



Zombie Apocalypse Virus Detectives

Debriefing from the CDC



- <https://www.youtube.com/watch?v=m1NnJ-85mTU&feature=youtu.be>

Background - <https://courses.lumenlearning.com/microbiology/chapter/modes-of-disease-transmission/>

Your Mission:

Your Mission is to figure out how the zombie virus was originally transmitted, what mode of transmission is used for virus spreading, and suggest a family for your newly identified virus.

An increasing number of citizens are disappearing, especially at night. These victims are reappearing as perpetrators. They are slow-moving, very strong. They are impervious to pain/injury and appear to be unaware of their surroundings. We've discovered that after the victims disappear, they reappear without human blood. Without blood-flow, these perpetrators freeze quickly. We believe this is why they are headed south—to warmer temperatures. They are constantly hungry and attacking at an alarming rate.



We're currently trying to figure out how to stop them, but a defensive standoff is not a long-term solution. What we need to figure out is how this virus originally infected the first victims. Here's what we do know. All of the victims attended a carnival in Vancouver. We've collected interviews, but haven't had time to review them for consistencies.



Since the interviews the all individuals have been found and one of your brave colleagues Dr. Mary Anning has risked their life to collect blood samples from all individuals. Unfortunately, during sample collection one of the infected bite her. Because she has now turned into a Zombie herself, the electron microscopy has not been performed to help identify the virus.

What we need from you, agents, is a thorough investigation. We need is **1.)** to know the root of transmission for this virus, **2.)** to identify the source of infection, and **3.)** to determine what type of virus it is in order to create a vaccine or antiviral to stop the growing mass of those infected.

Interviews

Lauren

My son Henry is infected. He started acting really strange when we got home from the fair in town. At first he was really sick and we were about to call the doctor, but he started showing aggression so we left him alone. In the morning, he was gone. We went to the fair on Saturday. There was so much to do, but Henry had a hockey game later that night so we only had time to do a few things. I remember that he asked for a corn dog before we went on the ferris wheel. It made him queasy, so we left the ride area. We spent time at the petting zoo, there's always mosquitos around those animals. We also went through the Haunted House, and saw the exotic bird show and the stunt show. Oh, and we tried to see one of the pig races, but it was so busy over there you couldn't really see anything.

Ben

Yeah, man, I went to the fair! My friends and I go every year! We only go for the rides. We like to ride everything until we get sick. And the stunt show is pretty awesome. It's really the only place you can go to eat a turkey leg like a caveman. I guess some of the zombies are now eating people legs like cavemen. Anyway I went to have fun and pick up some chicks. I mean I just want to party man.

Tyler

I took both of my kids to the fair that weekend and both of them have disappeared. I've told the police countless times. We went to the fair, we came home, went to bed, and in the morning they were gone. They left behind a lot of drool and a really bad stench, which is why the police think they have been infected. At the fair, we did everything. I mean EVERYTHING! I watched them on the rides, play with the animals in the petting zoo, ride the ponies in a circle. We saw all of the shows on the agenda, and they even convinced me to let them go through the haunted house. We had got cotton candy next to the corn dog booth on the way out. Ok, we also grabbed a corn dog. I just don't understand what happened to them.

Andrew

My wife and my kids have both disappeared. My father is sick, so I spent the weekend out of town taking care of him. To entertain the kids, I suggested to my wife that she take them to the fair and let them get all of that energy out. When I came home, the house was ransacked. At the time, the police thought it was foul play, but now they have lumped them in with the rest of the people that are infected and missing. I talked to my wife on her way home from the fair. Our boys were passed out in the backseat, and she said they had fun. She said they did the rides before eating. The kids were too young



for the haunted house, so she volunteered to do the dunk tank to pacify them. I remember she said they saw the stunt show while they had corn dogs and lemonade in the stands. She told me that they rode those ponies that walk around in a circle, and then went through the petting zoo. They missed the pig race, so she said they spent a lot of time with the animals. She texted me photos of the kids eating and feeding the animals at the same time. Alex loves animals.

Jamie

I went with friends to the fair this year, but they were way more into it than I was. I ate a corn dog while they were watching the pig races, and ate cotton candy while they petted all the animals. Why come to the fair just to see dumb animals? And they all stunk like horse SH\$T after. No thank you! After they returned from the petting zoo we rode all of the rides, played a few games, and went through the haunted mansion before calling it a night. Oh, and we did sit through the stunt show, but like I said, the mosquitos were swarming but I don't think I got bitten. Too much alcohol in my blood. Lol. The next day, they were missing.

Emily

My sister is totally a zombie! Well, they say it's some kind of virus, but whatever. She's a flippin' zombie! She came after me once we got home from the fair. At first I thought she was joking around, but she had this dead look in her eyes and was grunting a lot. I don't even think she knew it was me she was lurching towards. I barred myself in our interior bathroom, like in a tornado, you know? I actually slept in there. She was gone in the morning. It was so totally creepy. Oh, yeah, the fair? We went around dinner on Saturday. We blew all of our allowance. We had funnel cakes before riding all of the rides. We had one of those wristband things that let's you do everything you want. We even went to the exotic bird thing, but didn't stay long. We also went to the pig races. Sarah got a closer look than I did, but it was still a waste of time. I was over the animals by then and the mosquitos, but Sarah went through the petting zoo while as I was a little queasy from the rides. I am not sure if she washed her hands after seeing the animals. I thought a corn dog would help my stomach, so we ate and left.

