

Gus: You're listening to Brains On. Where we're serious about being curious.

Brains On! Is supported in part by a grant from the National Science Foundation

(outside sounds, birds)

Gus: Bob! Over here! Wow, you made it!

Bob: You sound so surprised,

Molly: Well, when we planned to have a socially distant picnic in the park, we weren't sure you'd feel comfortable.

Bob: Oh I'm very excited to see you all — and don't worry, I brought my measuring tape (measuring sounds) to be sure we stay 6 feet apart. So I'll set up right here! (blanket whoosh)

Molly: So, how have you been?

Bob: Well, I haven't been out much — safer at home, you know.

Gus: Right. But you were taking walks for a while, right?

Bob: Yeah, that kind of fizzled out. You know what I've been doing lately, is making popsicles.

Molly: Oh of course! What flavors?

Bob: Well, since i'm staying home I've just been using things I have around — so, pasta water popsicles,

Gus: Wow, that sounds kinda bland, Bob.

Bob: I prefer to think of it as soothing. Another one of my favorites is toothpaste

Molly: That sounds awful.

Bob: Oh it is. Not recommended. I was feeling kinda funky last week, so I made a couple with cheese rind flecks! I might add coffee grounds to my next batch for some texture, too.

Gus: Bob, you might want to think about getting out a little more. Some new ingredients might be good.

Bob: I mean, I know, but I'm doing OK with the ingredients I have, and, I just feel so worried about, you know, being around people.

Molly: Yeah. It's a lot to handle. If you want, I can drop off some new ingredients for you next time I go to the store — you can send me your requests, and I'll leave them on your doorstep so we can keep far apart, too.

Bob: Oh wow, that would be great, Molly! Imagine the possibilities! Rhubarb! Nectarine! Vegetable Bullion! Yum!

(Theme music plays)

Molly: You're listening to Brains On from American Public Media. I'm Molly Bloom and we're back today with our co-host Gus!

Gus: Hi, Molly!

Molly: Hi, Gus! Gus lives in Seattle. And he has been our co host for all of our episodes about this pandemic we're living through. So Gus, how is it going?

Gus: I'm doing fine.

Molly: So does summer feel different?

Gus: Well, not really. I mean, the only differences are, here in Seattle, it was like rainy for most of the summer until now. And I don't have any summer camps. So those are the only differences.

Molly: So what have you been doing to have fun and keep busy?

Gus: Um, well, sometimes I go to my backyard, and wax sticks against stuff. Um, I got a blister from doing that the other day, and like to ride bikes, and I'm doing more screen time than usual.

Molly: Tell me about the whacking sticks against stuff.

Gus:

Um, well, I have this bamboo stick that I've had for a few years and I just, yeah!

Molly: So you're just whacking it against stuff. Yeah. So Gus, what is like some of your favorite things to hit with this stick?

Gus: Well, my favorite thing for sure is dandelion stems because when you hit those with a stick, it comes off so clean that it looks like you literally snipped it with scissors. It's like they're like, really stiff, but really, like, easy to chop down. So it's really satisfying when you wack 'em.

Molly: Excellent. So what does it sound like?

Gus: Yeah, it makes a (whoosh)

Molly: So besides your newfound love of stick whacking, does the summer feel any different than the school year when you were doing distance learning?

Gus: No, there's no difference at all.

Molly: So it's just like, you're in May in the school year, and now you're in July in the summer, and they're kind of the same.

Gus: Exactly.

Molly: So you're bike riding, Where has your bike riding taken you?

Gus: Um, well, I do it within like a nine block radius, sometimes 12 blocks, I just bike in like a weaving pattern around these nine or 12 blocks in my neighborhood.

Molly: What has been hard about this summer?

Gus: Mostly just not seeing friends, but I also like not seeing friends at the same time. I like not seeing people but I don't like not seeing friends.

Molly: Mm hmm. So you're okay staying home but you would like to see your friends.

Gus: Yes.

