

Upgrading gpDB: Effectors' families and their interaction with G proteins

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GpDB is a publicly accessible, relational database of G-proteins, GPCRs and their interactions. At the moment, data for 410 G-proteins and 2795 GPCRs are available. G-proteins and GPCRs are categorized into classes, families, subfamilies and types. The interaction between them is shown at the subfamily level. Our goal in this project was to update gpDB, adding all the recent data concerning G-proteins, GPCRs and their interactions. Furthermore, we wanted to extend the database including now information about signal transduction from G-proteins to effector molecules. In order to achieve this, we collected information concerning the interaction between G-proteins and their effectors by an extended literature search. We also collected sequence information regarding the effectors from the publicly available protein database UNIPROT. In particular, 1510 sequences of effectors were retrieved. We then categorized the effectors into families, subfamilies and types based on their function. Specifically we ended up in 21 families, 31 subfamilies and 68 types of effectors. Different G-protein subfamilies interact with particular effector types. We also gathered information concerning the results of every interaction between G-proteins and particular effectors and this information is also included in our database. The data has been organized on the basis of a relational model and is stored in a PostgreSQL database system. In order to extend the database, we modified its relational scheme. The interactions between G-proteins and GPCRs, are now shown at the subfamily level, whereas, for the interactions between G-proteins and their effectors, G-protein subfamilies are allowed to interact with specific effector types. Each database entry contains the following fields: gpDB name, gpDB id, Uniprot accession number, Protein description and classification, sequence, species, organism common name, taxonomy, links to other databases and coupling preference for

G proteins and GPCRs (if existent) and/or interaction between G proteins and Effectors. For GPCRs there is information for accessory proteins, and also for homodimerization and/or heterodimerization (if existent). All this information is accompanied by links to original articles. Many tools are available to the user. In the main page of gpDB the user may find links for the following tools: Navigation, Text Search, BLAST Search, Pattern Search. In the entry page for GPCRs the user may also find additional tools (HMMTM, PRED-GPCR, PRED-COUPLE2, TMRPres2D). There is also an extensive user's manual page, describing in detail the available tools. All the information provided in this database may be used in the future to develop algorithms predicting the coupling specificity of GPCRs to G proteins and/or help in the construction of a protein interaction networks.