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What is a datum?

- a formal, computable representation of experimental findings
- a manageable chunk of information, sufficient to unambiguously describe an experimental finding, expressed using concepts readily understood by biologists

Searching the Datum Knowledge Base

<http://pl.csl.sri.com/datumkb.html>

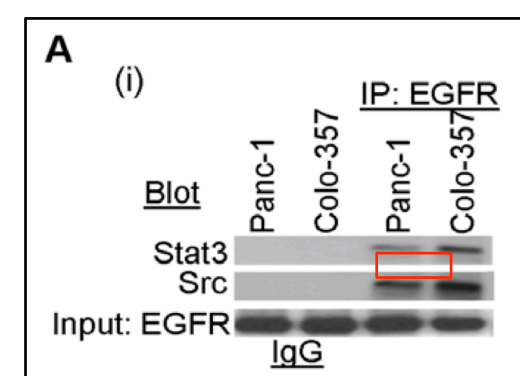
A searchable database of more than 39k datums collected as evidence for models of signal transduction in response to external stimuli

Two types of Datum

- a **state datum** describes the state of something (protein, gene) in a defined system
 - present/absent, active/inactive
 - a protein-protein interaction
- a **change datum** describes the change in the state of something in a system in response to a stimulus.

An Example of a State Datum

Stat3[Ab] copptby[WB] Egfr[Ab] is detectable
cells: PANC1 in BMS
source: 21573184-Fig-1a

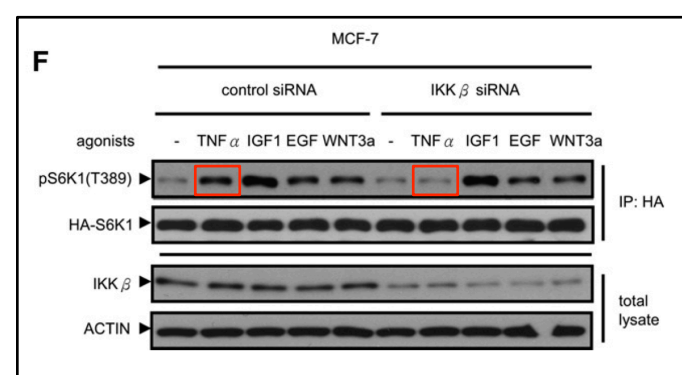


Information that this datum supplies:

- (1) PANC1 cells growing in medium with serum express endogenous Stat3 and Egfr.
- (2) Endogenous Stat3 and Egfr can coprecipitate in PANC1 cells growing in medium with serum.

An Example of a Change Datum with an Extra

xS6k1[tAb]IP phos(T412)[phosAb] is increased irt Tnf (30 min)
cells: MCF7<xS6k1> in BMLS
reqs: Ikk2 [RNAi]
source: 17693255-Fig-3f



Information that this datum supplies:

- (1) The phosphorylation of expressed S6k1 on T389 is increased in response to the addition of TNF to quiescent MCF7 cells for 30 min.
- (2) The response described in (1) is abrogated by removal of Ikk2 by RNAi.
- (3) Quiescent MCF7 cells overexpressing S6k1 in medium without serum express endogenous Ikk2.

Using Datums as input to design of Experiments

Q1: What proteins have been shown to be directly phosphorylated by Mekk1?
Result: Stat3, Mek1, Erk2, and Mkk4

Q2: Is expressed Ikk2 constitutively active?
Result: Yes

Q3: What proteins have been shown to be required for the activation of Jnk kinase activity in response to IL1?
Result: Irak1, Irak4, Mkk7, Myd88, Tak1, Traf6

Q4: What proteins have been shown to NOT be required for the activation of Jnk kinase activity in response to IL1?
Result: Ripk1, Tab2, Traf2, Traf5,

Q5: How long should I treat cells with IL1 to maximize Jnk phosphorylation?
Result: between 10 and 15 minutes