Molly: Have you been doing any distance visits with anyone? Or are you pretty much just staying home?

Gus: Yes, I actually have been. Un the winter, me and my friend jack would do rain walks together and these days I play games with my friend Henry in his backyard.

Molly: It's been almost five months since our first episode about this new Coronavirus that's had a big impact on the whole world.

Gus: And sometimes it feels like we're all alone -- it helps to remember that literally everyone is dealing with this in some way right now. Teachers...

Molly: Bakers...

Gus: Stunt car drivers...

Molly: Pineapple farmers...

Gus: Hot sauce testers...

Molly: Magicians...

Gus: Accountants...

Molly: Beyonce...

Gus: Everyone. So none of us are truly alone.

Molly: And scientists around the world are doing amazing work. They're learning so much and sharing it with each other to help protect us all from this virus. We've learned a ton in a short amount of time. Of course, you all have been sending in your questions too. And a lot of them have to do with how this virus spreads.

My name is Santo from Philadelphia. My question is how did the Coronavirus germs travel?

Hi, my name is Samuel from California. And my question is how does Coronavirus spread?

My name is Lucy from Minneapolis, Minnesota, and, why do we have to wear masks?

Hi my name is Anna and my name is Lucy and we're from San Diego, California. Our question is how to masks prevent the coronavirus from spreading?

Molly: Producer Menaka Wilhelm looked into the latest info to help us answer these questions.

Menaka: I did! And first, I want to say, knowing what to do about coronavirus these days can feel confusing and frustrating. It can seem like the information keeps changing on us! But there's a good part of that, too: it means we're learning more. In a way, we're watching science happen live— teams of scientists all around the world are studying, and learning, and checking each others' work. That's how science has worked for centuries.

Menaka: To give you an example, let's talk about the sun and the planets. We know now that the earth and all the planets move around the sun — but in the early days of astronomy, lots of people thought the sun revolved around Earth!

Ancient Greek Human: Well, the sun rises on one side and sets on the other, so it must go around us!

Menaka: As more and more people observed the sky, and interpreted what they saw, it became clear that the Earth moves around the sun, not the other way around. A lot of different people did a bunch of work to figure that out. And they had to miss a couple shots before they could get to the slam dunk facts we know now about space.

Menaka: So that's what scientists are doing now, as the world watches. Researchers are looking at what's happening with the coronavirus, and interpreting what they see.

Gus: And when they learn things, we're learning about them too.

Menaka: Yeah! Every time new information comes out we're getting a more complete picture of this virus, what it does, and how to protect ourselves and the people around us. So it may feel hard to keep up, but all these updates are good. They're a sign that we're learning.

Molly: So what have scientists learned about how this coronavirus spreads?

Menaka: The main thing researchers have found is that this coronavirus spreads from person to person — it doesn't seem to spread in food, and while it can live on surfaces, touching things doesn't seem to be a big way that people get sick.

Molly: So we should still wash our hands though, right? To be safe?

Menaka: Oh, definitely, yes. It's good hygiene and a great way to protect yourself from germs in general. One scientist I talked to about this coronavirus is Linsey Marr. In her lab at Virginia Tech, she studies how viruses move around in air. And she says that's a big way this virus gets around.

Linsey Marr: When people talk or cough, they release droplets. Sometimes you can see the large ones, but there's also hundreds of times more that you can't see, because they're too small. And those can contain virus if someone is infected.

Menaka: So, basically, when we laugh, or exhale, or sing — anytime air comes out of our mouths or noses, really, a bunch of these little tiny droplets fly out of our faces. They're too tiny to see. But it's like...a super small spray from your schnozz! Or, a cloud emanating from your cakehole! Dinky lil' drizzles of drool! Itty bitty spit storms! I'm getting carried away! Anyway, all these little bits from our breath, our spit, and our snot make an invisible cloud around us. I'm gonna call that our mouth mist.

Gus: And some of the bits in our mouth mist are spit, but they're a mix of other things, too, right?

