There are THREE COVID-19 Out There?

COVID-19 Strains Comparison & Symptoms Prediction

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Report Generated: February 6, 2020

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Sequence Source: NCBI GENBANK https://www.ncbi.nlm.nih.gov/genbank/2019-ncov-seqs/

Software: GENEIDO 0.9

Software Functions: Pathogen genome analysis and symptom prediction from Rivermap Research & Consulting LLC

Total Number of Complete Genome Analyzed: 217 (including error stains not listed here)

Summary:

Update:

- Lately, doctors around the world are reporting that sudden loss of smell and taste could also be symptoms of COVID-19. This does not surprise me at all because we already predicted that the viruses could affect CNS on 2/6/20. Therefore olfactory (smell) and glossopharyngeal (taste) nerves may lose their functions. Also, we also predicted that the S3 strain may damage the inner linings of the respiratory and digestive tracts. This could also affect the smell and taste. (See 2019-nCoV Strains Comparison and Symptoms Prediction, posted on 2/6/2020)
- Until today (4/15/20), I am still seeing the same THREE patterns, S1, S2 and S3.
- The ratio between S1, S2 and S3 has changed: S1:S2 was about 5:1, now 2:1. S1:S3 was about 7:1, now 4:1. The increase in S2 and S3 are from submission outside of China. What does this mean?
    - This could mean that we are going to see conflicting symptoms. For example, some people will have fever, some may have chills; some may have lung edema (and pus in the lung), some may have lung fibrosis.
    - We may need to reconsider the criteria for diagnosis
    - Drug and vaccine companies need to be careful since their products may work for one group of patients but may not for the other two.

Other information:

1. Among all the 2019-nCoV genome submissions in GENBANK from 1/14/2020 to 4/10/2020, **THREE** "variations" (named S1, S2 and S3 below) are found.
2. Symptoms associated with each strain are predicted based on HUE Charts** generated using GENEIDO. See Table 1 and Table 2.
3. Symptoms can be dramatic but disappear at the end, even without treatment; but some patients may not last to the end.
4. Some patients may be infected with more than 1 strains. That means, some may get S1+S2, S1+S3, S2+S3 or S1+S2+S3. Symptoms associated with these cases are predicted and listed in Table 3, Table 4 and Table 5.
5. A patient gets S1+S2+S3 may be asymptomatic first, then suddenly drop dead when viruses reach a critical number.
6. Patients infected with S3 may have low or no fever, but likely to have dehydration/necrosis of the Lung and inner linings of the respiratory and digestive tracts which will lead to breathing difficulty.
7. Patients infected with S1 and S2 may have lung edema, kidney disease and surge of steroid hormone that could cause miscarriage.
8. Strain S1, S2 and S3 can cause decreasing of brain and CNS functions.
9. Strain S1, S2 and S3 can cause paralysis.
10. S2 cause low immunity, muscle weakness and shortness of breath throughout the whole time.
11. SHOCK may be seen in S3 patients.
12. Fluctuate of blood pressure in S2 and S3 patients.

** HUE Charts:

- The HUE Charts are generated by the software GENEIDO.
- Each HUE Chart contains 3 layers corresponding to embryo germ layers: Heaven (Ectoderm), Human (Mesoderm) and Earth (Endoderm).
- Symptoms are predicted based on the distributions and ratios between the nucleotides in the HUE Charts.

Interesting discovery from the HUE Charts:

- If we take S1 as the 'original' 2019-nCoV strain since most of the sequences in GENBANK show this pattern and we named the Heaven layer of S1 "S1H", the Human layer of S1 "S1U" and so on, then we can see from Table1 that
    1. S2H = S1U, S2U = S1E, S2E = S1H, as everything shift 1 layer up from S1
    2. S3H = S1E, S3U = S1H, S3E = S1U, as everything shift 2 layers up from S1

Note: "=" here means looks just like

- Similarly, let's use (S1+S2) as the 'standard' strain, then we can see from Table 3 that

1. (S1+S3)H = (S1+S2)E, (S1+S3)U = (S1+S2)H, (S1+S3)E = (S1+S2)U
2. (S2+S3)H = (S1+S2)U, (S2+S3)U = (S1+S2)E, (S2+S3)E = (S1+S2)H

