The stochastic route of haematopoiesis

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Propositions

accompanying the dissertation

THE STOCHASTIC ROUTE OF HAEMATOPOIESIS

MODELLING AND INFERENCE METHODS IN CLONAL TRACKING STUDIES

by

Luca DEL CORE

1. "A state-space formulation of a stochastic quasi-reaction network allows to model the dynamics of cell differentiation while considering measurement noise of clonal tracking data" (Chapter 2).
2. "Stochastic quasi-reaction networks combined with Kalman filter provides parameter estimates with low uncertainty against typical measurement noise, limited clonal recapture, and low sampling frequency characterizing clonal tracking data" (Chapter 2).
3. "The cell differentiation structure is shared across the gene therapy clinical trials, while differs between the preclinical studies." (Chapter 2).
4. "Our proposed state-space formulation of cell differentiation is able to predict genotoxic impact on unbalanced cell production in a mice study" (Chapter 2).
5. "Stochastic quasi-reaction networks combined with random-effects relaxes the homogeneity for clonal dynamics and, in turn, is able to detect possible clonal dominance" (Chapter 3).
6. "The application of random-effects stochastic quasi-reaction networks in a mice study uncovered the genotoxic impact on clonal expansions" (Chapter 3).
7. "Shape constrained splines allow to quantify and remove confounding effects from the Shannon entropy index, thus providing an artefacts-free measure of clonal complexity" (Chapter 4).