Menaka: Yeah! Some of the droplets you exhale out come from all the way down in your lungs. They'll have proteins, and salts in them — things that came from your inside body. And scientists have found that if someone has the coronavirus, it can hang out in their mouth mist.

Molly: So everytime we exhale, little bits from our insides make it out into the world, and those bits seem to be the main way the coronavirus spreads from person to person.

Menaka: Right. And the coronavirus also has a major trick up its sleeve: it can spread from people who don't feel sick. Some people feel just fine, and they still have virus bits in their mouth mist. But now that we know both of those things, we can figure out ways to stop the coronavirus from jumping from person to person.

Menaka: First, we can keep distance from each other. Because if you're right next to someone who happens to be infected, you might end up breathing in little bits of their mouth mist.

Linsey: But as you get farther away from them, that becomes much more diluted. Like if you're close to a smoker, you're going to breathe in more of that cigarette smoke, but if you get farther way you'll, you'll breathe in a lot less.

Menaka: So keeping distance from other people is a very good idea. If someone is feeling a little close to you, it's totally OK to say nicely, Hey, can I have a little space? The coronavirus eventually shrivels up and dries out if it can't find a human's nose, mouth, or eyes to jump into. So by keeping distance you're not giving it anywhere to go if someone exhales it... or coughs it... or sneezes it out.

Menaka: Another good idea is spending time outside. If you're going to do a socially distant hang with someone, it's way safer to spend time together outdoors. Sunlight and heat make the coronavirus shrivel up and dry out quicker. But mostly...

Linsey: It's a much huger space, we have the whole sky that the droplets can move into versus indoors, if you they can just kind of be trapped and sit there and build up.

Menaka: Sometimes, we do still have to be inside. And being inside with your family is totally fine. But if you're indoors with people outside your family, like at a store -- all that mouth mist can hang in the air -- which is not good. What is good is opening windows and doors so fresh air can blow some of that mist away. And if you do need to be inside, there's a great way to keep our mouth mist to ourselves all the time. Covering up our face holes!

Linsey: the masks, cloth masks especially, can be very good at blocking droplets that come out of your mouth.

Menaka: But we thought about this differently early on — so this part can definitely feel a little bit confusing.

Molly: Yeah — when we did our first Brains On episode about the coronavirus, back in March — experts were still recommending that only healthcare workers wear masks.

Menaka: But now, as researchers are learning more about how this virus works, it's clear: masks can really help keep this virus from spreading. Masks definitely help you keep your mouth mist to yourself, and they might even give you some protection from other people. Plus, when we see people in masks, it seems to help remind us to keep distance in between us. So the more people who wear masks, the safer we'll all be.

(notification alert sound)

Gus: Molly, is that your phone?

Molly: Oh my gosh, yeah, I'm sorry. Yeah, I should have turned it off before we started taping. I'm so sorry. But -- oh wow, it's our virus pals Kara and Gilly.

Menaka: Oh wow I LOVED their latest episode of the Going Viral Podcast. What are they up to?

Molly: It looks like they're promoting their new single? Here let's check it out.

(music)

Gilly: Hello, humans of the planet, we are so happy to share our talent,

Kara: I'm Kara,

Gilly: And I'm Gilly,

Kara: here with our debut track,

Gilly: where we're gonna drop facts!

Kara: And we decided, to tell you, today, about things coronaviruses hate.

Kara: So first on the list of things a virus hates!

Gilly: Can a virus live with Soap?

Kara: Say it with me,

Both: big nope!

Kara: Soap on the scene makes a virus go away!

Gilly: Soap! Soap! Soap! Soap! Soap!

Both: Let's go viral!

Gilly: Does a virus like to sunbathe?

Kara: Uh-uh, That's a no way!

Gilly: What is the thing that coronavirus hates?

Kara: Sunbathe Sun rays sun light all ways

Gilly: Sun Sun Sun Sun Sun Sun Sun Sun

Gilly: Does the virus like to feel the wind in its hair?