Corine

My husband and I went to the fair this year, but we stayed away from the mainstream crowd. We mostly went for the food. I was craving a funnel cake, and my husband ate everything in sight. We ended up eating the funnel cake, cotton candy, shaved ice, shaved potato fries, and corn dogs. Healthy, I know. Sometimes you have to live a little. Anyway, we watched the exotic bird show while we ate, and went home early. I wasn't feeling well. The mosquitos were everywhere at the fair. It was kind of gross. I have chronic hepatitis B virus infection so I am always on antivirals.

Whitney

My parents actually went to the fair, but we didn't get to go. My parents had a date night and dropped us off at our grandparents' house. Mom had a pie in one of the contests, so they went for the ceremony. When they got home they called told us they had corn dogs and turkey legs to celebrate her win and watched the stunt show and the bird show. They didn't ride any of the rides though. My mom is paranoid about the safety of those things. Dad did say she screamed her way through the haunted house, which is kind of funny. My sister is really into animals, so they went by the petting zoo and snapped a few photos to show her. My dad even got animal poop on his shirt! Oh, and Dad won us



goldfish at one of those games. It served them right that they were covered in mosquito bites. I thought it was unfair that they got to go have fun and we had to spend the night watching loud TV with old people. When they didn't pick us up in the morning we were worried and eventually called the police, but they had less answers than we did. It seems like a lot of people just vanished.

Nathan

I don't know why you want to talk to me. It clearly wasn't anything at the fair that made these people turn into zombies. Everyone knows zombies come from radiation. Plus, I was at the fair and do I look like a zombie to you? What did I do? I rode all of the rides, ate a ton of junk food, and played a few games. Oh, and watched the bird show, or the "exotic" bird show, whatever. I thought I was going to see something cool like a vulture, but it was a bunch of pigeons. One even pooped on me. And I have a bit of a runny nose today!

Michael

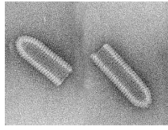
I took my family to the fair this year, but we all got sick after eating the cronut burger. The kids rode the ponies around in a circle, but we couldn't even attempt to ride anything so we skipped the petting zoo with the other animals. We did go through the haunted house and watched the exotic bird show, but after that we had to leave. We were not zombified in the morning, but food poisoning is no joke.

Use the Table Below to determine the source of the outbreak

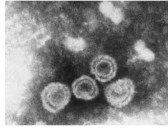
	Haunted House	Rides	Dunk Tank	Games	Corn dog	Turkey Leg	Cotton Candy	Funnel Cake	Butter	Petting Zoo	Pony Rides	Games	Exotic Bird Show	Pig Races	Stunt Show	Noticed Mosquito at Petting Zoo	Infected (Y/N)
Henry																	
Ben																	
Tyler's Kids																	
Emily's sister																	
Corine																	
Michael																	
Andrew's family																	
Jamie's friends																	
Whitney's parents																	
Nathan																	

After determining the source of the infection and the possible mode of transmission, you prepare your blood samples for electron microscopy.

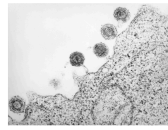
You acquire the images below from performing electron microscopy on the patient samples.



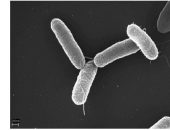
Henry



Corine



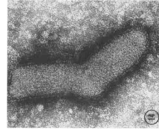
Ben



Michael



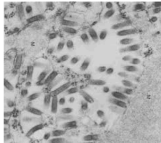
Andrew's Family



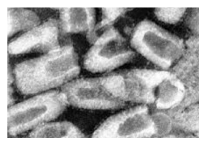
Emily's sister



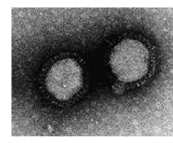
Tyler's Kids



Jamie's Friends



Whitney's Parents



Nathan

Questions:

Question 1: Knowing the various routes of virus transmission and considering the evidence in the interviews, which route do you think is how the new Zombie virus is being spread and should be further investigated?

- A. Sexual Transmission
- B. Vector-Borne Transmission
- C. Airborne Transmission
- D. Fecal-Oral Transmission
- E. Vertical Transmission

Question 2: Considering the travel path through the fair of the infected, what element at the fair do you think is the source of the outbreak?

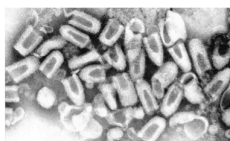
- A. Animals at the Petting Zoo
- B. Corn Dog Vendor
- C. Birds at the Exotic Bird Show
- D. Pony Rides
- E. Mosquitos at the Petting Zoo
- F. Funnel Cake Vendor

Question 3: After analyzing your electron micrographs of each blood sample, what kind of virus do you think is causing the Zombie Apocalypse? Use the Key at the bottom to help you identify which the viruses.

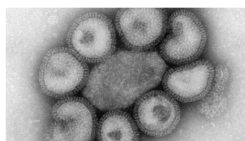
- A. Tobacco Mosaic Virus
- B. Adenovirus
- C. HIV
- D. T4 bacteriophage
- E. Rabies Virus

Virus Structure and Identification by Electron Microscopy

Types of Viruses – Electron Micrograph Pictures



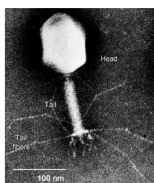
Rabies Virus – the shape of a Bullet



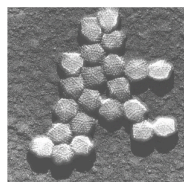
Influenza Virus – spherical in shape



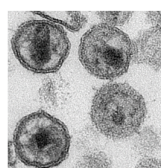
SARS-CoV-2 – spherical in shape with a halo of spikes



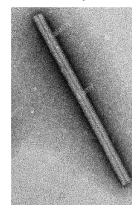
Bacteriophage – bacteria virus with a complex shape looking like an alien spider



Adenovirus – geometric in shape



HIV – Spherical with an inner capsid



Tobacco mosaic virus – long rod