patient factors, but also observed patient-specific responses that are not accounted for within the models themselves, and that reflect BSV that distinguishes the specific patient from the typical patient reflected by the model.

[0020A] Herein disclosed is a method for providing a patient-specific dosing regimen for treatment with a medication using a computerized medication dosing regimen recommendation system, the system comprising a microprocessor, a memory, and a database stored in the memory, the database being accessible by the microprocessor and storing information indicative of dosing regimens configured for use with the medication, the method comprising operating the system to: store a plurality of mathematical models in the memory, each model describing response profiles for a population of patients treated with the medication, each model further describing a plurality of typical patient responses as a function of covariate patient factors; receive data indicative of characteristics of a specific patient, wherein characteristics of the specific patient include at least one of disease stage, disease status, prior therapy, concomitant diseases, demographic information, and laboratory test result information; select a mathematical model from the plurality of mathematical models in the memory to match the characteristics of the specific patient with covariate patient factors of the selected mathematical model; receive a first plurality of proposed dosing regimens from the database; forecast at least one typical patient response from the plurality of typical patient responses for each of the first plurality of proposed dosing regimens as a function of the selected model; select a recommended typical dosing regimen suitable for a typical patient having the specific patient's characteristics; provide, as output from the system, the recommended typical dosing regimen; receive

data reflecting an observed response of the specific patient to an administered dosing regimen; update the selected model as a function of the observed patient response data, to create an updated patient-specific mathematical model; receive a second plurality of proposed dosing regimens from the database; forecast a patient-specific response for each of the second plurality of proposed dosing regimens, as a function of the updated patient-specific mathematical model; select a recommended patient-specific dosing regimen suitable for the specific patient; and provide, as output from the system, the recommended patient-specific dosing regimen.

[0020B] Herein disclosed is a method for providing a patient-specific dosing regimen for treatment with a medication using a computerized medication dosing regimen recommendation system, the system comprising a microprocessor, a memory, and a plurality of mathematical models, each of the plurality of mathematical models describing response profiles for a population of patients treated with the medication, each model further describing typical patient responses as a function of covariate patient factors, the method comprising operating the system to: perform Bayesian model averaging to develop a composite model as a function of the plurality of mathematical models and characteristics of a specific patient corresponding to the covariate patient factors of the models, the composite model describing a response profile for a typical patient having as covariate patient factors the specific patient's characteristics, wherein characteristics of the specific patient include at least one of disease stage, disease status, prior therapy, concomitant diseases, demographic information, and laboratory test result information; process the composite model to perform Bayesian forecasting to forecast a typical patient response for each of a first

plurality of proposed dosing regimens as a function of the composite model; select, from a set of forecasted typical patient responses, a recommended typical dosing regimen suitable for a typical patient having the specific patient's characteristics, the recommended typical dosing regimen being selected to achieve a predefined target response; provide, as output from the system, the recommended typical dosing regimen; receive data reflecting an observed response of the specific patient to an administered dosing regimen; perform a Bayesian update to each of the plurality of mathematical models, as a function of the observed patient response data, to create a corresponding plurality of updated patient-specific mathematical models; perform Bayesian model averaging of the plurality of updated patient-specific mathematical models to develop an updated patient-specific composite model; perform Bayesian forecasting to forecast a patient-specific response for each of a second plurality of proposed dosing regimens, as a function of the updated patient-specific composite model; select, from a set of forecasted patient-specific responses, a recommended patient-specific dosing regimen suitable for the specific patient, the recommended patient-specific dosing regimen being selected to achieve the predefined target response; and provide, as output from the system, the recommended patient-specific dosing regimen.