Kara: No!

Wind in the air blows the virus outta there!

Gilly: How can we get to where we're going if the wind is blowing??

Kara: So what makes coronavirus harder to spread?

Gilly: Airflow flow flow flow flow flow flow flow!

Kara: Mic drop!

Kara: Okay, so that's the jam,  
Three things to make coronavirus scram!  
Gilly: Which humans seem to want?

Kara: Soap soap soap soap soap soap  
Gilly: And Sun sun sun sun sun sun sun sun  
Kara: Air flow flow flow flow flow flow flow flow

Gilly: To all the viralinos, we thank you  
Kara: Your love is infectious, you know it's true  
Gilly: She is Kara and I am Gilly  
Kara: Now go ahead and pay us a milly

Molly: Wow, that was unexpected and surprisingly good for two viruses.

Gus: I wonder when their album comes out

Menaka: Soon, I hope! Maybe one day, they'll get so famous that they'll have a website and a merch store and I'll finally be able to buy a trucker hat with their faces on it, -- if viruses had faces -- or even — you know what, I need to go see if they have any other songs out. I'm gonna scoot. Molly, can you send me that Kara and Gilly link?

Molly: Sure <SFX text send>

Gus: Bye, Menaka!

Menaka: (as she's scooting away) Later skaters! Sun Sun Sun Sun Sun Sun Sun Sun!

Molly: Okay Gus, it's time for the (Mystery Sound)

Molly: You ready, Gus?

Gus: Yeah!

Molly: Okay, here it is.

(Mystery Sound)

Molly: Oh, that's a very short one.

Gus: Ooh, that's a hard one.

Molly: I know. Okay, let's give it another listen.

Gus: Hmm, that's a tough one.

Molly: Walk me through your thought process.

Gus: Maybe a paper cutter or a copy machine or a robot.

Molly: Well, we're gonna hear it again a little later in the show, and give you another chance to guess.

Molly: We're working on an episode about stars and we want to hear from you. There are so many stars out there and some of them have been given names by humans. Some have poetic names like Betelgeuse, which comes from the Arabic for "hand of the giant" or Bellatrix, which is Latin for "female warrior." But there are lots of stars out there without proper names. So we want to hear from you -- if you had a chance to name a star, what would you name it and why? You can share your answer at [brains on dot org slash contact](https://brainsondotorg.com/contact). While you're there you can send us questions, mystery sounds and drawings too! Or maybe you just want to say hi?

Gus: Whatever it is, you can send it to us at [brains on dot org slash contact](https://brainsondotorg.com/contact).

Molly: That's where we got this question.

Mikah: Hi, my name is Mikah and I'm from Concord, California. My question is why do sharks die if they stop moving?

Gus: We'll answer that question during our Moment of Um at the end of the show.

Molly: And we'll read the most recent group of listeners to be added to the Brains Honor Roll.

Gus: We also have one more exciting thing to tell you about...

Molly: We wrote a book! It's called *It's Alive: From Neurons and Narwhals to the Fungus Among Us*. It's a fun and fact-filled journey that will introduce you to the mind-blowing living things that exist on this planet. It comes out Sept. 8 but you can pre-order it now. Just head to [brainson.org](https://brainson.org) to learn more.

Gus: And keep listening!

Infomercial Narrator: Are you tired of coughing, sneezing, and breathing tiny particles out into the world? Do you want to be extra sure to keep all of your fluids to yourself, to do your part? Now, you can! With a cloth mask!

Infomercial Narrator: Play, walk, and even talk — with a cloth mask that fits closely over your nose and mouth, you'll be sure to keep more of your particles to yourself.

Infomercial Narrator: But that's not all. Cloth masks will help keep the people around you healthy! Whether you're swinging on swings! ... strolling through the grocery store! ... Picking up takeout!... going to the eye doctor! ...trying to put tiny doll clothing on squirrels at the park -- so cute! Just wear a mask!

