

**Lauren 00:10**

LDA's Healthy Children Project advocates for safer products and healthier food, water, and air that are free of chemicals that harm children's brain health. In this episode we're focusing on safer options for bug repellents. Please note that LDA does not endorse any products or services.

**Tracy Gregoire 00:27**

Hello everyone. I'm Tracy Gregoire, the Director of the Healthy Children Project and today I have Sydney Cook, the Director of Science and Research at MADE SAFE. MADE SAFE provides America's first comprehensive health and ecosystem focused certification for nontoxic products. Products carrying the MADE SAFE seal ensure that no known or suspected toxic ingredients are used in their production, giving shoppers comfort that products do not contain ingredients that are known to be unsafe for use on their bodies, with their families, and in their homes. Sydney has been the MADE SAFE for over six years as a Director of Science and Research, she manages MADE SAFE screening by working with our team of ingredient researchers and MADE SAFE's advisory board of area-specific experts. Sydney also researches all aspects of ingredients and materials, including human and environmental toxicity, manufacturing process, and contamination risks.

**Tracy Gregoire 01:38**

Today we are talking about insect repellents. People use repellents for all sorts of insects including mosquitoes and ticks to protect themselves from insect-borne diseases like Lyme. It is important to talk about the options for types of bug sprays, and how to best protect ourselves and lessen our exposure to harmful chemicals when we can. What most people don't know about bug sprays are that the active ingredients are pesticides. Many people have heard about DEET. Sydney, can you share some information on DEET and possible health effects with our listeners?

**Sydney Cook, MADE SAFE 02:11**

Sure. What's tough about DEET is that it's one of the most effective bug repellents. It's also recommended by the CDC for ticks and since it works people love to use it. The problem is that there are some concerns with DEET to be aware of. So large doses of DEET have been linked to skin blisters, seizures, memory loss, headaches, and skin irritation. DEET is also linked to neurotoxicity. It's been found to inhibit cholinesterase, which is an important neurotransmitter. In rat studies of chronic applications of DEET alone and when mixed with permethrin, which is another bug spray active that I'll talk about a little later, led to neural cell death in various parts of the brain. And the collective effects of impairing these parts of the brain may lead to physiological and behavioral differences, especially with motor skills, learning, and memory dysfunction. And another study also found that when DEET and permethrin were mixed together, the mixture was linked to disease in the offspring of exposed adults. So this could partially be due to DEET's ability to cross the placenta. In animal studies, DEET was found in the fetus and in newborns after exposing the mother to the chemical. DEET is also absorbed quickly through this skin. One study showed that 48% of the applied dose is absorbed within six hours. And when you mix it with some sunscreen chemicals, it's absorbed even more quickly. And lastly, last but not least, when it comes to the environment, DEET breaks down really slowly in soil. And it also has the potential to contaminate groundwater. It has actually been detected in groundwater, surface water, and drinking water.

**Tracy Gregoire 04:04**

Thanks Sydney. Are there other common pesticides that people should be aware of?

**Sydney Cook, MADE SAFE 04:11**

Another common class of bug spray actives are called pyrethroids, which are synthetic pesticides. Many pyrethroids are lipophilic, which means they really love to stick to the fat cells in our body, and many of them can easily cross the blood-brain-barrier and so they can become toxic to our central nervous system. The World Health Organization has actually said that synthetic pyrethroids are neurotoxicants. There are some acute reactions to pyrethroids, things like dermatitis, asthma-like reactions, but the most severe poisoning cases have unfortunately been reported in infants because their systems can't really efficiently break down pyrethroids well and some pyrethroids have been linked to endocrine disruption and have been classified as carcinogens. One of the most common pyrethroids is called permethrin and permethrin is used to repel both mosquitoes and ticks. It's most commonly used to treat bug resistant clothing, things like outdoor gear, mosquito netting, but it's also commonly used in sprays and it is actually one of the most commonly used worldwide pesticides for crops. Permethrin is associated with neurotoxicity. Additionally, like I mentioned before, one study that found permethrin and DEET used either in combination or separately were linked to the death of neural cells in various parts of the brain. Another study found that newborn exposure to permethrin impaired working memory by interfering with neural processing in the frontal lobe of the brain. When consumed orally, permethrin is considered a likely carcinogen by the EPA. To be clear, permethrin is not used orally for repelling insects, but it just means that more research is needed on carcinogenicity when exposed to the skin in light of that research. And then finally, when it comes to the environment, permethrin is toxic to fish, aquatic life, and our important pollinator friends, the bees. So it's really tough on our environment.