- The HUE Chart of S1+S2+S3 shows that the patterns in all layers are the same

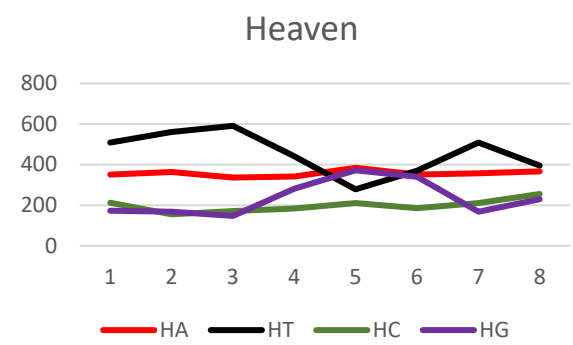
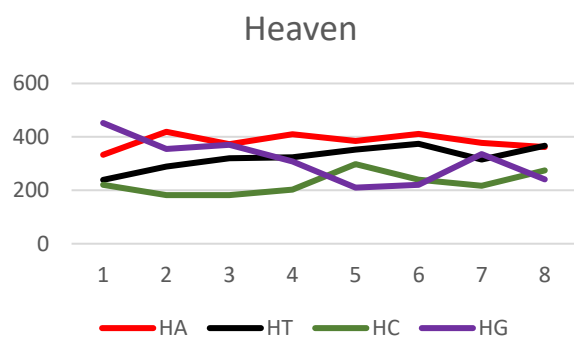
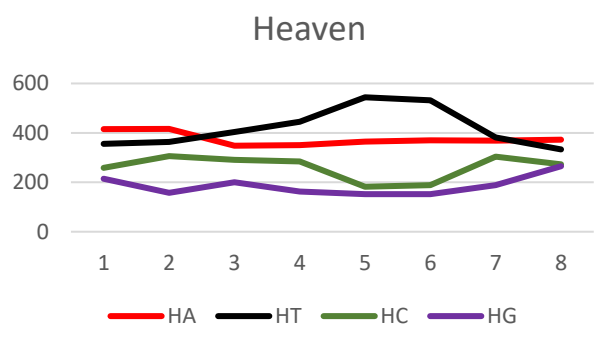
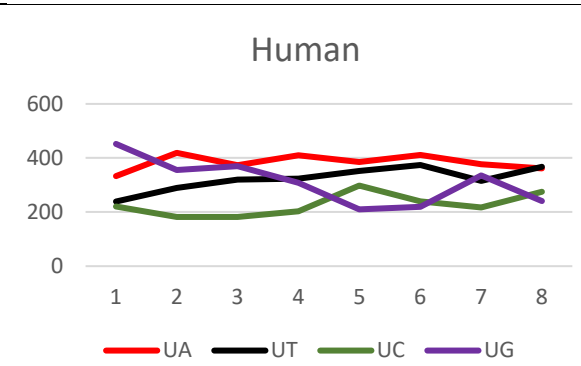
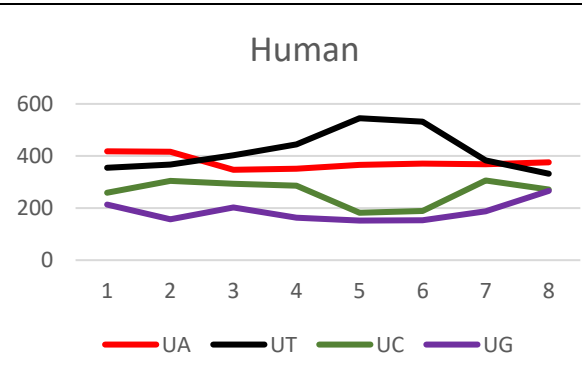
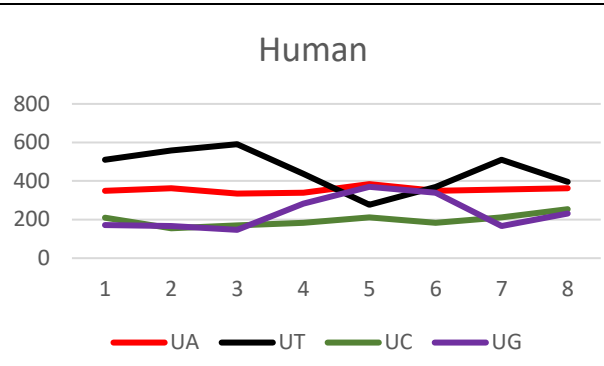
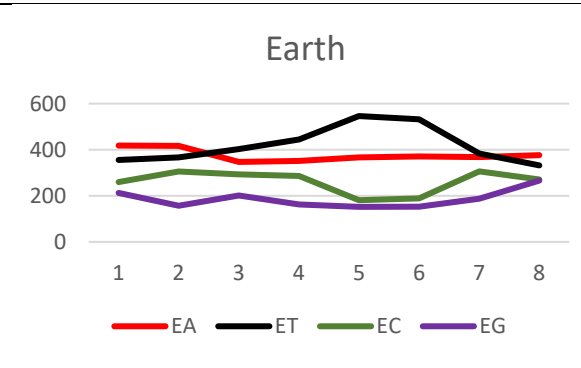
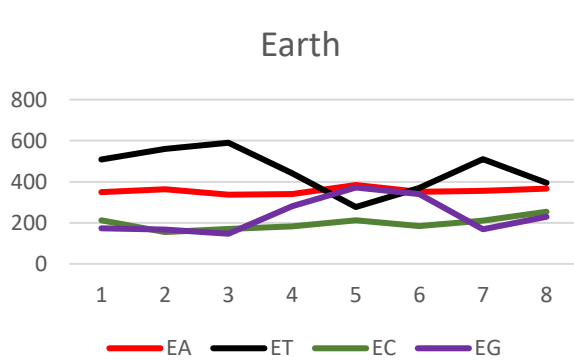
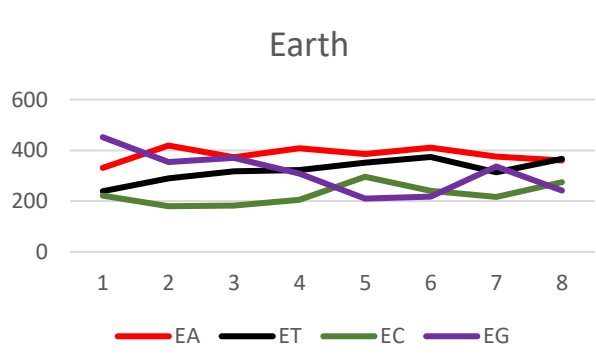
2019-nCoV Strain S1	2019-nCoV Strain S2	2019-nCoV Strain S3
		
