BIOMI 290 10
Fatal Flu Case Study
12/03/04

The electron micrograph images show a consistency through all four patients of *Human Coronavirus*. This leads me to believe that *Human Coronavirus* is the cause of the community-acquired pneumonia outbreak. I took the patients' sputum samples and grew the virus in tissue culture cells, inoculating three mammalian cell lines. Cell culture line C showed the *Human Coronavirus* in all patients, while Cell culture line A showed *Human Respiratory Syncytial Virus* only in patients 2 and 3. These results are indicative of complications in patients 2 and 3, but given that cell culture C tested positive in all four cases for *Human Coronavirus*, I find it difficult to blame *RSV* for the outbreaks, and I believe that *Human Coronavirus* is a much more probable candidate.

The electron micrographs are the helpful in analyzing samples, because they are able to easily resolve images only nanometers in length, and show good contrast. I also tested the patients using the direct fluorescent antibody test, which detects the presence of a particular antigen, generating a very sensitive protein tag. However, for this test I unfortunately did not include a positive control of *Human Coronavirus*, instead sampling for only *Human Respiratory Syncytial Virus* (which also tested positive in patients 2 and 3), *Rhinovirus, Influenza* and *Human Adenovirus*. In retrospect, I should have also used the direct fluorescent antibody test for *Human Coronavirus*, in order to verify the results of the electron micrograph. ✓

Finally, used the gram stain test, a typical test for community acquired pneumonia. The gram stain test uses microscopy to differentiate between bacteria based on the composition of their cell walls. I tested *Legionella, Staphylococcus, Streptococcus, Pseudomonas*, and *Heamophilis*. None of the patients had evidence of any of these

bacterium in their sputum samples. Therefore, I was able to rule out bacterial pathogens as the cause of the outbreak. This result was unexpected because bacterial pneumonias tend to be the most serious especially *Streptococcus pneumoniae*. I was surprised to find that *Human Coronavirus* was the culprit because historically, disease in humans has tended to be mild.

I feel my results are conclusive, but would definitely recommend further testing of RSV to determine if serious complications arise in patients infected with both viruses simultaneously. In the future, would also have included *Human Coronavirus* in my direct fluorescent antibody testing. would also like to test a greater number of patients to obtain legitimate statistical results, and also be provided with documentation of symptoms.

Finally, I believe this pathogen spread so quickly because the virus particles are able to travel through the air, contaminating anyone within a certain diameter and under specific conditions. Physical contact, of course, also greatly increases the risk of contamination. To control further spread of this virus, I recommend that all medical professionals treating patients with symptoms indicative of the disease (rapid onset of high fever, chills, sore throat, shortness of breath, cough, and evidence of pneumonia) should use standard hygiene precautions, together with airborne and contact precautions (respirator, gowns and gloves, eyewear, etc Suspected carriers of the virus should be diagnosed using chest x-ray, gram stain and sputum cultures to confirm the presense of *Human Coronavirus*. Family members or anyone who has come in near proximity to the patient should be immediately quarantined for a matter of at least one week. Furthermore, travel should be restricted in areas of severe outbreak, and passengers needing to travel should be examined by security for any sign of illness.