**Tracy Gregoire 06:25**

Thanks, Sydney. LDA works on protecting children's brain health. Certainly any neurotoxicity is of particular concern, but also knowing the other possible health effects and effects on the environment is really important. And in order for people to make informed decisions when they're choosing the products for their families. I also know there are a lot of inactive ingredients and you know, Healthy Children Project and I know MADE SAFE works on this, like a lot of those inactive ingredients aren't necessarily on the labels and don't necessarily have to be on the labels. What are some of the other ingredients in bug sprays that people should know about and stay away from, if possible?

**Sydney Cook, MADE SAFE 07:13**

In addition to the actual bug repellents in the sprays, there are lots of other ingredients in bug sprays too, things like solvents, preservatives, fragrances. So when choosing a bug spray, it's important to consider the toxicity of those substances too where you can. One tricky thing about insect repellent is that they're regulated like pesticides. So this means that only the active ingredients need to be disclosed on the packaging, and all of the other inert ingredients can be withheld. So the problem with this is that numerous inert ingredients are problematic for human health and or the environment. And with that lack of disclosure, it makes it essentially impossible for you to know you and your family are being exposed to. As much as possible, at MADE SAFE we recommend choosing products where 100% of the ingredients are disclosed. When those ingredients are disclosed, we have a really good

resource on our website that you can use to check them. It's called the MADE SAFE Banned and Restricted List. And it's a list of over 6500 toxic substances compiled from authoritative sources from around the world. And it includes numerous different toxicity endpoints, including environmental and human health. And substances on the banned list are not typically permitted in certified products. So it's a really great resource for you to kind of easily check those inert ingredients on the back of the packaging to see if they're a better option.

**Tracy Gregoire 08:52**

Sure, wonderful. It's great to have resources and be able to look up information. Now that we've covered concerns around ingredients and bug sprays, let's talk about some of the safer alternatives. Right, as a mom, I want to know, what are some of the safer alternatives for my family? Can you cover some of those alternatives for folks?

**Sydney Cook, MADE SAFE 09:14**

Yes, absolutely. Let's talk about the good stuff. So there are a number of safer bug spray options. First I'll talk about three essential oil options. So the first one is clove. In a study that tested the efficacy of five different oils, and those oils in various combinations, clove was found to be one of the two most effective alongside thyme, specifically for mosquitoes. It was most effective when mixed with other oils like geranium and thyme and when mixed with those two specifically, that mixture protected against mosquito bites for two and a half hours. Another essential oil option to consider is lemongrass. One study found that lemongrass oil was 74% and 95% effective against two different mosquito species for two and a half hours. And lastly is thyme. As I mentioned, thyme was considerably one of the most effective mosquito repelling essential oils alongside clove. And one study found it to provide 1.5 to 2.5 hours of protection against repelling malaria and yellow fever vectors, clove was affected for about 60 minutes. There's a fourth option called oil of lemon eucalyptus. It sounds like an essential oil option. But that's not exactly true. It can be naturally derived but it's most often synthetically produced. When it's synthetic, it's often called PMD. And it's a safer synthetic over DEET and it's very highly efficacious. The CDC endorses the use of it as an effective bug repellent for mosquitoes and for ticks.

**Tracy Gregoire 11:03**

Wonderful. Yeah, this reminds me of sunscreens, like we tell people you need to apply sunscreens often, right? You can't just put it on once and be done with it. So if people are doing a long hike or are outside, you know, the reminder that some of these effective bug sprays do need to be reapplied, right, after a certain period of time to kind of get the most benefit from these bug sprays.