		
		

Table 1. HUE Charts (Level 1) of S1, S2 and S3

S1		S2	S3
S1 Sequences include:	48. MT163716.1	**S2 Sequences include:**	**S3 Sequences include:**
1. MN996527.1	49. MT163717.1	1. MN996531.1	1. MN996530.1
2. MN996528.1	50. MT163719.1	2. MN988668.1	2. MN938384.1
3. MN996529.1	51. MT188339.1	3. MN988669.1	3. LR757996.1
4. MN908947.3	52. MT188340.1	4. LR757998.1	4. MN975262.1
5. MN985325.1	53. MT188341.1	5. MT039888.1	5. MT123291.1
6. MN994467.1	54. MT192759.1	6. MT093631.1	6. MT152824.1
7. MN994468.1	55. MT192772.1	7. MT123292.1	7. MT050493.1
8. MN997409.1	56. MT226610.1	8. MT123293.1	8. MT246457.1
9. MT007544.1	57. MT233523.1	9. MT012098.1	9. MT246471.1
10. LR757995.1	58. MT240479.1	10. LC528233.1	US-WA:
11. MT019529.1	59. MT246464.1	11. MT192765.1	10. MT263447.1
12. MT019530.1	60. MT246467.1	12. MT192773.1	11. MT263438.1
13. MT019531.1	61. MT246476.1	13. MT246450.1	12. MT263437.1
14. MT019532.1	62. MT246488.1	14. MT246452.1	13. MT263416.1
15. MT019533.1		15. MT246478.1	14. MT263404.1
16. MT020880.1	CN-HangZhou	16. MT246480.1	15. MT263402.1
17. MT020881.1	63. MT253696.1	US-WA :	16. MT263399.1
18. MT027062.1	64. MT253697.1	17. MT263440.1,	17. MT259282.1
19. MT027063.1	65. MT253698.1	MT263435.1,	18. MT259267.1
20. MT027064.1	66. MT253699.1	MT263411.1,	19. MT259266.1
21. LC521925.1	67. MT253700.1	MT263408.1,	20. MT259264.1
22. MT039873.1	68. MT253701.1	MT263406.1,	21. MT259256.1
23. MT039887.1	69. MT253702.1	MT263394.1,	22. MT259249.1
24. MT039890.1	70. MT253703.1	MT263392.1,	23. MT259235.1
25. LC522972.1	71. MT253704.1	MT262916.1,	24. MT246480.1
26. LC522973.1	72. MT253705.1	MT262915.1,	25. MT246478.1
27. LC522974.1	73. MT253707.1	MT262914.1,	26. MT246452.1
28. LC522975.1	74. MT253708.1	MT262913.1,	27. MT246450.1
29. MT044257.1	75. MT253709.1	MT262912.1,	28. MN908947.2 (removed)
30. MT044258.1	76. MT253710.1	MT262911.1,	
31. MT049951.1		MT262910.1,	
32. MT066175.1	US-WA	MT262909.1,	
33. MT066176.1	77. MT263457.1,	MT262908.1,	
34. MT072688.1	78. MT263434.1,	MT262907.1,	