Infomercial Narrator: Masks come in all kinds of shapes and materials, so you can find one that works for you — or you can make one yourself, from the comfort of your own home.

Infomercial Narrator: A mask with multiple layers will trap more particles — so feel free to double that fabric up. Be sure your mask is comfortable. The best mask is one you can keep on your face.

Infomercial Narrator: Not over your neck , or over the top of your head — right over both your nose and mouth!

Infomercial Narrator: That way, those pesky droplets and particles that are always exiting your face holes will have to make it through a wall of fabric first.

Person 1: But won't a mask trap in all the carbon dioxide that I exhale?

Infomercial Narrator: No, it won't. Cloth has tiny holes in it that gases can travel through. It's larger particles and droplets that get trapped, so you'll be able to breathe easy.

Person 2: But how can my mask do anything if my pants can't even keep my fart smells in when I toot??

Infomercial Narrator: Fart gas particles are actually even smaller than some of the droplets you breathe out! So farts getting through your pants has nothing to do with masks trapping droplets. If you toot, just say excuse me! and put on your mask!

Infomercial Narrator: Wearing a mask is perfect for any person who plans to share space with others — but remember, you should always keep your distance for extra protection.

Infomercial Narrator: Masks! All the benefits of avoiding other people's droplets and particles, along with the gift of keeping your face fluids to yourself. Act now — the masks of the world can't wait to meet your face!

Gus: You're listening to Brains On from American Public Media. I'm Gus.

Molly: And I'm Molly. Gus -- are you ready to hear that mystery sound again?

Gus: Am I ever!

Molly: Here it is.

(Mystery Sound)

Molly: I'm gonna give you a hint before you guess this time. This is something that you've probably done a lot of times in your life and has to do with a way that you can get around town.

Gus: Ooh. Oh, is it kicking up a kickstand?

Molly: Ooh, I love that guess. That's an excellent guess.

Gus: Okay, I think that's my final guess. I mean, I could total, I could definitely be wrong, but that's my final guess.

Molly: I like the guess. Here is the answer.

Maya: Hi, my name is Maya. And that was the sound of me unbuckling and buckling my seat.

Molly: So that is a seat belt.

Gus: Seriously? Oh, oh, I see cuz the clicking sound when you slide the -- Oh I see. It sounded like a kickstand.

Molly: For more on seatbelts. Here's producer Marc Sanchez.

Marc: Hello. So, Gus, I want to ask you something. When you're in a car. How often do you wear a seatbelt?

Gus: All the time?

Marc: Exactly. Wearing a seatbelt is like second nature. Most people don't even think about it. You put on a seatbelt to help protect you in an accident. It's kind of the same with masks. You put on a mask to help protect against spreading this coronavirus. So why does some people skip wearing one? Well, it turns out, people don't always embrace new habits, even ones designed to protect them. Take a listen to this:

Clip: Buckle up for safety, buckle up! The National Safety Council says if you don't have seatbelts, yet them if you do have seatbelts use them. Seatbelts can and do save lives every day. Buckle up, for safety, everybody! Buckle up!

Marc: That was an ad from 1964, more than 50 years ago. A few years later, the US told car manufacturers that they had to put seatbelts in every seat on all new cars. But there was no law saying that you had to use them. And believe it or not, a lot of people just refused. There were plenty of statistics showing that wearing a seatbelt could save your life or reduce your chance of

being injured or killed in a car accident. But most drivers back then grew up without wearing seatbelts. So a lot of them were like, nah, seatbelts are too uncomfortable. And I'm pretty sure I'm a good driver. Plus, stop, tell me what to do. And some people even argued that it was more dangerous to wear a seat belt because it might hurt you in an accident. Even though lots of tests and studies proved this was wrong. It took about 20 years for people to finally make the shift towards safety. And Gus what do you think might have changed their minds?

Gus: Uh, they made cushions? They said it was uncomfortable.

