NORWALK VIRUS

COMMON ALIASES AND CHARACTERISTICS

- Norwalk virus and Norovirus are interchangeable.
  - media often use “Norwalk virus” to describe outbreaks.
    - OMG it has a name?
    - It’s never good news when a disease has a name…
  - Norwalk virus has also been called:
    - winter vomiting disease
    - acute nonbacterial gastroenteritis
    - small, round-structured virus
• the Norwalk Virus received its name in 1968 from its place of discovery: Norwalk, Ohio.

• after an outbreak of acute gastroenteritis, the epicenter of this outbreak was determined to be Bronson Elementary School.

• The actual viral strain was identified in 1972, after thorough inspection of student stool samples collected during the outbreak.
SCHULER: I HATE THIS BUG.
DANIELS: OH, COME ON, CASEY. YOU HAVE TO ADMIRE ITS SIMPLICITY. IT’S ONE BILLIONTH OUR SIZE AND IT’S BEATING US.
SCHULER: WHAT DO YOU WANT TO DO? TAKE IT TO DINNER?
DANIELS: WHAT THEN?
SCHULER: KILL IT.
DANIELS: KNOW YOUR ENEMY
KNOW YOUR ENEMY: CHARACTERISTICS OF A VIRUS

- A virus is an infectious organism that can only replicate inside the living cells of other organisms
- Viruses hijack the protein synthesizing organelles and their metabolisms to produce new viral bodies
- These new viral bodies exit the host and continue to infect host cells
KNOW YOUR ENEMY: CHARACTERISTICS OF NORWALK VIRUS

- When viewed through an electron microscope, the Norwalk virus has a primarily-round shape with feather edges
- The Norwalk virus has a lipid envelope
- The Norwalk virus does not move independently and does not have staining characteristics
- Norwalk virus can not be cultured in a laboratory setting
KNOW YOUR ENEMY: VIRULENCE FACTORS

- The Norwalk virus binds to histo-group antigens
  - Antigens are complex carbohydrate structures on the cellular membranes of living creatures used for communication
- The Norwalk virus is thought to bind to the antigen sites of gastrointestinal epithelial cells in the stomach and large intestine.
  - Symptomology indicates this is likely
KNOWN IMAGES OF NORWALK VIRUS

- To right: electron microscopy of Norwalk virus cell bodies; note round shape, feathery borders

- To right: artificially-colored image of Norwalk virus demonstrating protein structure
THERE IS NOTHING SO PATIENT, IN THIS WORLD OR ANY OTHER, AS A VIRUS SEARCHING FOR A HOST.

quote from Countdown
DESCRIPTION OF THE DISEASE AND PRESENTING SYMPTOMS

- Norwalk virus causes inflammation of the lining of the stomach and small intestine

- Symptoms of infection include nausea, vomiting, watery diarrhea, abdominal cramps, and flu-like symptoms: body ache, fever, chills, fatigue

- The virus has an incubation time of approximately 12 hours, and infected individuals will usually demonstrate symptoms within 12 hours of infection. Symptoms may last up to 60 hours or longer
DIVERSE POPULATIONS AND THEIR ATTENDANT SYMPTOMS
METHODS OF VIRAL SPREAD

- Children are more likely to present with vomiting
- Adults are more likely to present with watery diarrhea
- Vomit and feces are loaded with viral bodies; after exiting the body the Norwalk virus seeks new hosts
- The virus infects new hosts by way of ingestion of infected feces or vomit
In 2007, a Caucasian male, “Scott J,” contracted Norwalk virus. Scott was violently ill multiple times per day for almost 4 weeks. He would sweat so heavily that his bedsheets required changing up to three times daily. His fever and nausea were so severe that there are long periods of time that he can not remember.

“Even after I ‘got better,’ it took at least another 4 weeks to really feel like myself again”

-Scott J
• As with all viruses, Norwalk virus “hacks” the reproductive and metabolic mechanisms of host cells to reproduce more viral cells

• Norwalk virus also affects the cell membranes of stomach and intestinal epithelial cells, causing them to dump out their fluids.