[0020C] Herein disclosed is a method for providing a patient-specific dosing regimen for treatment with a medication using a computerized medication dosing regimen recommendation system, the system comprising a microprocessor, a memory, and a plurality of mathematical models, each of the plurality of mathematical models describing response profiles for a population of patients treated with the medication,

each model further describing typical patient responses as a function of covariate patient factors, the method comprising operating the system to: perform Bayesian model averaging to develop a composite model as a function of the plurality of mathematical models and characteristics of a specific patient corresponding to the covariate patient factors of the models, the composite model describing a response profile for a typical patient having as covariate patient factors the specific patient's characteristics, wherein characteristics of the specific patient include at least one of disease stage, disease status, prior therapy, concomitant diseases, demographic information, and laboratory test result information; process the composite model to perform Bayesian forecasting to forecast a patient response for each of a first plurality of proposed dosing regimens as a function of the composite model; select, from a set of forecasted typical patient responses, a recommended typical dosing regimen suitable for a typical patient having the specific patient's characteristics, the recommended typical dosing regimen being selected to achieve a predefined target response; and provide, as output from the system, the recommended typical dosing regimen.

[0020D] Herein disclosed is a method for providing a patient-specific dosing regimen for treatment with a medication using a computerized medication dosing regimen recommendation system, the system comprising a microprocessor, a memory, and a plurality of mathematical models, each of the plurality of mathematical models describing response profiles for a population of patients treated with the medication, each model further describing typical patient responses as a function of covariate patient factors, the method comprising operating the system to: perform Bayesian model averaging to develop a composite model as a function of the plurality of

mathematical models and characteristics of a specific patient corresponding to the covariate patient factors of the models, the composite model describing a response profile for a typical patient having as covariate patient factors the specific patient's characteristics, wherein characteristics of the specific patient include at least one of disease stage, disease status, prior therapy, concomitant diseases, demographic information, and laboratory test result information; receive data reflecting an observed response of the specific patient to an administered dosing regimen; perform a Bayesian update to each of the plurality of mathematical models, as a function of the observed patient response data, to create a corresponding plurality of updated patient-specific mathematical models; perform Bayesian model averaging of the plurality of updated patient-specific mathematical models to develop an updated patient-specific composite model; and provide, as output from the system, the updated patient-specific composite model.

[0020E] Herein disclosed is a method for providing a patient-specific dosing regimen for treatment with a medication using a computerized medication dosing regimen recommendation system, the system comprising a microprocessor, a memory, and at least one mathematical models, each mathematical model describing response profiles for a population of patients treated with the medication, each model further describing typical patient responses as a function of covariate patient factors, the method comprising operating the system to: process the model to perform Bayesian forecasting to forecast a patient response for each of a first plurality of proposed dosing regimens as a function of the model; select, from a set of forecasted typical patient responses, a recommended dosing regimen suitable for a typical patient having the

specific patient's characteristics, wherein characteristics of the specific patient include at least one of disease stage, disease status, prior therapy, concomitant diseases, demographic information, and laboratory test result information, the recommended typical dosing regimen being selected to achieve a predefined target response; provide, as output from the system, the recommended typical dosing regimen; receive data reflecting an observed response of the specific patient to an administered dosing regimen; perform a Bayesian update to each mathematical model, as a function of the observed patient response data, to create a corresponding updated patient-specific mathematical model; perform Bayesian forecasting to forecast a patient-specific response for each of a second plurality of proposed dosing regimens, as a function of each updated patient-specific model; select, from a set of forecasted patient-specific responses, a recommended patient-specific dosing regimen suitable for the specific patient, the recommended patient-specific dosing regimen being selected to achieve the predefined target response; and provide, as output from the system, the recommended patient-specific dosing regimen.

[0020F] Herein disclosed is a method for providing a patient-specific dosing regimen for treatment with a medication using a computerized medication dosing regimen recommendation system, the system comprising a microprocessor, a memory, and at least one mathematical models, each mathematical model describing response profiles for a population of patients treated with the medication, each model further describing typical patient responses as a function of covariate patient factors, the method comprising operating the system to: receive data reflecting an observed response of the specific patient to an administered dosing regimen; perform a Bayesian

update to each mathematical model, as a function of the observed patient response data, to create a corresponding updated patient-specific mathematical model; perform Bayesian forecasting to forecast a patient-specific response for each of a second plurality of proposed dosing regimens, as a function of each updated patient-specific model; select, from a set of forecasted patient-specific responses, a recommended patient-specific dosing regimen suitable for the specific patient, the recommended patient-specific dosing regimen being selected to achieve the predefined target response; and provide, as output from the system, the recommended patient-specific dosing regimen.

