CLAIMS

1. A method for predicting a suitable therapy for treating a patient, the method comprising:
   a) measuring a response output for each candidate drug from an initial set of candidate drugs in an ex vivo sample obtained from the patient at one or more predetermined doses of the candidate drug;
   b) determining a minimum set of test combinatorial therapies from the initial set of candidate drugs; wherein each test combinatorial therapy comprises zero, one or more candidate drugs at predetermined doses; wherein the predetermined doses are doses below clinically approved doses; wherein the minimum set of test combinatorial therapies is determined according to an ~~composite experimental design~~ orthogonal array composite design (OACD) resolution IV design;
   c) measuring a response output for each test combinatorial therapy in the set in a sample obtained from the patient to determine a relationship between the response output and the corresponding predetermined doses of the candidate drugs, the relationship including one or more components indicative of respective drug-drug interactions;
   d) predicting a suitable therapy for treating the patient based on the derived relationship.

~~2. A method according to claim 1, wherein the composite experimental design is an orthogonal array composite design (OACD).~~

~~3. A method according to claim 2, wherein the composite experimental design is an OACD resolution IV design.~~

~~4.~~2. The method of ~~any one of~~ claim~~s~~ 1 ~~to 3~~, wherein the candidate drugs are clinically approved drugs or investigational drugs.

~~5. The method of any one of claims 1 to 4, wherein the one or more candidate drugs are selected from the group consisting of Cyclophosphamide (Cyclo), Doxorubucin (Dox), Etoposide (Etop), Cytarabine (Cyta), Gemcitabine, Dexamethasone (Dex),~~

~~Cisplatin (Cisp), Methotrexate (Metho), Ifosfamide (IFos), L asparaginase (L asp) and Bortezomib.~~

~~6. The method of any one of claims 1 to 5, wherein the predetermined doses are doses below clinically approved doses.~~

3. The method of 1 or 2, wherein the *ex vivo* sample comprises patient tumor cells.

4. The method of any one of 1 to 3, wherein the ex vivo sample is a patient-derived organoid.

5. The method of any one of 1 to 4, wherein the ex vivo sample is a patient-derived xenograft.

6. The method of any one of 1 to 5, wherein the method further comprises generating a heat map illustrating patient-specific response output for a subset of test combinatorial therapies based on the measured response output.

7. The method of any one of 1 to 6, wherein the method comprises ranking each test combinatorial therapy based on the measured response output.

~~7.~~8. The method of any one of claims 1 to ~~6~~7, wherein the relationship between the response output and the corresponding predetermined doses of the one or more drugs in step c) is represented by the second order quadratic equation:

$$y=\beta_0 +\beta_1 x_1 + ... + \beta_n x_n + \beta_{12} x_1 x_2 + ... +\beta_{mn} x_m x_n +\beta_{11} x_1^2 + ... +\beta_{nn} x_n^2$$

where y represents the desired output, x_n is the nth drug dose, β_0 is an intercept term, β_n is a single-drug coefficient of the n^{th} drug, β_{mn} is an interaction coefficient between the m^{th} and n^{th} drugs such that $\beta_{mn} x_m x_n$ is one of said components indicative of a drug-drug interaction for the m^{th} and n^{th} drugs, and β_{nn} is a quadratic coefficient for the n^{th} drug.

~~8.~~9. The method of any one of claims 1 to ~~7~~8, wherein the patient is a cancer patient.

~~9.~~10. The method of claim ~~8~~9, wherein the cancer is a solid or haematological cancer.

~~10.~~11. The method of any one of claims 1 to ~~9~~10, wherein the therapy is a personalized therapy.

12. The method of any one of claims 1 to ~~10~~11, wherein the ~~method further comprises treating the~~ patient is to be treated by the suitable therapy.

~~11.~~13. The method of any one of claims 1 to 12, further comprising selecting a patient for a clinical trial based on the predicted therapy.

~~12.~~14. A method for selecting a suitable therapy for treating a patient, the method comprising:

a) measuring a response output for each candidate drug from an initial set of candidate drugs in an ex vivo sample obtained from the patient at one or more predetermined doses of the candidate drug;

b) determining a minimum set of test combinatorial therapies from the initial set of candidate drugs; wherein each test combinatorial therapy comprises zero, one or more candidate drugs at predetermined doses; wherein the predetermined doses are doses below clinically approved doses; wherein the minimum set of test combinatorial therapies is determined according to an ~~composite experimental design~~ orthogonal array composite design (OACD) resolution IV design;

c) measuring a response output for each test combinatorial therapy in the set in a sample obtained from the patient to determine a relationship between the response output and the corresponding predetermined doses of the candidate drugs, the relationship including one or more components indicative of respective drug-drug interactions; and

d) selecting a suitable therapy for treating the patient based on the derived relationship.

~~13.~~15. A method for screening a drug combination for treating a patient, the method comprises:

a) measuring a response output for each candidate drug from an initial set of candidate drugs in an ex vivo sample obtained from the patient at one or more predetermined doses of the candidate drug;

b) determining a minimum set of test combinatorial therapies from the initial set of candidate drugs; wherein each test combinatorial therapy comprises zero, one or more candidate drugs at predetermined doses; wherein the predetermined doses are doses below clinically approved doses; wherein the minimum set of test combinatorial therapies is determined according to an orthogonal array composite design (OACD) resolution IV design ~~a composite experimental design~~;

c) measuring a response output for each test combinatorial therapy in the set in a sample obtained from the patient to determine a relationship between the response output and the corresponding predetermined doses of the candidate drugs, the relationship including one or more components indicative of respective drug-drug interactions; and

d) selecting a drug combination for treating the patient based on the derived relationship.

~~14. A method of treating a patient, the method comprising:~~

~~a) measuring a response output for each candidate drug from an initial set of candidate drugs in a sample obtained from the patient at one or more predetermined doses of the candidate drug;~~

~~b) determining a minimum set of test combinatorial therapies from the initial set of candidate drugs; wherein each test combinatorial therapy comprises zero, one or more candidate drugs at predetermined doses; wherein the minimum set of test combinatorial therapies is determined according to a composite experimental design;~~

~~c) measuring a response output for each test combinatorial therapy in the set in a sample obtained from the patient to determine a relationship between the response output and the corresponding predetermined doses of the candidate drugs, the~~

~~relationship including one or more components indicative of respective drug-drug interactions;~~

~~d) selecting a suitable therapy for treating the patient based on the derived relationship; and~~

~~e) treating the patient with the therapy.~~

~~The method of claim 14, wherein the method comprises administering the one or more drugs concurrently or sequentially to the patient.~~