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# On the analysis of complex biological supply chains: From Process Systems Engineering to Quantitative Systems Pharmacology

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Highlights

- Overview of quantitative systems pharmacology and its relations to PSE
- Overview of models of increasing complexity of the inflammatory response
- Challenges and opportunities in bridging PSE and QSP ideas

## Abstract

The use of models in biology has become particularly relevant as it enables investigators to develop a mechanistic framework for understanding the operating principles of living systems as well as in quantitatively predicting their response to both pathological perturbations and pharmacological interventions. This application has resulted in a synergistic convergence of systems biology and pharmacokinetic-pharmacodynamic modeling techniques that has led to the emergence of quantitative systems pharmacology (QSP). In this review, we discuss how the foundational principles of chemical process systems engineering inform the progressive development of more physiologically-based systems biology models.

## Keywords

Pharmacokinetics, pharmacodynamics, multi-scale systems biology, quantitative systems pharmacology