**Sydney Cook, MADE SAFE 11:35**

Absolutely. Especially with the essential oil-based sprays, reapplying is key.

**Tracy Gregoire 11:48**

I know some people use products with essential oils as bug deterrents. What can you share about making some of these products like the DIY, the do it yourself products, that people might make in their homes?

**Sydney Cook, MADE SAFE 12:05**

One thing to know about natural options is that just because they're natural doesn't mean they are the right option for you. Some people are really highly sensitive to essential oils. So it's always a good idea to do a patch test to check for sensitivity and irritation. And then if you are somebody who knows that you're sensitive to different essential oils, you should always talk to a doctor about using essential oils. And we always avoid, we always recommend avoiding any botanical ingredients that you know you're sensitive to. Essential oils are also incredibly potent, so they must be diluted properly. For that reason, at MADE SAFE we recommend either buying premixed bug spray that contains essential oils or doing a lot of research before you DIY. With a premixed bug solution, you have the peace of mind it has been properly diluted. When you're DIYing, because essential oils are so potent, they're usually used in really small concentrations, so just do your research to make sure that you're using them in correct concentrations. Also, when it comes to an essential oil-based repellent or really any repellent, it's important to know your area and know your family. Know where you are and what you're at risk of. So whether that's Zika, malaria, dengue fever, Lyme or just very pesky, irritating bug bites. Either way, essential oil-based bug repellents are great for casual settings to diminish bites, but they can't prevent diseases. So with the rise of mosquito borne illnesses, we always recommend talking to a health care professional about which bug repellent options are right for your area, and making sure that you're choosing an option that's efficacious for what kind of bites you're trying to prevent. And lastly, always make sure that you choose an age-appropriate bug solution. So not every bug spray active is right for a child of every age. So make sure you read the manufacturer guidelines on the back of the packaging to find an age appropriate option for you.

**Tracy Gregoire 14:12**

Thank you. Always good reminders to think about your family and also know your area. Know what, you know, mosquito is the main thing, do you have ticks? Are you in an area like I am where there's the possibility of Lyme and other tick borne diseases? So doing some of that research is really important so you can pick the right product for your family. I know there are some other ways for people to protect themselves from bugs and insect-borne diseases. What are some of the other alternatives to bug sprays and are they effective?

**Sydney Cook, MADE SAFE 14:50**

Now there are lots of effective tips for avoiding bites for mosquitoes. Choosing long pants and sleeves, especially made of thick fabrics. Mosquito netting when you're feeling like you're in a setting where you can, you know, don some mosquito netting. Staying indoors around dawn and dusk, that's when mosquitoes are worst. One of my favorite tips is to use a fan. Mosquitoes have a hard time landing in the wind, so an overhead fan can help keep bugs away. You can also consider using a tabletop fan but then placing it on the ground instead, as a lot of mosquito species actually like to hang out around near the ground, which you've probably noticed from all of the bites on your legs. And then when you can skip conventional bug spray formulas that mix together DEET and conventional sunscreen chemicals like oxybenzone. Instead, we recommend one option to consider is choosing zinc oxide-based sunscreen with one of the safer solutions we've discussed here and applying them separately. For ticks, it's important to know where you'll find them. So usually grass, brush in the woods. For that reason, it can be helpful to stay on really well trodden trails, to staying in the middle of the trail, staying away from the edges when you're hiking just to avoid contact with areas that might have ticks. And then once you get home, make sure you're checking your clothing for ticks pretty much immediately after coming

indoors. If you want to be extra safe, you can wash your clothes right away in hot water or run them in the dryer for 10 minutes to kill ticks. You can also consider taking a shower. The CDC says that showering within two hours of coming home reduces your risk of getting Lyme disease, which is a really helpful tip. And then finally, the shower is a perfect time to check yourself for ticks. So really focus on those areas that they like to hide, you know, in your hair, under your arms, behind your legs, etc.

