MicroRogue: Neime (*Neisseria meningitidis*)

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Artistic recreation of Neime (Public Health Image Library, ID # 22881).

Claim to fame: causes meningitis, a deadly disease you can avoid

The human body is home to approximately 38 trillion microbes, about the same as the number of human cells! These microbes help to digest food, protect against infection by pathogenic microbes, produce vitamins, and regulate our immune system (body defense system). But a few of them can cause disease under certain circumstances, such as when our defences are low. One such disease is meningitis caused by Neime

The MicroRogue Neime. Neime, also called the meningococcus and *Neisseria meningitidis*, is a human-specific bacterium is found in the nose of approximately 10% of the population at any time, usually without causing illness. Occasionally however, Neime can cause disease in those carriers, or individuals with risk factors living in close conditions with a carrier.

Risk factors for meningococcal disease include age (infants, teens, and elderly are all at higher risk), living in a group setting (including college dormitories), some medical conditions (including those that weaken your immune system), and recent travel to sub-Saharan Africa, where case numbers are higher and hence the probability of transmission is higher. Neime is spread through saliva or spit, so close or lengthy contact is usually required for transmission.

Symptoms of meningococcal meningitis. An infected individual may experience symptoms, including fever, headache, stiff neck, nausea, vomiting, sensitivity to light and confusion. These symptoms are consistent with meningitis, where the bacteria get into and grow in the cerebral spinal fluid surrounding the brain.

Additional symptoms may occur if Neime gets into the bloodstream. Fatigue (feeling tired), cold hands and feet, severe aches, rapid breathing, diarrhea, and a dark purple rash are characteristic of a septic infection - an infection that has spread to the bloodstream. This presentation represents an urgent medical emergency!

Treatment of meningococcal meningitis. This includes antibiotics administered through the blood. The most serious infections may require other medical interventions, including breathing support, medications to lower blood pressure, surgery to remove dead tissue, and general wound care. With early treatment, however, 80 - 90% of survivors have no long-term side effects.

Stealth mode activated. Neime has a couple of ways to hide from the human defense systems, or immune system. It produces a polysaccharide (sugar) capsule, which acts as a cloak or a coat, often preventing the immune system from recognizing it as a threat. This sugar coating helps Neime survive in the bloodstream and to get through the blood-brain barrier. It also protects the bacterium from drying out on surfaces, such as shared utensils or cups and glasses. So, the sugar coating actually helps the bacterium to be efficiently transmitted person to person.

Neime can also bind to human proteins, including factor H (a protein that helps to control part of the immune system), which is like putting on a mask. Binding to factor H hides the bacterial cell from destruction!

Neime is a sneaky horrid MicroRogue we need to combat!

Vaccine prevention of meningococcal disease. If you are in close contact with someone who is infected with Neime, there are ways to protect yourself. You can take antibiotics to prevent getting the infection from them. But, more importantly, there are effective vaccines that protect against infection.

There are at least 12 variants of the different sugar coats that Neime can put on to hide from our defense systems. But these coats can be revealed to our defence system through antibodies that specifically bind to them, as though they have been hit by a paintball. Of the 12 variants, only 6 most commonly cause disease and of these only 3 – types B, C, and Y – cause most of the disease in the United States. Crucially, an effective vaccine against these three types is available, so serious illness from meningococcal infections is readily prevented by vaccination!