A Platform For The Optimal Design Of Personalised Chemotherapy Protocols For Acute Myeloid Leukaemia (AML)

Eirini Velliou, Eleni Pefani, Maria Fuentes, Nicki Panoskaltsis, Athanasios Mantalaris, Michael C. Georgiadis, Efstratios N. Pistikopoulos
The Motive

- **AML** is an aggressive blood cancer characterised by a weak immune system.
- **Intensive chemotherapy** is required with several *life-threatening* complications.
- The choice of treatment depends on the treating physician’s experience and limited patient- and leukaemia-specific factors are taken into consideration.
Platform for optimal personalised chemotherapy protocols

Personalised optimal protocol

Optimal chemotherapy scheduling

Patient
- sex
- age
- height
- weight
- BSA

Measurement
- Tumour biopsy
- Karyotype analysis
- % of Cancer cells
- % of Normal cells
- Haematology test
- Cardiac function
- Kidney function
- Liver function
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In Vitro Platform

- Bioreactor design for the culture of primary leukaemia in-vitro
- Experiments realisation for the characterisation and modelling of normal and cancer cell cycle based on patient-specific and disease-specific information
  
  (Prof. Mantalaris group, Dr. N. Panoskaltsis)

Automated Treatment Design

- Validation of high-fidelity model for the simulation of disease behaviour under treatment
- Design optimal treatment protocols based on patient and disease specific information

(Prof. Pistikopoulos group, Dr. N. Panoskaltsis)

Optimal protocols validation
Platform for optimal personalised chemotherapy protocols

Patient specific biomimicry cell culture
3D hollow fibre bioreactor

Model Validation
Parameter Estimation
Sensitivity Analysis

PC-Advisor
Validated high fidelity model

Optimisation
Optimal treatment protocol

Patient
Patient bone marrow sample

LEUKAEMIA CHARACTERISTICS
PATIENT CHARACTERISTICS

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