The Reactome Pathway Knowledgebase

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The Reactome Knowledgebase (https://reactome.org) provides molecular details of signal transduction, transport, DNA replication, metabolism, and other cellular processes as an ordered network of molecular transformations—an extended version of a classic metabolic map, in a single consistent data model. Reactome functions both as an archive of biological processes and as a tool for discovering unexpected functional relationships in data. To support the continued brisk growth in its size and complexity, we have implemented a series of improvements.

Aiming to reduce the complexity of the represented knowledgebase and to enable a more straightforward access to its content, Reactome provides its data in a Neo4j graph database (available at https://reactome.org/download-data). Neo4j's query language, Cypher, allows queries to be written in a more intuitive way and reduces the average response time per query by 93%.

Additionally, Reactome has improved the performance of its data analysis tools, and adopted new data structures and strategies to boost diagram viewer performance. To make our website more accessible to human users, we have improved our multiscale pathway visualisation by implementing interactive, textbook-style illustrations. To ensure consistency in the visual representation of pathway diagrams we created a freely accessible (under a CC-BY 4.0 licence) Icon Library (https://reactome.org/icon-lib) that includes icons ranging from simple protein labels to representations of organelles, receptors and cell types.

In response to user feedback, the Reactome knowledgebase portal has been simplified and reorganised following a cleaner and responsive design that allows seamless browsing on a variety of portable devices. To encourage re-use of our content, our web service (https://reactome.org/ContentService) allows exporting of pathway diagrams to raster and vector images, as well as to 'PowerPoint' files. Also, analysis results can be downloaded in easy to follow PDF documents.