CLAIMS

1. A method of determining patient response to a neuropharmacological intervention, comprising the steps of:

obtaining structural neurological data from a plurality of patients before neuropharmacological intervention, said structural neurological data indicative of a physical structure of a plurality of cortical regions;

generating a first correlation matrix from the structural neurological data by:

assigning a plurality of structure nodes corresponding to cortical regions of the brain; and

determining pair-wise correlations between pairs of the structure nodes based at least in part on corresponding data of the structural neurological data;

obtaining further structural neurological data from the plurality of patients after neuropharmacological intervention, said further structural neurological data indicative of the physical structure of the plurality of cortical regions; and

generating a second correlation matrix from the further structural neurological data by:

determining pair-wise correlations between pairs of the structure nodes based at least in part on corresponding data of the further structural neurological data;

the method including:

comparing the first correlation matrix and the second correlation matrix, and thereby determining patient response to the neuropharmacological intervention.

2. The method of claim 1, wherein the physical structure is cortical thickness and/or surface area.

3. The method of either claim 1 or claim 2, wherein a p-value is determined for each pair-wise correlation, and is compared to a significance level, wherein only p-values less than the significance level are used to generate the corresponding correlation matrix.

4. The method of any preceding claim, wherein comparing the first correlation matrix and the second correlation matrix includes comparing a number and/or density of inverse correlations in the first correlation matrix to a number and/or density of inverse correlations in the second correlation matrix.

5. The method of any preceding claim, wherein assigning the plurality of structure nodes corresponding to cortical regions of the brain further includes defining groups which contain structure nodes corresponding to homologous or non-homologous lobes.

6. The method of claim 5, wherein comparing the first correlation matrix and the second correlation matrix includes comparing the number and/or density of correlations between different groups of structure nodes.

7. The method of either claim 5 or claim 6, wherein comparing the first correlation matrix and the second correlation matrix includes comparing the number and/or density of correlations between groups of structure nodes located respectively in the frontal lobe and the parietal and occipital lobes.

8. The method of any preceding claim, wherein the patients have been diagnosed with a neurocognitive disease.

9. The method of any preceding claim, wherein the neuropharmacological intervention is a disease modifying pharmaceutical, which is optionally a tau aggregation inhibitor.

10. The method of any of claims 1 - 8, wherein the neuropharmacological intervention is a symptomatic treatment.

11. The method of any preceding claim, wherein the neuropharmacological intervention is a disease modifying pharmaceutical, and efficacy is established by reduction in number and/or density of correlations between anterior and posterior brain regions of the first correlation matrix and the second correlation matrix.

12. The method of any preceding claim, wherein the structural neurological data is obtained via magnetic resonance imaging.

13. A method of determining a patient's likelihood of developing one or more neurological disorders, comprising the steps of:

obtaining data indicative of electrical activity within the brain of the patient;

generating a network, based at least in part on the obtained data, said network comprising a plurality of nodes and directed connections between nodes, wherein the network is indicative of a flow of the electrical activity within the brain of the patient;

calculating, for each node, a difference in a number and/or strength of connections into the node and a number and/or strength of connections out of the node; and

determining, using the calculated differences, the patient's likelihood of developing one or more neurological disorders.

14. A system configured to perform the method of any of claims 1 – 12, the system comprising:

data acquisition means, configured to obtain the structural neurological data;

correlation matrix generation means, configured to generate the first correlation matrix and the second correlation matrix;

wherein the system further comprises either:

display means, for presenting the first correlation matrix and second correlation matrix; or

comparison means, for comparing the first correlation matrix and the second correlation matrix, and thereby determining patient response to the neuropharmacological intervention.

15. A system configured to perform the method of claim 13, the system comprising:

data acquisition means, configured to obtain the data indicative of electrical activity within the brain of the patient;

network generating means, configured to generate the network based at least in part on the obtained data;

difference calculation means, configured to calculate, for each node, the difference in a number and/or strength of connections into the node and a number and/or strength of connections out of the node; and either:

display means, configured to display a representation of the calculated differences; or

determination means, configured to determine using the calculated differences, the patient's susceptibility to one or more neurological disorders.

16. A computer program comprising executable code stored on a non-transitory storage medium which, when run on a computer, causes the computer to perform the method of any of claims 1 – 12.

17. A computer program comprising executable code stored on a non-transitory storage medium which, when run on a computer, causes the computer to perform the method of claim 13.

18. A method of any of claims 1-12, or a system of claim 14, or a computer program of claim 16, wherein the patient response to a neuropharmacological intervention is determined in the context of a clinical trial for assessing the efficacy of a pharmaceutical in the treatment of the or a neurocognitive disease, and the the efficacy of the pharmaceutical is assessed in whole or in part based on comparison of the patient group response with a comparator group who have not received the intervention.

19. A method of determining a patient response to a neuropharmacological intervention against a neurological disorder, comprising the steps of, before the neuropharmacological intervention, of:

(a) obtaining data indicative of electrical activity within the brain of the patient;

(b) generating a network, based at least in part on the obtained data, said network comprising a plurality of nodes and directed connections between nodes, wherein the network is indicative of a flow of the electrical activity within the brain of the patient;

(c) calculating, for each node, a difference in a number and/or strength of connections into the node and a number and/or strength of connections out of the node; and

(d) determining, using the calculated differences, the patient's status in relation to the neurological disorder;

(e) repeating steps (a) – (d), after the neuropharmacological intervention, to determine a further status of the patient in relation to the neurological disorder; and

(f) determining, based on said first status and said second status, the patient response to the neuropharmacological intervention.

20. A system adapted to perform the method of claim 19.