[0020G] Herein disclosed is a method for providing a patient-specific dosing regimen for treatment with a medication using a computerized medication dosing regimen recommendation system, the system comprising a microprocessor, a memory, and at least two mathematical models, each mathematical model describing response profiles for a population of patients treated with the medication, each model further describing typical patient responses as a function of covariate patient factors, the method comprising operating the system to: process each respective model to perform Bayesian forecasting to forecast a typical patient response for each of a first plurality of proposed dosing regimens as a function of the respective model; select, from a set of forecasted typical patient responses, a recommended dosing regimen suitable for a typical patient having the specific patient's characteristics, wherein characteristics of the specific patient include at least one of disease stage, disease status, prior therapy, concomitant diseases, demographic information, and laboratory test result information, the recommended typical dosing regimen being selected to achieve a predefined target

response; provide, as output from the system, the recommended typical dosing regimen; receive data reflecting an observed response of the specific patient to an administered dosing regimen; perform a Bayesian update to each mathematical model, as a function of the observed patient response data, to create a corresponding updated patient-specific mathematical model; and provide, as output from the system, the updated patient-specific mathematical model.

[0020H] Herein disclosed is a method for providing a patient-specific dosing regimen for treatment with a medication using a computerized medication dosing regimen recommendation system, the method comprising: receiving data indicative of characteristics of a specific patient, wherein the characteristics of the specific patient include at least one of disease stage, disease status, prior therapy, concomitant diseases, demographic information, and laboratory test result information; comparing the received data with a database to select a first model representing the specific patient; forecasting at least one patient response for each of a first plurality of dosing regimens as a function of the selected first model; based on the forecasted at least one patient response, selecting a first recommended dosing regimen; outputting the recommended dosing regimen; receiving data reflecting an observed response of the specific patient to the recommended dosing regimen; updating the selected first model based on the received data reflecting the observed response of the specific patient, to create an updated patient-specific model; forecasting a patient-specific response for each of a second plurality of dosing regimens, as a function of the updated patient-specific model; based on the forecasted patient-specific response, selecting a second

recommended patient-specific dosing regimen; and providing, as output from the system, the second recommended patient-specific dosing regimen.

[0020I] In a first aspect of the invention, there is provided a method in a medication dosing regimen recommendation system, the system comprising: a microprocessor; a memory; and one or more databases stored in the memory, the one or more databases being accessible by the microprocessor and storing information indicative of dosing regimens configured for use with medication drug, and storing a plurality of mathematical models, each model describing response profiles for a population of patients treated with the drug and having a set of covariate patient factors, wherein the response profiled for the population of patients are not specific to any particular patient; the microprocessor configured to: receive data indicative of characteristics of a specific patient, wherein the characteristics of the specific patient include at least one of disease stage, disease status, prior therapy, concomitant diseases, demographic information, and laboratory test result information; select a mathematical model from the plurality of mathematical models in the memory to match the characteristics of the specific patient with the covariate patient factors of the selected mathematical model; receive a first plurality of proposed dosing regimens from the database; forecast, using the selected mathematical model, a predicted drug concentration time profile indicative of a patient response to the drug, wherein the predicted concentration time profile is not specific to any particular patient, for each of the first plurality of proposed dosing regimens; select, based on the predicted drug concentration time profiles, a recommended typical dosing regimen having the predicted drug concentration time profile that achieves a desired exposure level; provide, as

output from the system, the recommended typical dosing regimen; receive data indicative of a measured drug concentration level that reflects a response of the specific patient to administration of the recommended dosing regimen or a modified version of the recommended dosing regimen, the measured drug concentration level being measured from a blood sample from the patient; update the selected model, to create an updated patient-specific mathematical model that reflects the measured drug concentration level of the specific patient; receive a second plurality of proposed dosing regimens from the database; forecast, using the updated patient-specific mathematical model, a patient-specific predicted drug concentration time profiles indicative of the patient response, specific to the patient, of the second plurality of proposed dosing regimens, as a function of the updated patient-specific mathematical model; select, based on the patient-specific predicted drug concentration time profiles, a recommended patient-specific dosing regimen having the patient-specific predicted drug concentration time profile that achieves the desired exposure level; and provide, as output from the system, the recommended patient-specific dosing regimen.

