

Genetic coding; New research applications and insights

“The Week”, 11th April 2020, explored the state of disarray over COVID 19 testing. An extract from the Guardian reminded us that the two different types of test are -

- The antigen test – by swabbing the upper airway – detects whether a person is carrying the virus. Swabs are sent to a Lab. Many swabs call for big lab space.
- The antibody test measures circulating antibodies to COVID 19 in a drop of blood. The test kits purchased by the Government have not proved accurate enough. Presumably, there are false positives – allowing freedom of movement to someone still vulnerable, and false negatives – requiring someone now immune to continue in confinement

The Telegraph Science Editor, Saturday 11th April, reported a Cambridge Genetics Study showing how the Coronavirus first took hold in humans.

To paraphrase Sarah Knapton, the study applies “Phylogenetic techniques”, usually reserved for tracing the migration of early human ancestors, to study the COVID 19 outbreak. They have discovered that there have been three distinct variants of Coronavirus early on, since that virus transferred to humans in Wuhan last December (2019). Three types of Covid 19 have followed different migratory paths across the globe, possibly because they have mutated to be better at infecting specific populations.

Variant A is the ancestral Wuhan strain which is most closely related to the Coronavirus found in bats and pangolins

Type B is the mutation of a mutation of variant A. **Type C** is a mutation (“Daughter”) of type B – i.e. a third generation mutation. This **Type C** variant was located in **Singapore and off-shore East Asia**. An engineer who attended a Singapore conference returned to the UK via a ski chalet in the Alps became a ‘super-spreader’*, and contributed to our pandemic. *Type C infected Britain and Europe, but is not found in China at all.*

Geneticist, Dr. Peter Forster, the Cambridge University Study’s Lead Author, explained that the phylogenetic technique makes possible the tracing of the

earliest evolutionary paths of COVID 19 before becoming obscured by “**vast numbers of mutations**”. Surprisingly, the countries from which a specific variant type first spread appear to be having most success in controlling the virus. Thus Singapore and Hong Kong have had no crisis yet.

What about Germany? They have 110,000 cases and only 2,349 deaths. The research shows that both **Germany** (27th January) and a **Singapore cluster** together sparked the devastating outbreak **in Italy**. With resorts full of half term skiers, more **type C variant crossed into the UK** *

The USA early cases were mutated variants of **type A from China**. These affected Australia too. Type A is **largely absent from Europe**.

This data is taken from 160 virus genomes sampled from 24th December to 4th March. Wuhan type A has not shown much mutation, perhaps because it is immunologically or environmentally adapted to a large section of the population of East Asia. Perhaps this population is more homogeneous.

By contrast the other Coronavirus types have shown accelerated rates of mutation, perhaps in order to adapt to populations of people with different immunological responses. This may relate to possibly greater genetic diversity in Western populations.

The study depends on amassing genome **decoding results from centres in different countries**. Spain and Germany have decoded a few dozen each, Italy fewer than ten. Perhaps those Laboratories have been retasked to more urgent real time testing! In consequence of these limited numbers the **authors cannot yet say** whether Covid 19 mutations produce some variant types more lethal than others

Question 1, I wonder- Are tests purchased from China better at detecting variant A than our own variant type C, or are there other dissatisfactions?

Question 2, How does this impact the work of the vaccine laboratories in Oxford under Prof. Sarah Gilbert? In a recent Radio 4 interview she spoke of help arriving this year by increasing production **ahead** of positive study results!

Dr. David R Hughes

President

14th April 2020