35. MT093571.1 36. MT106052.1 37. MT106053.1 38. MT106054.1 39. MT123290.1 40. MT126808.1 41. MT135041.1 42. MT135042.1 43. MT135043.1 44. MT135044.1 45. LC528232.1 46. MT121215.1 47. US-Cruise A: (MT159705.1 - MT159722.1; MT184907.1, MT184909.1, MT184912.1)	79. MT263425.1, 80. MT263424.1, 81. MT263415.1, 82. MT263414.1, 83. MT263410.1, 84. MT259286.1, 85. MT259252.1, 86. MT259246.1, 87. MT259243.1, 88. MT259241.1, 89. MT259239.1, 90. MT259231.1, 91. MT259230.1, 92. MT259229.1, 93. MT259228.1, 94. MT259227.1, 95. MT259226.1, 96. MT258378.1, 97. MT276597.1, 98. MT276598.1, 99. MT246471.1, 100. MT246457.1	MT262906.1, MT262905.1, MT262904.1, MT262903.1, MT262902.1, MT262901.1, MT262900.1, MT262899.1, MT262899.1, MT262897.1, MT262896.1, MT259287.1, MT259271.1, MT259254.1, MT259253.1) 18. MT263074.1 19. MT262993.1 20. MT276323.1 21. MT276324.1 22. MT276326.1 23. MT276327.1 24. MT276328.1 25. MT276329.1 26. MT276330.1 27. MT246488.1 28. MT246476.1 29. MT246467.1 30. MT246464.1 31. MT240479.1	

S1 Key symptom prediction:	S2 Key symptom prediction:	S3 Key symptom prediction:
• Chill and fever • Rash/bleeding underneath skin (e.g. rosy spots) • Lung edema • Kidney damage • Surge of steroid hormone may cause miscarriage • Spleen and/or pancreatic failure • Decrease in CNS & brain functions • Flaccid paralysis (may be temporary) • Muscle and joint pain • Increase in RBC • Unstable WBC • Shortness of breath • Headache • Less or no diarrhea • Myocarditis • SHOCK in children	• Symptoms are to SARS • Fever, may have rash • Lung edema • Shortness of breath • Muscle weakness may lead to paralysis • Decrease in WBC • Kidney damage • Unstable of steroid hormone can cause miscarriage • Decrease in CNS & brain functions • Liver failure • Spleen/Pancreatic damage • Unstable blood pressure • Diarrhea • Cough with phlegm	• Low or no fever, more likely to have chill and shivering • Inner lining necrosis (dehydration) of lung, respiratory & digestive tracts • Flaccid paralysis (may be temporary) • May have liver damage • Endocarditis • Loss of hair • Shortness of breath • Sweating • Cough with or without phlegm • Inflammation, dehydration & lesion of inner linings of respiratory and digestive tracts • Pus could be found later in Lung • SHOCK • Unstable blood pressure • Diarrhea • Headache

Table 2. Symptoms Associated with S1, S2 and S3 Predicted based on HUE Charts in Table 1