Marc: Good guess but it was actually money. Well, losing money. States started to pass laws that made it illegal not to wear a seatbelt, people could now get a ticket for being beltless. And they would have to pay a fine. In 1985, only 15% of people used seatbelts. That same year, New York put the very first seatbelt law into effect in the US. And on January 1, just after midnight, Betty Shufelt had the distinction of being the first person to get a ticket. This is what she told a reporter at the Washington Post,

Betty: It was a lot of hassle, and I don't like being told what to do.

Marc: Clearly she wasn't happy about getting caught. But she did go on to say that she would buckle up going forward. So that's a win for safety. So far, people have been quicker to embrace masks than they did seat belts. And that's a good thing. Sometimes we have to do things that are a little annoying or uncomfortable or just different. Buckling up a seatbelt, getting vaccinated or wearing a mask aren't the first things on anybody's time to party list, but they are very important. They can help you and the people around you stay safe.

Gus: Yes. Wear your seatbelt. And your mask! Thanks, Marc.

Marc: You bet. See you later.

Molly: We've been getting lots of questions from our listeners wondering about the future: when will the vaccine be ready? what will it be like at school? When will things go back to normal? I -- and all the adults in your lives -- have the same questions. We're going to do our best to answer some of these questions in our next coronavirus episode. But they don't have concrete answers right now.

Gus: Right now, trying to look a month, or a year into the future is hard.

Molly: Right. We're used to being able to count down to all sorts of stuff, like birthday parties, or school concerts, or sports tournaments, or vacations.

Gus: But we're not exactly sure when we'll be able to do those things again.

Molly: We call this feeling of not knowing what will happen -- uncertainty. And it's hard to deal with.

Nakita: When we have a lot of uncertainty, that part of our brain that gets anxious goes into overdrive. And we just started to worry a lot, especially when when things around us aren't really as predictable as they used to be.

Gus: That's Dr. Nakita Natala.

Molly: She's a psychiatrist at the University of Minnesota. She helps kids with their mental health.

Nakita: We all have a little bit of anxiety and that's all, anxiety is actually a good thing for us and it keeps us safe.

Molly: Anxiety keeps us safe by making us nervous in dangerous situations.

Gus: Yeah. It keeps us from going near the edge of a cliff or touching fire. Anxiety can be useful. It helps us organize the world into things that are safe -- and things that are threats.

Molly: But uncertainty about the future can make it hard for our brains to organize things.

Nakita: And I think that's what makes it really hard for us to deal with uncertainty, if that makes sense. And then when we can't predict things, then we start to worry about all the what ifs.

Molly: Our brains like answers, because they help keep us safe. So what can we do when we don't have all the answers about what the next few months will look like?

Gus: Nakita recommends focusing on what's happening right now -- the present.

Nakita: Really kind of examining our lives like every day and trying to figure out things that we can enjoy just like on a day to day basis, and trying not to focus as much on the future or what will come. And one thing that I've noticed as I've tried to do this more myself too, is that I found new things I like to do.

Molly: One thing that I found that I like to do is a really simple thing. And it's just to go outside in my backyard and pay attention to all the flowers as they sort of bloom and then fall off. I've been like watching this whole cycle of my garden and it's been really enjoyable because I don't really generally have time to do that. How about you Gus? What have you found that you like that's new.

Gus: When I do bike around or go on walks, I see bees buzzing around the lavender and stuff. And I like to watch them especially the bumblebees with their big, like snout things.

Molly: Very cool.

Gus: And they sip the lavender. And I actually got my own lavender plant and I'm planning on building a bee nest. That's like a buried upside down flowerpot, for the most part.

Molly: Cool!

Gus: And I'm gonna make it in the late winter when the newborn queen bees start buzzing around looking for a new place.

Molly That is so cool. So you noticed something you hadn't noticed before? And now it's causing you to like help our be friends. That's so cool.

Gus: Yeah.

Molly: Well, Nikita also says it's important to let yourself feel your feelings and know you're not alone in them. It's normal right now to feel frustrated or angry or sad, or all of them at the same time.

