

## **SABIO-RK: a resource for manually curated biochemical reaction kinetics**

Andreas Weidemann, Ulrike Wittig, Maja Rey, Wolfgang Mueller

Heidelberg Institute for Theoretical Studies (HITS) gGmbH, Heidelberg, Germany

In 2006, SABIO-RK database (<http://sabiork.h-its.org/>) has been established to support modellers of biochemical reactions and complex networks. SABIO-RK represents a repository for structured, curated and annotated data about reactions and their kinetics. The data are manually extracted from the scientific literature and stored in a relational database. The content comprises both naturally occurring and alternatively measured biochemical reactions. The data are made available to the public by a web-based search interface and by web services for programmatic access.

Data are highly interlinked to external databases, ontologies and controlled vocabularies. Links are implemented for reactions to KEGG, for proteins to UniProtKB, for organisms to NCBI taxonomy, for tissues to Brenda TissueOntology (BTO), for publications to PubMed, for compounds to ChEBI, KEGG and PubChem, for cell locations and signalling events to Gene Ontology (GO), for kinetic laws and parameters to Systems Biology Ontology (SBO), and for enzymes to ExPASy, KEGG, BRENDA, IntEnz, IUBMB, Reactome and MetaCrop.

Kinetics data and related informations can be exported in different formats including SBML, XML and as spreadsheets.

SABIO-RK web services can be used to access the database automatically which is also used for retrieval of kinetics data by thirdparty software tools and data workflows. These tools include CellDesigner, VirtualCell, Sycamore, SBMLsqueezer, cy3sabiork, Path2Models, LigDig and FAIRDOMHub. Currently SABIO-RK is accessed mostly (ca. 90%) via web services, which underlines the importance of its integration in modelling and visualization tools.