Q6: What stimuli turn on Jun-gene transcription?
Result: Egf, Ngf, PMA, IL2, Serum, Lps, Hypoxia, IL3, and UV

Q7: Do untreated HELA cells express endogenous Myc?
Result: Yes

Q8: Where is endogenous Atf2 located in untreated cells?
Result: in the nucleus and cytoplasm

Q9: What proteins have been shown to coprecipitate with Trka?
Result: Crk1, CrkL, Gab2, Ngf, Frs2, Sh2b1, Grb2, Abl1, Csk, Rgs19ip1, Shc1, Matk, Arms, Pik3r1, Plcg1, Rgs19, RasGrf1, Trpv1

Subject: [\(lookup\)](#)

Protein Search

Enter the full or partial name of a protein (or its Uniprot ID), and we'll look up what it's called in our database.

Protein	Uniprot ID	Synonyms
S6k1	P23443	Ribosomal protein S6 kinase 1 S6K S6K1 70 kDa ribosomal protein S6 kinase 1 p70 S6 kinase alpha p70-S6K-alpha p70-S6K p70-alpha p70S6k p85alphaI p85aI-S6 kinase K6B1_HUMAN

Found 1 results.

Sample Query

What proteins are required for an increase in phosphorylation of S6k1 on T412 in response to Tnf treatment in MCF7 cells?

Subject: [\(lookup\)](#)

Endogenous
 Purified
 Expressed
 Recombinant
 Knockin

Environment: Cells: [\(lookup\)](#)

Assay: Phosphorylation
 Total
 S-only
 T-only
 ST-only
 Y-only
Site:

Extras: Effect:
 Inhibited by: [\(lookup\)](#)
 Enhanced by: [\(lookup\)](#)
 Reversed by: [\(lookup\)](#)
 Unaffected by: [\(lookup\)](#)
 Requires: [\(lookup\)](#)
 Does not require: [\(lookup\)](#)

Treatment: No Treatment
 Addition of Something to Cell Supernatants
Something specific: [\(lookup\)](#)
 Protein Expression
Expressed Protein 1: [\(lookup\)](#)
Expressed Protein 2: [\(lookup\)](#)
 Protein Removal
Removed Protein 1: [\(lookup\)](#)
Removed Protein 2: [\(lookup\)](#)
 Stress
Specific stress: [\(lookup\)](#)
 Addition of Something to Cell Free Reaction
Something specific: [\(lookup\)](#)

Sample Query Result: Ikk2, Nemo, and Mtor

Screen Shot of Datum Result Page

Showing 3 of 3 matching datums

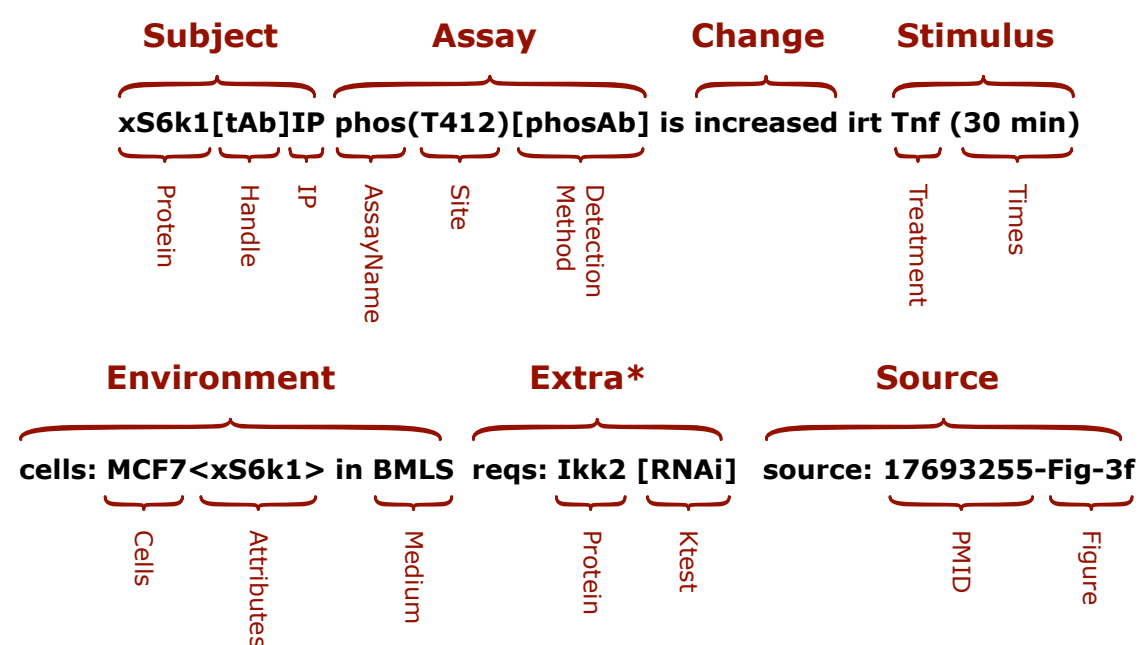
[Expand All](#) | [Collapse All](#)

