

CLAIMS

1. A method for determining the probability a human subject will develop a severe response to a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, the method comprising:
 - i) performing a genetic risk assessment of the human subject, wherein the genetic risk assessment comprises:
 - (a) detecting, in a biological sample derived from the human subject, polymorphisms at rs10755709, rs112317747, rs112641600, rs118072448, rs2034831, rs7027911 and rs71481792;
 - (b) determining the number of risk alleles at each of rs10755709, rs112317747, rs112641600, rs118072448, rs2034831, rs7027911 and rs71481792, wherein;
 - i) G is the risk allele at rs10755709;
 - ii) C is the risk allele at rs112317747;
 - iii) T is the risk allele at rs112641600;
 - iv) C is the risk allele at rs118072448;
 - v) C is the risk allele at rs2034831;
 - vi) A is the risk allele at rs7027911; and
 - vii) T is the risk allele at rs71481792;
 - (c) multiplying the number of risk alleles at each of rs10755709, rs112317747, rs112641600, rs118072448, rs2034831, rs7027911 and rs71481792 by their respective SNP β coefficients; and
 - (d) adding together the numbers produced in step (i)(c) to produce a SNP Risk Factor (SRF);
 - ii) performing a clinical risk assessment of the human subject, wherein the clinical risk assessment comprises:
 - (a) obtaining information from the subject on age, gender, race/ethnicity, height, weight, does the human have or has had a cerebrovascular disease, does the human have or has had a chronic kidney disease, does the human have or has had diabetes, does the human have or has had a haematological cancer, does the human have or has had hypertension, does the human

have or has had a non-haematological cancer, and does the human have or has had a respiratory disease (other than asthma);

(b) assigning a clinical β coefficient based on each piece of information obtained from the subject in step (ii) (a);

- iii) combining the genetic risk assessment with the clinical risk assessment using the following formula, Log Odds (LO) = $-1.36523 + \text{SRF} + \sum \text{Clinical } \beta \text{ coefficients}$
- iv) determining the probability the subject will develop a severe response to a SARS-CoV-2 infection using the following formula:
 $e^{\text{LO}} / (1 + e^{\text{LO}})$, which is then multiplied by 100.

2. The method of claim 1, wherein in the genetic risk assessment:

- i) the β coefficient for the risk allele at rs10755709 is 0.124239;
- ii) the β coefficient for the risk allele at rs112317747 is 0.2737487;
- iii) the β coefficient for the risk allele at rs112641600 is -0.2362513;
- iv) the β coefficient for the risk allele at rs118072448 is -0.1995879;
- v) the β coefficient for the risk allele at rs2034831 is 0.2371955;
- vi) the β coefficient for the risk allele at rs7027911 is 0.1019074; and
- vii) the β coefficient for the risk allele at rs71481792 is -0.1058025.

3. The method of claim 1, wherein the subject is between 18 and 84 years of age and in the clinical risk assessment

- a) a β coefficient of -1.3111 is assigned if the subject is between 18 and 29 years of age;
- b) a β coefficient of -0.8348 is assigned if the subject is between 30 and 39 years of age;

- c) a β coefficient of -0.4038 is assigned if the subject is between 40 and 49 years of age;
- d) a β coefficient of 0.5747727 is assigned if the subject is between 70 and 74 years of age;
- e) a β coefficient of 0.8243711 is assigned if the subject is between 75 and 79 years of age;
- f) a β coefficient of 1.013973 is assigned if the subject is between 80 and 84 years of age;
- g) a β coefficient of 0.2444891 is assigned if the subject is male;
- h) a β coefficient of 0.29311 is assigned if the subject is an ethnicity other than Caucasian;
- i) the subjects height (in metres (m)) and weight (in kilograms (kg)) is applied to the formula: (10 times m²) divided by kg, which is multiplied by -1.602056 to provide the β coefficient to be assigned;
- j) a β coefficient of 0.4041337 is assigned if the subject has ever been diagnosed as having a cerebrovascular disease;
- k) a β coefficient of 0.6938494 is assigned if the subject has ever been diagnosed as having a chronic kidney disease;
- l) a β coefficient of 0.4297612 is assigned if the subject has ever been diagnosed as having diabetes;
- m) a β coefficient of 1.003877 is assigned if the subject has ever been diagnosed as having haematological cancer;
- n) a β coefficient of 0.2922307 is assigned if the subject has ever been diagnosed as having hypertension;
- o) a β coefficient of 0.2558464 is assigned if the subject has ever been diagnosed as having a non-haematological cancer; and
- p) a β coefficient of 1.173753 is assigned if the subject has ever been diagnosed as having a respiratory disease (other than asthma).

4. The method of claim 1, further comprising comparing the probability to a predetermined threshold, wherein if the probability is at, or above, the threshold the subject is

assessed as being at risk of developing a severe response to a SARS-CoV-2 infection.