[0020J] In a second aspect of the invention, there is provided a medication dosing regimen recommendation the method comprising: storing a plurality of mathematical models in a memory that stores at least one database accessible by a microprocessor, the at least one database storing data indicative of dosing regimens for use with the medication, each model describing response profiles for a population of patients treated with the medication and having a set of covariate patient factors, wherein the response profiles for the population of patients are not specific to any particular patient; receiving data indicative of characteristics of the specific patient, wherein the characteristics of

the specific patient include at least one of disease stage, disease status, prior therapy, concomitant diseases, demographic information, and laboratory test result information; developing a composite model as a function of the plurality of mathematical models and characteristics of the specific patient corresponding to the covariate patient factors of the models, the composite model describing a response profile for a typical patient having as covariate patient factors the specific patient's characteristics; processing the composite model to forecast a predicted drug concentration time profile indicative of a patient response not specific to any particular patient, for each of a first plurality of proposed dosing; selecting based on the predicted drug concentration time profiles,, a recommended typical dosing regimen suitable for a typical patient having the specific patient's characteristics, the recommended typical dosing regimen being selected to achieve a predefined target response; providing the recommended typical dosing regimen; receiving data indicative of a measured drug concentration level that reflects a response of the specific patient to administration of the recommended dosing regimen or a modified version of the recommended dosing regimen, the measured drug concentration level corresponding to a blood sample from the specific patient; receiving data indicative of a measured drug concentration level that reflects a response of the specific patient to administration of the recommended dosing regimen or a modified version of the recommended dosing regimen, the measured drug concentration level corresponding to a blood sample from the specific patient; updating each of the plurality of mathematical models, as a function of the measured drug concentration level, to create a corresponding plurality of updated patient-specific mathematical models; developing from the plurality of updated patient-specific mathematical models to

develop an updated patient-specific composite model; forecasting using the updated patient-specific composite model patient-specific predicted drug concentration time profile indicative of the patient response, specific to the patient, for each of a second plurality of proposed dosing regimens; selecting, from the second plurality of proposed dosing regimens and based on the patient-specific drug concentration time profiles, a recommended patient-specific dosing regimen that achieves the predefined target response; and providing the recommended patient-specific dosing regimen.

[0020K] In a third aspect of the invention, there is provided a medical dosing apparatus, comprising at least one microprocessor configured to: store, in at least one database accessible by the at least one microprocessor, (1) data indicative of dosing regimens for use with a drug, (2) data indicative of a model describing response profiles for a population of patients treated with the drug and having a set of covariate patient factors, wherein the response profiles for the population of patients are not specific to any particular patient, and (3) data indicative of one or more characteristics of the specific patient, wherein the one or more characteristics of the specific patient include at least one of disease stage, disease status, prior therapy, concomitant diseases, demographic information, and laboratory test result information; identify a first plurality of proposed dosing regimens from the at least one database; process the model to obtain a predicted drug concentration time profile indicative of forecast a patient response for each of a first plurality of proposed dosing regimens; selecting, based on the predicted drug concentration time profiles, a recommended dosing regimen suitable for a patient having the specific patient's characteristics; select, based on the predicted drug concentration time profiles a recommended dosing regimen that achieves a

predefined target response; provide, as output from the apparatus, the recommended typical dosing regimen; receive data indicative of a measured drug concentration level that reflects observed response of the specific patient to administration of the recommended dosing regimen or a modified version of the recommended dosing regimen; update the model to obtain an updated patient-specific model that reflects the measured drug concentration level of the specific patient; obtain, using the updated patient-specific model, a plurality of predicted patient-specific drug concentration time profiles indicative of the predicted patient response, specific to the patient, to each of a second plurality of proposed dosing regimens; select, based on the predicted patient-specific drug concentration time profiles, a recommended patient-specific dosing regimen from the second plurality of proposed dosing regimens, the recommended patient-specific dosing regimen being selected to achieve the predefined target response; and provide, as output from the apparatus, the recommended patient-specific dosing regimen.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] An understanding of the following description will be facilitated by reference to the attached drawings, in which:

