Cypher queries used to extract information on the set of signal transduction processes from the Reactome Knowledgebase (<u>http://www.reactome.org/</u>, accessed date: 20/03/2017) [Fabregat et al. 2016, PMID: <u>26656494</u>]

The set of signal transduction processes and involving pathways in the human was found using the Neo4j version of the Reactome DB and the Cypher query language. Specifically, signal transduction processes were considered processes with at least one protein/complex as a reactant and at least one protein/complex as a product.

Cypher queries:

The "ReactionLikeEvent" class in the Reactome Graph Model represents the human processes; the "EntityWithAccessionedSequence" and the "Complex" classes show proteins and protein complexes, respectively. More details on the data model of the Reactome Graph Model are available on the Reactome Documentation page, at http://www.reactome.org/pages/documentation/data-model/. In the Cypher query, the processes were marked as signal transduction processes if at least one (the "ANY" qualifier in the "WHERE" clause) of the reactants and at least one of the products are proteins or protein complexes; consequently, the newly-created ReactionLikeEventType attribute for such processes (the ReactionLikeEvent objects) was to the "SignalTransductionProcess" value:

QS1_1. MATCH (react)<-[:input]- (rle:ReactionLikeEvent {speciesName:"Homo sapiens"})-[:output]->(prod)

WITH DISTINCT rle, COLLECT(distinct react) AS reactants, COLLECT(distinct prod) AS productsWHEREANY(reactINreactantsWHERE((react:Complex)) or(react:EntityWithAccessionedSequence)))and ANY (prod in productsWHERE ((prod:Complex))or (prod:EntityWithAccessionedSequence)))

Set rle.ReactionLikeEventType ="SignalTransductionProcess"