Synthetic Turf: Health and Environmental Risks and Benefits

Glen Ridge Board of Health

October, 2013
Disclosures and Disclaimers

We have no relevant financial relationship with the manufacturer of any commercial product and/or provider of commercial services discussed in this presentation.

Our conclusions are based on an assessment of more than 25 of the many reports on synthetic turf safety, with a focus on peer-reviewed scientific articles and city, state and federal government reports.
Particular Thanks To

• Joel Forman, MD – Mount Sinai School of Medicine
Survey Criteria

• Synthetic turf has been used since the 1960’s
• In the 1990’s, crumb rubber turf was introduced and became a leading synthetic turf product
• Most of the relative available literature on health risks deals with crumb rubber turf
• Alternatives to crumb rubber are relatively recent and there are limited data addressing potential health risks
Crumb Rubber Turf

Infill

- Vulcanized Rubber
  - SBR - Styrene-Butadiene-Rubber (recycled tires)
  - EPDM - ethylene propylene diene monomer (M-class) rubber (usually new)
- Volatile Organic Compounds
- Hydrocarbons
- Unpredictable/unknown components from recycled tires

Blades of ‘grass’

- Nylon
  - Noted to have lead in several tests of fields in NJ
- Polyethylene
  - Lead generally not found

Most fields installed now only use polyethylene blades

This can be written into the contract
Alternative Infill Materials

- TPE – Thermoplastic Elastomers
  - Known, ‘safe’ plastics
  - Predictable size/shape
- Ecofill
  - Sand
  - Cork products
  - Coconut husks
  - Lab-tested to 35 degrees cooler than crumb rubber

Potential Adverse Health Effects of Synthetic Turf

- Exposure to Toxins
  - Breathing
  - Contact – Skin or mucous membrane irritation and absorption
  - Ingestion - hand to mouth
- Injuries
- Infections
- Exposure to High Temperature
  - Burns
  - Dehydration
Toxins

• Several studies suggest that concentrations of air particulate matter and metals at the synthetic turf site with high play activity are higher than background levels but below national air quality and lead standards.
• Studies to determine levels of a number of volatile organic compounds have not detected unsafe levels of those compounds.
• Studies do not point to obvious environmental risks (air, water).
• Unknowns: Black carbon effects
  Other volatile organic compounds
Injuries

• Evidence does not support an increase in serious injuries on synthetic turf compared to natural grass (some studies suggest serious injuries more prevalent on grass)

• There is evidence of increased incidence of abrasions ("turf burns") on synthetic turf, particularly in contact sports, e.g., football

• Such abrasions are susceptible to infection
MRSA

• Anecdotal evidence has been cited to suggest an association between synthetic turf and MRSA (methicillin-resistant *Staphylococcus aureus*)

• Comprehensive studies do not support that association

• Athletes should not share towels and equipment, a more likely source of infectious outbreaks
High Temperature

- Many studies point to exceptionally high temperatures on synthetic turf, especially on hot, sunny days
- Watering field provides very short-term relief
- Health risks are heat stroke, muscle cramping and overall athlete fatigue
- New infill materials are claimed to reduce field temperatures (but long-term safety data not yet available)


http://plantscience.psu.edu/research/centers/src/documents/temperature.pdf
<table>
<thead>
<tr>
<th>Surface Material</th>
<th>Injuries</th>
<th>Infections</th>
<th>Elevated Temperatures</th>
<th>Exposures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grass</td>
<td>More serious injuries?</td>
<td>No</td>
<td>No</td>
<td>No* (*pesticides)</td>
</tr>
<tr>
<td>Synthetic turf (crumb rubber)</td>
<td>Overall, more injuries in football, but not soccer</td>
<td>There is a correlation between turf burn and infection. But there is no increase in MRSA with turf.</td>
<td>Yes</td>
<td>Lead – from paint – can be stipulated not to use. Black Carbon – unknown risk. Volatile Organic Compounds – we don’t know what we don’t know. No leeching into water supply. At present, no known increased risk of cancer.</td>
</tr>
<tr>
<td>Alternative Infills</td>
<td></td>
<td>May be ameliorated with cork</td>
<td></td>
<td>Exact composition of infill is known</td>
</tr>
</tbody>
</table>
Continuing Health/Safety Concerns

- Heat issues very clearly demonstrated
- Compelling need for increased sports field access, but will synthetic turf really increase access (heat issues)?
- Alternative infills might reduce temperatures but their safety has not been established

- Increased abrasions may lead to more infection
- Chemical and toxin exposure from recycled tire infill not adequately investigated
- Continuing unknowns, e.g., Black Carbon, volatile compounds not currently identified
Balancing Act

Benefits

- Field Use
- Physical Activity
- Obesity
- Water Conservation
- Carbon Footprint?
- Use for Recycled Tires

Risks

- Local Heat Effects
- Toxic Exposures on Fields?
- Toxin Exposures Disbursed from Field?
- Environmental Heat Effects?
- Ecosystem Impact (runoff)?
- Long-term Health Effects?
Tips for Safer Use of Synthetic Turf:

- Do not use the turf fields on extremely hot days.
- Be sure to clean and monitor any “turf burns” obtained while playing.
- Attempt to remove all pellets from shoes and clothes prior to leaving the fields.
- At home, shake out your children’s equipment and clothes in the garage or over the garbage.
- Have your child shower and wash thoroughly after playing on the field.
References

Toxins:
• [http://eohsi.rutgers.edu/files/Pavilonis%20et%20al%202013.pdf](http://eohsi.rutgers.edu/files/Pavilonis%20et%20al%202013.pdf)
• [http://www.slocounty.ca.gov/Assets/PH/CLPPP/Lead+Levels+in+Artificial+Turf.pdf](http://www.slocounty.ca.gov/Assets/PH/CLPPP/Lead+Levels+in+Artificial+Turf.pdf)
• [www.mdpi.com/2071-1050/2/1/294/pdf](http://www.mdpi.com/2071-1050/2/1/294/pdf)

Injuries:
• [ajs.sagepub.com/content/40/5/990.short](http://ajs.sagepub.com/content/40/5/990.short)
• [http://turf.uark.edu/turfhelp/archives/021109.html](http://turf.uark.edu/turfhelp/archives/021109.html)
References

Infections, MRSA
- [http://turf.uark.edu/turfhelp/archives/021109.html](http://turf.uark.edu/turfhelp/archives/021109.html)

High Temperature
- [http://turf.uark.edu/turfhelp/archives/021109.html](http://turf.uark.edu/turfhelp/archives/021109.html)
- [http://plantscience.psu.edu/research/centers/ssrc/documents/temperature.pdf](http://plantscience.psu.edu/research/centers/ssrc/documents/temperature.pdf)
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