[0022] Figure 1 is a flow diagram illustrating an exemplary prior art method for developing a medication dosing regimen for a patient;

[0023] Figure 2 is a flow diagram illustrating an exemplary method for providing patient-specific medication dosing as a function of mathematical models updated to

account for an observed patient response in accordance with an exemplary embodiment of the present invention; and

[0024] Figure 3 is a schematic diagram of an exemplary system for providing patient-specific medication dosing as a function of mathematical models updated to account for an observed patient response in accordance with an exemplary embodiment of the present invention;

[0025] Figure 4 is a series of graphs showing relationships between times since last dose (TSLD) and observed/predicted patient responses for sixteen exemplary patients;

[0026] Figures 5A-5D are exemplary graphs showing infliximab blood level concentrations as a function of time;

What is claimed is:

1. A method in a medication dosing regimen recommendation system, the system comprising:

a microprocessor;

a memory; and

one or more databases stored in the memory, the one or more databases being accessible by the microprocessor and storing information indicative of dosing regimens configured for use with medication drug, and storing a plurality of mathematical models, each model describing response profiles for a population of patients treated with the drug and having a set of covariate patient factors, wherein the response profiled for the population of patients are not specific to any particular patient;

the microprocessor configured to:

receive data indicative of characteristics of a specific patient, wherein the characteristics of the specific patient include at least one of disease stage, disease status, prior therapy, concomitant diseases, demographic information, and laboratory test result information;

select a mathematical model from the plurality of mathematical models in the memory to match the characteristics of the specific patient with the covariate patient factors of the selected mathematical model;

receive a first plurality of proposed dosing regimens from the database;

forecast, using the selected mathematical model, a predicted drug concentration time profile indicative of a patient response to the drug, wherein the predicted concentration time profile is not specific to any particular patient, for each of the first plurality of proposed dosing regimens;

select, based on the predicted drug concentration time profiles, a recommended typical dosing regimen having the predicted drug concentration time profile that achieves a desired exposure level;

provide, as output from the system, the recommended typical dosing regimen;

receive data indicative of a measured drug concentration level that reflects a response of the specific patient to administration of the recommended dosing regimen or a modified version of the recommended dosing regimen, the measured drug concentration level being measured from a blood sample from the patient;

update the selected model, to create an updated patient-specific mathematical model that reflects the measured drug concentration level of the specific patient;

receive a second plurality of proposed dosing regimens from the database;

forecast, using the updated patient-specific mathematical model, a patient-specific predicted drug concentration time profiles indicative of the patient response, specific to the patient, of the second plurality of proposed dosing regimens, as a function of the updated patient-specific mathematical model;

select, based on the patient-specific predicted drug concentration time profiles, a recommended patient-specific dosing regimen having the patient-specific predicted drug concentration time profile that achieves the desired exposure level; and

provide, as output from the system, the recommended patient-specific dosing regimen.

2. The method of claim 1, wherein each model in the plurality of mathematical models does not take into account variability between patients having the set of covariate patient factors.

3. The method of claim 1, wherein the microprocessor is further configured to provide, as output from the system a plurality of alternative recommended typical dosing regimens.

4. The method of claim 1, wherein forecasting the predicted drug concentration time profile comprises:

automatically selecting the first plurality of proposed dosing regimens according to predefined logic; and

forecasting a patient response for each of the first plurality of proposed dosing regimens.

5. The method of claim 4, wherein automatically selecting the first plurality of proposed dosing regimens according to predefined logic comprises selecting a next proposed dosing regimen as a function of a forecasted patient response not specific to any particular patient to to a proposed dosing regimen.

