ecological Safety of Exposure to Recycled Tire Rubber found at Playgrounds and Synthetic Turf Fields.\(PDF\)](#) [↗](#) . A 2013 document produced for the Rubber Manufacturers Association by the consulting firm Cardno ChemRisk.
- [Federal Research Action Plan on Recycled Tire Crumb Used on Playing Fields - EPA](#) [↗](#)