**Tracy Gregoire 17:07**

Yeah, absolutely. I know, my son's a teenager now. But just starting when he was really young, like teaching him how to check himself for protection, you know, in the shower in the bath, right, and just having a part of the routine during those months that ticks are more common. And certainly, I know in Maine, it's getting warmer for longer periods of time and you know, even in the spring and then into the fall, right? Doing those tick checks, it's very important. I know there are some other alternatives as well, such as foggers and coils. Can you share some of those options? And some of the cons in terms of using foggers and coils or other means of reducing our exposure to insects?

**Sydney Cook, MADE SAFE 18:35**

Options that don't go on your skin aren't necessarily safer. And coils and candles, and foggers too, can release fumes that are harmful to your health. So for example, mosquito coils have been found to contain formaldehyde, which is a known carcinogen, and other volatile chemicals. Foggers really often use pyrethroid pesticides, which is that class of bug spray repellent actives that I talked about earlier, which I think are best avoided when you can. And then things like candles, they really haven't been shown to be particularly effective. And since there's a wide range of chemicals found in bug candles, there's a wide range of substances that you can be exposed to that are volatilizing in the air while you're burning them, so you're breathing them in. So while these options are really tempting, because they don't go on the skin, if you can choose safer options, that's what we recommend at MADE SAFE.

**Tracy Gregoire 19:52**

Thank you. Yeah, I have family members that, when they were younger, just were very sensitive to even just the buzzing of insects like mosquitoes by their head, or just worried about things like landing on their skin. And I know I've been tempted by those bug zappers, like, hey, you know, it seems like there's some proof that they actually do, you know, zap bugs and you can kind of see in the video when they're advertising them, you know, bugs that were caught by them. But I also know that they don't necessarily work well. Can you share a little bit about bug zappers and the cons with those devices?

**Sydney Cook, MADE SAFE 20:44**

Yeah, so some people go to bug zappers, because they're a non-chemical option. Sounds really great in theory, and some of the marketing around these, like you said, is really tempting. But there are unfortunately some problems with them. So first of all, bug zappers do kill a lot of bugs. But the problem is, is that they're not really killing mosquitoes, which is the whole reason why we buy them, right? So in analysis of bug zappers, only a really small percentage of the bugs killed were mosquitoes. So instead, it was mostly good bugs, the bugs that increase necessary biodiversity, bugs that are an important part of our food chain, and even some pollinators like moths, and others were killed, too. So interestingly, it's pretty much unanimous by bug experts in the US that bug zappers are a kind of a waste of money for

one reason or another. But nonetheless, they're still on the market. So do your research and you know, read about the efficacy and you can decide for yourself, but I like to take their advice and skip those.

**Tracy Gregoire 21:53**

Thank you. Certainly a lot of information that you shared with us today. I think it's so important that people have the information, follow the science, and you know, then make informed decisions for their families, because I know we all want to protect our families, and you know, do what's best. So I really appreciate all the information that you shared today. Can you give us, you know, a quick recap of the highlights?

**Sydney Cook, MADE SAFE 22:20**

Yeah, absolutely. So first of all, read the labels to know the ingredients. And if you are reading a label and you notice that not all of the ingredients are disclosed, you might consider choosing another option. Skip DEET and permethrin where you can. If you are looking for a natural option, consider clove, lemongrass, thyme or naturally extracted oil of lemon eucalyptus. If you're considering a safer synthetic, you could consider the synthetic version of oil of lemon eucalyptus which is called PMD. Also learn about alternatives that you can try out. Things like using a fan, wearing the right clothing, showering when you come home, checking for ticks. You can also check out [madesafe.org](https://www.madesafe.org) for certified products including bug sprays, and tons of non-toxic living guides. And then last but not least, know where you live. Know your family. Read about the options and decide what the right option is for you and your family.

**Tracy Gregoire 23:28**

Thank you so much Sydney. The Healthy Children advocates for safer products and healthier food, water and air that are free of chemicals that harm children's brain health. If you found this information helpful, please share this podcast. You can check out our website at [healthychildrenproject.org](https://www.healthychildrenproject.org) and MADE SAFE's website at [madesafe.org](https://www.madesafe.org). Thanks again, Sydney for joining us today.

**Sydney Cook, MADE SAFE 23:54**

Thanks so much for having me. Appreciate it.