6. The method of claim 5, wherein the predefined logic provides for selection of the first plurality of proposed dosing regimens to provide a corresponding forecasted drug concentration best meeting a treatment objective.

7. The method of claim 5, wherein the predefined logic provides for selection of the first plurality of proposed dosing regimens to find a minimum of an objective function.

8. The method of claim 5, wherein the predefined logic provides for selection of the first plurality of proposed dosing regimens to find a global minimum of an objective function.

9. The method of claim 4, further comprising the system:

selecting from the forecasted typical patient responses a recommended typical dosing regimen suitable for a typical patient having the specific patient's characteristics, the recommended typical dosing regimen being selected for meeting predefined criteria.

10. The method of claim 1, wherein the microprocessor is further configured to provide, as output from the system, a plurality of alternative recommended patient-specific dosing regimens.

11. The method of claim 1, wherein the microprocessor is configured to forecast the plurality of patient-specific drug concentration time profiles by:

automatically selecting the second plurality of proposed dosing regimens according to predefined logic; and

forecasting a drug concentration for each of the second plurality of proposed dosing regimens.

12. The method of claim 11, wherein automatically selecting the second plurality of proposed dosing regimens according to predefined logic comprises selecting a next proposed dosing regimen as a function of a forecasted patient-specific response to a proposed dosing regimen.

13. The method of claim 11, wherein the predefined logic provides for selection of the second plurality of proposed dosing regimens to provide a corresponding forecasted drug concentration response best meeting a treatment objective.

14. The method of claim 11, wherein the predefined logic provides for selection of the second plurality of proposed dosing regimens to find a minimum of an objective function.

15. The method of claim 11, wherein the predefined logic provides for selection of the second plurality of proposed dosing regimens to find a global minimum of an objective function.

16. The method of claim 1, wherein the plurality patient-specific drug concentration time profiles are forecasted by processing the updated patient-specific mathematical model using a Bayesian forecasting technique.

17. The method of claim 1, wherein the covariate patient factors comprise at least one of: a blood concentration level, a blood pressure reading, and a hematocrit level.

18. A medication dosing regimen recommendation the method comprising:

storing a plurality of mathematical models in a memory that stores at least one database accessible by a microprocessor, the at least one database storing data indicative of dosing regimens for use with the medication, each model describing response profiles for a population of patients treated with the medication and having a set of covariate patient factors, wherein the response profiles for the population of patients are not specific to any particular patient;

receiving data indicative of characteristics of the specific patient, wherein the characteristics of the specific patient include at least one of disease stage, disease status, prior therapy, concomitant diseases, demographic information, and laboratory test result information;

developing a composite model as a function of the plurality of mathematical models and characteristics of the specific patient corresponding to the covariate patient factors of the models, the composite model describing a response profile for a typical patient having as covariate patient factors the specific patient's characteristics;

processing the composite model to forecast a predicted drug concentration time profile indicative of a patient response not specific to any particular patient, for each of a first plurality of proposed dosing;

selecting based on the predicted drug concentration time profiles,, a recommended typical dosing regimen suitable for a typical patient having the specific patient's characteristics, the recommended typical dosing regimen being selected to achieve a predefined target response;

providing the recommended typical dosing regimen;

receiving data indicative of a measured drug concentration level that reflects a response of the specific patient to administration of the recommended dosing regimen or a modified version of the recommended dosing regimen, the measured drug concentration level corresponding to a blood sample from the specific patient;

receiving data indicative of a measured drug concentration level that reflects a response of the specific patient to administration of the recommended dosing regimen or a modified version of the recommended dosing regimen, the measured drug concentration level corresponding to a blood sample from the specific patient;

updating each of the plurality of mathematical models, as a function of the measured drug concentration level, to create a corresponding plurality of updated patient-specific mathematical models;

developing from the plurality of updated patient-specific mathematical models to develop an updated patient-specific composite model;

forecasting using the updated patient-specific composite model patient-specific predicted drug concentration time profile indicative of the patient response, specific to the patient, for each of a second plurality of proposed dosing regimens;

selecting, from the second plurality of proposed dosing regimens and based on the patient-specific drug concentration time profiles, a recommended patient-specific dosing regimen that achieves the predefined target response; and

providing the recommended patient-specific dosing regimen.