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cells: MCF7 in BMS
reqs: Ikk2 [RNAi]
source: 17693255-Fig-2g
reqs: Nemo [RNAi]

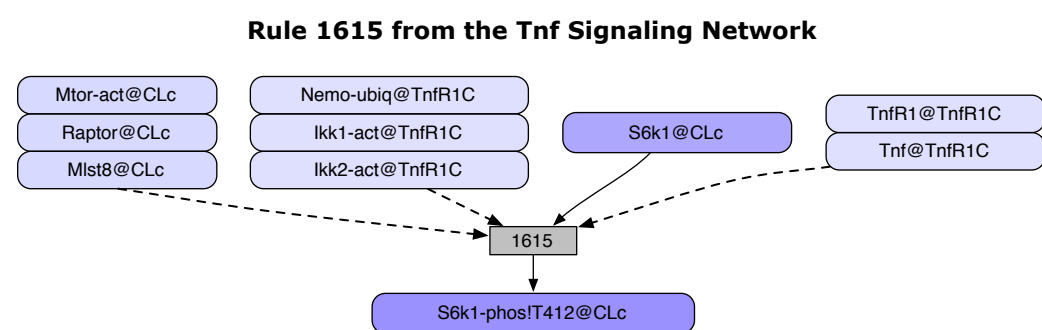
xS6k1[phosAb] phos(T412)[phosAb] is increased irt Tnf (30 min)
cells: MCF7 in BMLS
reqs: Mtor [RNAi]
source: 17693255-Fig-1c

What are the parts of a datum?



* Extras report the effects of system perturbations such as knockout or mutation of a protein or addition of inhibitors.

Using Datums as evidence for rules in signal transduction networks



Selected Evidence for Rule 1615

Requirement for Ikk2

xS6k1[tAb]IP phos(T412)[phosAb] is increased irt Tnf (30 min)
cells: MCF7<xS6k1> in BMLS
reqs: Ikk2 [RNAi]
source: 17693255-Fig-3f

Requirement for Mtor

xS6k1[phosAb] phos(T412)[phosAb] is increased irt Tnf (30 min)
cells: MCF7<xS6k1> in BMLS
reqs: Mtor [RNAi]
source: 17693255-Fig-1c

Requirement for Nemo

xS6k1[tAb]IP phos(T412)[phosAb] is increased irt Tnf (30 min)
cells: MCF7<xS6k1> in BMS
reqs: Nemo [RNAi]
source: 17693255-Fig-2g

Other Possible Uses for Datums

- a notebook to record and organize results of literature search
- input for computing influence diagrams
- a way to categorize experimental results stored in databases

Under the Hood