Note:

1. Sequences that contains errors, such as gaps or characters outside of A, T, C and G, are not include here.

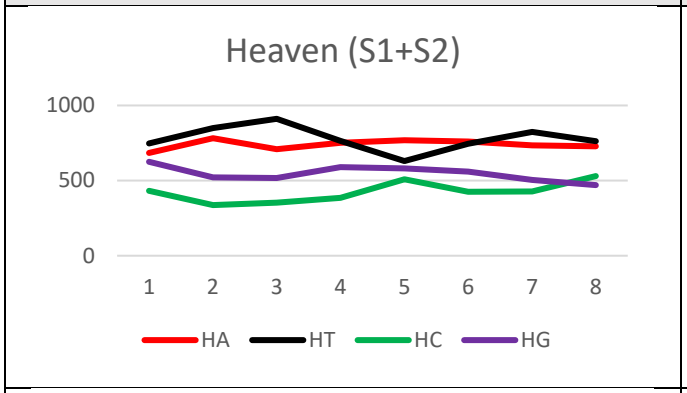
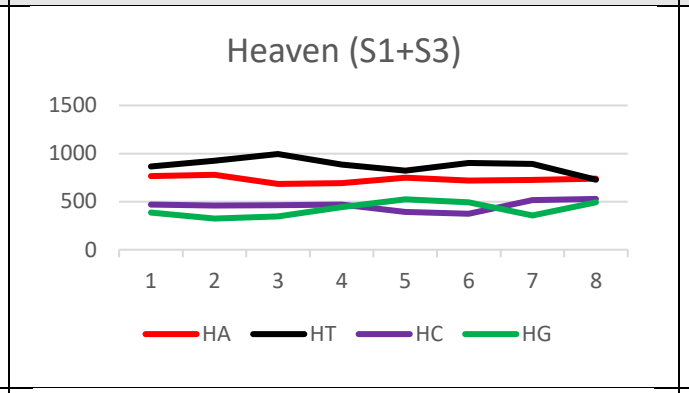
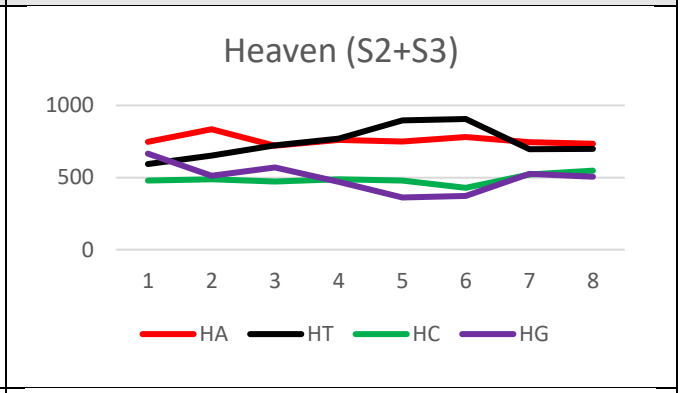