19. A medical dosing apparatus, comprising at least one microprocessor configured to:

store, in at least one database accessible by the at least one microprocessor, (1) data indicative of dosing regimens for use with a drug, (2) data indicative of a model describing response profiles for a population of patients treated with the drug and having a set of covariate patient factors, wherein the response profiles for the population of patients are not specific to any particular patient, and (3) data indicative of one or more characteristics of the specific patient, wherein the one or more characteristics of the specific patient include at least one of disease stage, disease status, prior therapy, concomitant diseases, demographic information, and laboratory test result information;

identify a first plurality of proposed dosing regimens from the at least one database;

process the model to obtain a predicted drug concentration time profile indicative of forecast a patient response for each of a first plurality of proposed dosing regimens;

selecting, based on the predicted drug concentration time profiles, a recommended dosing regimen suitable for a patient having the specific patient's characteristics; select, based on the predicted drug concentration time profiles a recommended dosing regimen that achieves a predefined target response;

provide, as output from the apparatus, the recommended typical dosing regimen;

receive data indicative of a measured drug concentration level that reflects observed response of the specific patient to administration of the recommended dosing regimen or a modified version of the recommended dosing regimen;

update the model to obtain an updated patient-specific model that reflects the measured drug concentration level of the specific patient;

obtain, using the updated patient-specific model, a plurality of predicted patient-specific drug concentration time profiles indicative of the predicted patient response, specific to the patient, to each of a second plurality of proposed dosing regimens;

select, based on the predicted patient-specific drug concentration time profiles, a recommended patient-specific dosing regimen from the second plurality of proposed dosing regimens, the recommended patient-specific dosing regimen being selected to achieve the predefined target response; and

provide, as output from the apparatus, the recommended patient-specific dosing regimen.

20. The system of claim 1, wherein the updated patient-specific mathematical model that reflects the measured drug concentration level of the specific patient takes into account variability between patients having the set of covariate patient factors.

21. The method of claim 1, wherein the drug is infliximab.

22. The method of claim 1, wherein the desired exposure level is a trough blood concentration level above a therapeutic threshold for the drug.

23. The method of claim 1, wherein the recommended dosing regimen includes a specific dose amount and a specific dose interval.

24. The method of claim 1, wherein the recommended patient-specific dosing regimen includes a specific dose amount and a specific dose interval.

25. The method of claim 1, wherein the selected model is updated by adjusting a set of parameters in the selected model to be conditional to the measured drug concentration level of the specific patient.

26. The method of claim 1, further comprising administering the recommended patient-specific dosing regimen or a modified version of the recommended patient-specific dosing regimen to the specific patient.

27. The method of claim 18, wherein the medication is infliximab.

28. The method of claim 18, wherein the predefined target response includes a trough blood concentration level above a therapeutic threshold for the medication.

29. The method of claim 18, wherein the recommended dosing regimen includes a first dose amount and a first dose interval, and the recommended patient-specific dosing regimen includes a second specific dose amount and a second dose interval.

30. The method of claim 18, wherein the updating each of the plurality of mathematical models comprises adjusting a set of parameters in each of the plurality of mathematical models to be conditional to the measured drug concentration level of the specific patient.

31. The apparatus of claim 19, wherein the drug is infliximab.

32. The apparatus of claim 19, wherein the predefined target response includes a trough blood concentration level above a therapeutic threshold for the drug.

33. The apparatus of claim 19, wherein the recommended dosing regimen includes a first dose amount and a first dose interval, and the recommended patient-specific dosing regimen includes a second specific dose amount and a second dose interval.

34. The apparatus of claim 19, wherein the model is updated by adjusting a set of parameters in the model to be conditional to the measured drug concentration level of the specific patient.