• This excess of fluids is thought to be the cause of the watery diarrhea or vomit.
MODE OF TRANSMISSION: VOMIT

- Periods of vomiting allow the virus to transfer from host to host

- The virus can spread through traces of vomit in garbage cans, bathroom fixtures, and floors, and on clothing and bedding

- Trace vomit may remain in an individual’s mouth and enter the air by way of breathing or discharged saliva

- Improper handwashing and handling of soiled materials allows virus to spread
MODE OF TRANSMISSION: DIARRHEA

- Multiple instances of diarrheal discharge give the virus many chances to escape into the air, or for trace fecal matter to be transferred to other surfaces on an infected individual’s hands or in their soiled clothing.

- Bedding, clothing, and hard surfaces may all hold traces of diarrheal discharge and transmit the virus to a new host.
METHOD OF INFECTION: ORAL INGESTION

- Trace fecal matter or vomit on surfaces may come into contact with a new host. If that host puts their hand in or near their mouth, the virus may be swallowed and begin incubating in a new host.

- Symptoms will manifest in the new host usually within 12 hours.
IT’S GONNA BE REAL Awkward if I have to stand up in front of a class of people I don’t know very well and tell them maybe they got sick from eating infected feces.

D. Arthurs to himself while building this presentation
DIAGNOSTIC PROCESS

- Norwalk virus may be identified by way of Real-Time Reverse Transcription Polymerase chain reaction tests
  - these tests are used to detect viral reproduction in host cells by isolating and identifying signature protein structures/amino acid patterns
  - these tests can detect presence of Norwalk virus in vomit or feces, or from samples taken from infected surfaces or water
PREVENTION

Go back and wash your hands!
PREVENTION OF TRANSMISSION

- Hand washing with soap and hot water, especially before food preparation and after restroom use
- Washing of fruits and vegetables thoroughly before consumption
- High-contact surfaces should be disinfected regularly
  - doorknobs, flat surfaces, mobile phones, electronics
PREVENTION OF TRANSMISSION, CONTINUED

▸ Animal proteins should be cooked to 140* Fahrenheit

▸ Potentially-contaminated food should be thrown out

▸ Sick infants and children should not be present in areas where food is prepared

▸ Ill individuals should not be exposed to others
  ▸ call in sick, stay home, don’t touch others’ food
  ▸ trust me, we’ll be okay without you
Fine. Don't wash your hands. But don't blame me when you get violent diarrhea.
First we'll kill it with fire

Then we'll run it over.
THERE IS NO SPECIFIC MEDICINE TO TREAT NORWALK VIRUS

- Antibiotics are not effective against viral infections
  - any treatment that would kill the virus would likely kill or significantly harm the host individual

- If an individual suspects infection, they should:
  - stay hydrated and avoid sugary beverages and alcohol
  - rest and allow the body to fight off the virus naturally
  - practice good hygiene techniques to prevent spreading disease
  - replace all hygiene items after recovery: toothbrush, bath poof, sponges, etc
There are approximately 19-21 million cases of acute gastroenteritis each year. 400,000 of these lead to emergency room visits, primarily for young children.

There are up to 800 deaths annually due to Norwalk virus; most victims are children or elderly individuals.
The Oregon Department of Public Health does not track cases of acute gastroenteritis caused by Norwalk virus, but...

The Department of Public Health provides guidelines for prevention of its spread

Restaurants, long-term care facilities, and restaurants all must abide by hand-washing and safe sanitation practices
WHY IS IT IMPORTANT TO STUDY THE NORWALK VIRUS?

▸ Acute gastroenteritis can be prevented very easily, yet infection can occur just as easily due to carelessness.

▸ By educating individuals about the spread of disease by way of unsanitary practices and teaching them healthy habits, fewer instances of acute gastroenteritis will occur, and its transmission can be greatly diminished.

▸ 800 deaths annually due to improper handwashing techniques? We can do better.
REFERENCES