Gus: But also think about the moments you have that are fun, and the times you feel contentment and happiness.

Molly: If you're having trouble staying focused on the present, there are some games you can play,

Gus: Like look around you and make a list in your head of everything you see that is green.

Molly: Or try to think of all the character's names in your favorite book or tv show.

Gus: It's also great to take deep breaths-- inhale for four counts, hold that breath for four, and then exhale for four. It feels great.

Molly: Or you can try distracting yourself by going outside, or watching a movie or reading a book.

Gus: And if you're still having trouble keeping your mind off the "what ifs" it's great to talk to your parents or another adult you trust.

Molly: There are always people who want to help you. And if you're looking for help we have some resources in the show notes for this podcast and at our website.

Gus: Nakita says a lot of the families she talks with are even seeing a positive side to this time.

Nakita: People are getting to spend more time together and not as like, distracted by every day, kind of that go go go that a lot of us experienced every day before Coronavirus. And so I think people are really valuing that time together. And they're really getting to spend more time

thinking about the things that they like to do, re-centering themselves and thinking about how to take good care of themselves.

(Theme music plays)

Molly: This new coronavirus has changed all of our lives, and is making things feel more uncertain.

Gus: It's normal for uncertainty to cause some big feelings, like anxiety -- but one way to deal with it is to focus on the present.

Molly: One thing that's happening in the present is that scientists all over the world are studying this coronavirus and working on treatments and vaccines.

Gus: Scientists are learning new things about it all the time -- and we get to watch science in action!

Molly: One thing scientists have learned is that this virus primarily spreads from droplets that come from our faces.

Gus: So that's why it's important to keep distance from others, and wear a mask. Keep your mouth mist to yourself!

Molly: That's it for this episode of Brains On.

Gus: Brains On is produced by Molly Bloom, Marc Sanchez, Sanden Totten and Menaka Wilhelm.

Molly: We had production help from Kristina Lopez and engineering help from Andrew Walsh and Johnny Vince Evans. Many special thanks to Phyllis Fletcher, Josh Santarpia, Vikki Krekler, Rosie DuPont, Alex Flood, Delia Bloom and to Anna Weggel and Tracy Mumford for being the very best sports.

Gus: Brains On is a non-profit public radio program.

Molly: You can support this show and help us keep making new episodes at [brains on dot org](http://brainsondotorg) slash fans.

Gus: Now before we go, it's time for our Moment of Um....

Mikah: My question is, why do sharks die if they stop moving?

Melissa: That's a really good question. Um, hi, everyone. My name is Melissa Christina Marquez, and I'm a shark scientist who studies where sharks are and why they're there. So

sharks have five to seven slits on the sides of their heads, or underneath them, depending on if they're a shark, or if they're a stingray. And those allow the animals to breathe. Now, all of the sharks and the stingrays, they have this. This is how they breathe, they don't have lungs like you and I do. So what happens is water will actually pass over the gills where there's tiny little blood vessels ready to extract oxygen from the salty water. And then the carbon dioxide waste also passes from the shark's blood out of the body through the gills. So that's how the sharks breathe, is constantly having water go through those gills. The big sharks that a lot of people know, such as great white sharks, mako sharks, tiger sharks will do what's called ramming. And the ram ventilation is because they're ramming water into our mouths by constantly swimming fast, so like they have to constantly keep moving in order for them to breathe. But a lot of the smaller sharks such as nurse sharks, wobbegong sharks, port jackson sharks. Those actually do what's called buccal pumping, which is named after cheek muscles. And you'll see a bunch of them opening and closing their mouths while they're just resting on the bottom of the ocean. And that's those cheek muscles helping pull water into the mouth and through the gills.

Molly: And now for a breath of fresh air... it's the Brains Honor Roll. These are the incredible listeners who send us their ideas, questions mystery sounds drawings and high fives.

Molly: We'll be back soon with more answers to your questions.

Gus: Thanks for listening!