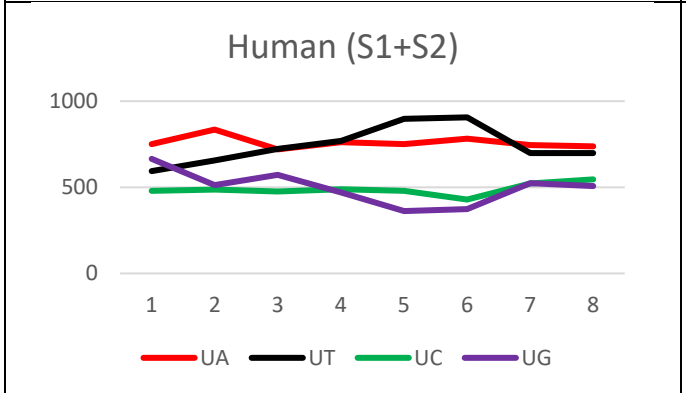
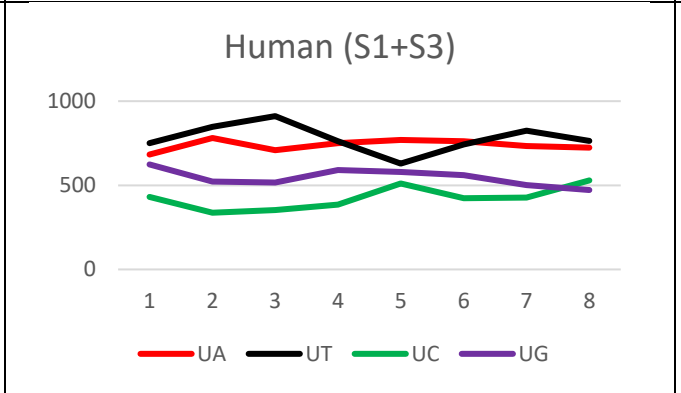
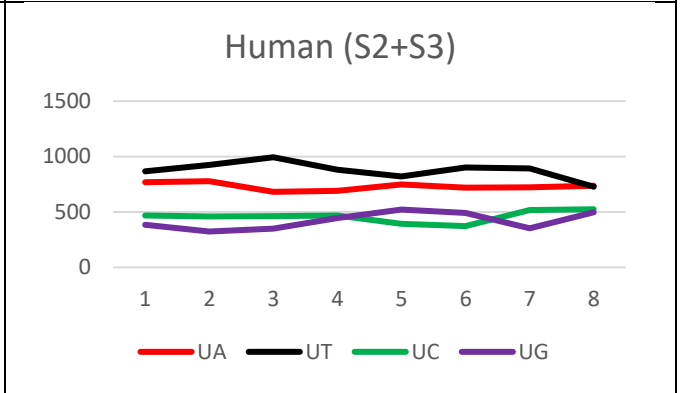
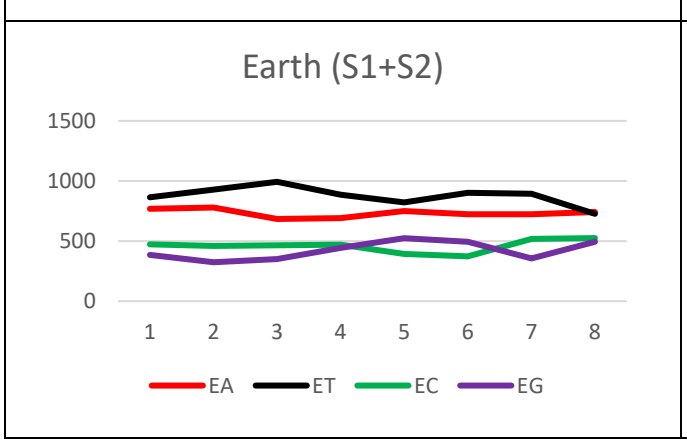
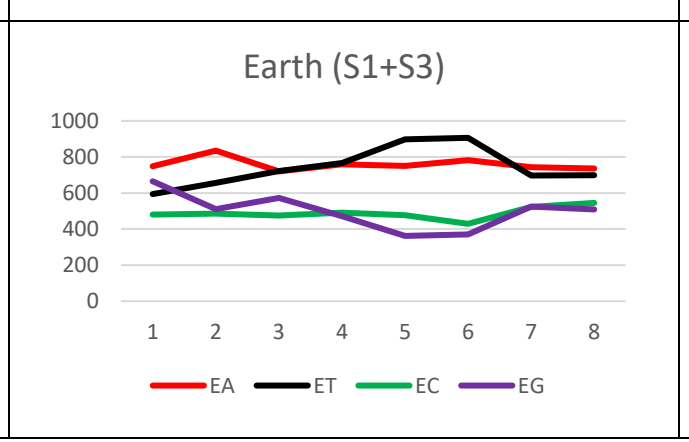
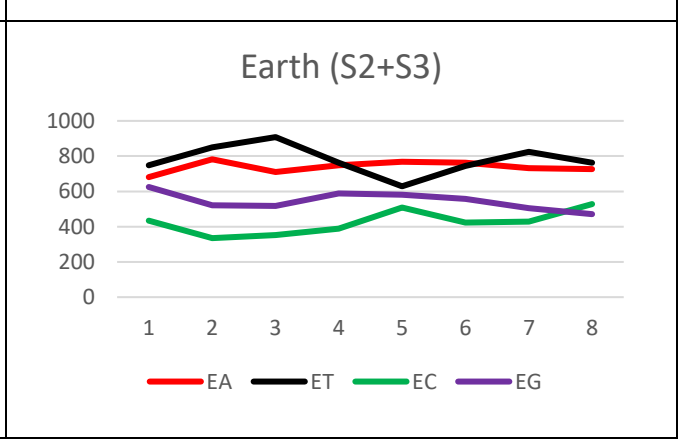
S1+S2	S1+S3	S2+S3
		