5. A method for determining the probability a human subject will develop a severe response to a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, the method comprising:
 - i) performing a genetic risk assessment of the human subject, wherein the genetic risk assessment comprises:
 - (a) detecting, in a biological sample derived from the human subject, polymorphisms at rs10755709, rs112317747, rs112641600, rs118072448, rs2034831, rs7027911 and rs71481792;
 - (b) determining the number of risk alleles at each of rs10755709, rs112317747, rs112641600, rs118072448, rs2034831, rs7027911 and rs71481792, wherein:
 - i) G is the risk allele at rs10755709;
 - ii) C is the risk allele at rs112317747;
 - iii) T is the risk allele at rs112641600;
 - iv) C is the risk allele at rs118072448;
 - v) C is the risk allele at rs2034831;
 - vi) A is the risk allele at rs7027911; and
 - vii) T is the risk allele at rs71481792;
 - (c) multiplying the number of risk alleles at each of rs10755709, rs112317747, rs112641600, rs118072448, rs2034831, rs7027911 and rs71481792 by their respective SNP β coefficient, wherein
 - i) the β coefficient for the risk allele at rs10755709 is 0.124239;
 - ii) the β coefficient for the risk allele at rs112317747 is 0.2737487;
 - iii) the β coefficient for the risk allele at rs112641600 is -0.2362513;
 - iv) the β coefficient for the risk allele at rs118072448 is -0.1995879;
 - v) the β coefficient for the risk allele at rs2034831 is 0.2371955;

- vi) the β coefficient for the risk allele at rs7027911 is 0.1019074; and
- vii) the β coefficient for the risk allele at rs71481792 is -0.1058025; and
- (d) adding together the numbers produced in step (i)(c) to produce a SNP Risk Factor (SRF);
- ii) performing a clinical risk assessment of the human subject wherein the clinical risk assessment comprises:
 - (a) obtaining information from the subject on age, gender, race/ethnicity, height, weight, does the human have or has had a cerebrovascular disease, does the human have or has had a chronic kidney disease, does the human have or has had diabetes, does the human have or has had a haematological cancer, does the human have or has had hypertension, does the human have or has had a non-haematological cancer, and does the human have or has had a respiratory disease (other than asthma); and
 - (b) assigning a clinical β coefficient based on each piece of information obtained from the subject in step (ii)(a), wherein:
 - i) a β coefficient of -1.3111 is assigned if the subject is between 18 and 29 years of age;
 - ii) a β coefficient of -0.8348 is assigned if the subject is between 30 and 39 years of age;
 - iii) a β coefficient of -0.4038 is assigned if the subject is between 40 and 49 years of age;
 - iv) a β coefficient of 0.5747727 is assigned if the subject is between 70 and 74 years of age;
 - v) a β coefficient of 0.8243711 is assigned if the subject is between 75 and 79 years of age;
 - vii) a β coefficient of 1.013973 is assigned if the subject is between 80 and 84 years of age;
 - viii) a β coefficient of 0.2444891 is assigned if the subject is male;

- ix) a β coefficient of 0.29311 is assigned if the subject is an ethnicity other than Caucasian;
 - x) the subjects height (in metres (m)) and weight (in kilograms (kg)) is applied to the formula: (10 times m²) divided by kg, which is multiplied by -1.602056 to provide the β coefficient to be assigned;
 - xi) a β coefficient of 0.4041337 is assigned if the subject has ever been diagnosed as having a cerebrovascular disease;
 - xii) a β coefficient of 0.6938494 is assigned if the subject has ever been diagnosed as having a chronic kidney disease;
 - xiii) a β coefficient of 0.4297612 is assigned if the subject has ever been diagnosed as having diabetes;
 - xiv) a β coefficient of 1.003877 is assigned if the subject has ever been diagnosed as having haematological cancer;
 - xv) a β coefficient of 0.2922307 is assigned if the subject has ever been diagnosed as having hypertension;
 - xvi) a β coefficient of 0.2558464 is assigned if the subject has ever been diagnosed as having a non-haematological cancer; and
 - xvii) a β coefficient of 1.173753 is assigned if the subject has ever been diagnosed as having a respiratory disease (other than asthma);
- iii) combining the genetic risk assessment with the clinical risk assessment using the following formula:
- $$\text{Log Odds (LO)} = -1.36523 + \text{SRF} + \sum \text{Clinical } \beta \text{ coefficients};$$
- and
- iv) determining the probability the subject will develop a severe response to a SARS-CoV-2 infection using the following formula:
- $$e^{\text{LO}} / (1 + e^{\text{LO}}), \text{ which is then multiplied by 100.}$$

6. The method of claim 5, further comprising comparing the probability to a predetermined threshold, wherein if the probability is at, or above, the threshold the subject is assessed as being at risk of developing a severe response to a SARS-CoV-2 infection.