		
		

Table 3. HUE Charts (Level 1 of S1+S2, S1+S3 and S2+S3) of Patients Infected with More Than 1 Strain

S1+S2 Key symptom prediction:	S1+S3 Key symptom prediction:	S2+S3 Key symptom prediction:
• Decrease in CNS and brain functions, may lead to coma • Fever and chill • Fatigue, Shortness of breath • Lung edema • Muscle weakness • Low immunity • Diarrhea • Kidney damage • Symptoms may disappear at the end without treatment	• Flaccid paralysis • Fever and chill • Unstable blood pressure • Lung edema • May have endocarditis • Kidney problem • Symptoms may disappear at the end without treatment	• Liver failure • Fever and chill • Diarrhea • Lung edema • Symptoms may disappear at the end without treatment

Table 4 Symptoms Predicted based on HUE Charts in Table 3.

S1+S2+S3	Key Symptoms Prediction

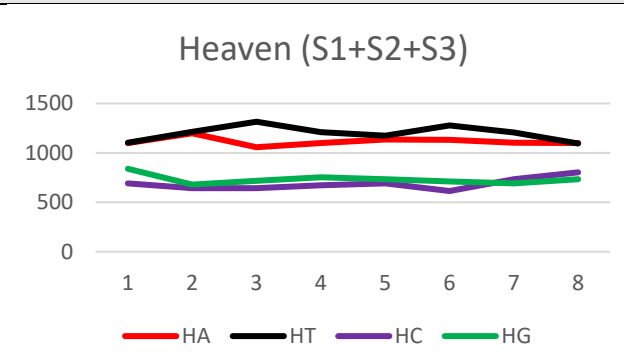
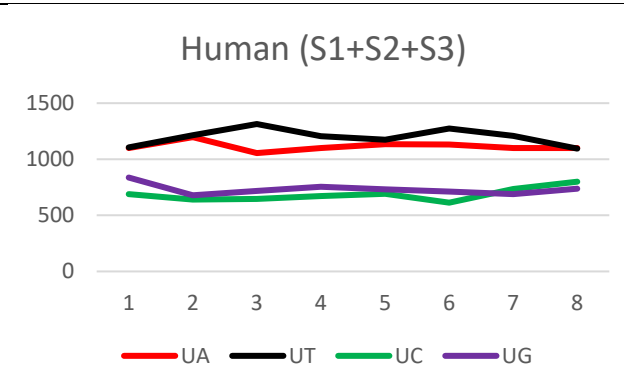
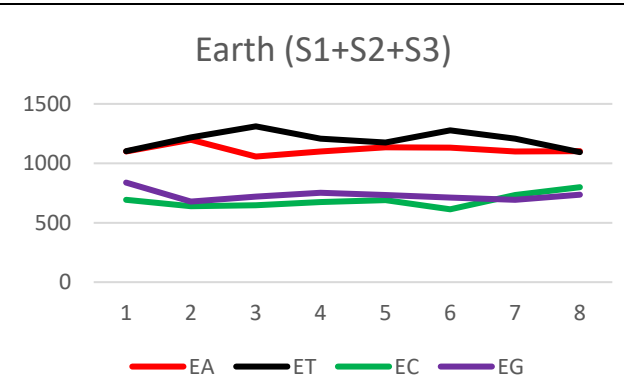

 
 
	• Chill, some may have fever and chill
	• Extreme fatigue
	• Shortness of breath
	• Pneumonia symptoms (cough with phlegm), pus
	• Diarrhea
	• Miscarriage
	• Some patients may be asymptomatic
	• When the viruses reach a critical number, the patient may suddenly
	  ○ faint due to brain/CNS failure
	  ○ become paralyzed due to tendon and muscle failure
	  ○ **drop dead** due to one or more organ failure (brain, liver, muscle, tendon, kidney)

Table 5. HUE Charts and Symptoms Predicted for S1+S2+S3