

Signal Transduction

**MDA course on NGS Data Analysis
Valencia, 30 Sep 2015**



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GDA course on NGS Data Analysis

Signal Transduction

Signal transduction is the transmission of molecular signals from cell's exterior to its interior.

Signals received by cells must be transmitted effectively into the cell to ensure an appropriate response.

This step is initiated by cell-surface receptors and terminated by target protein.

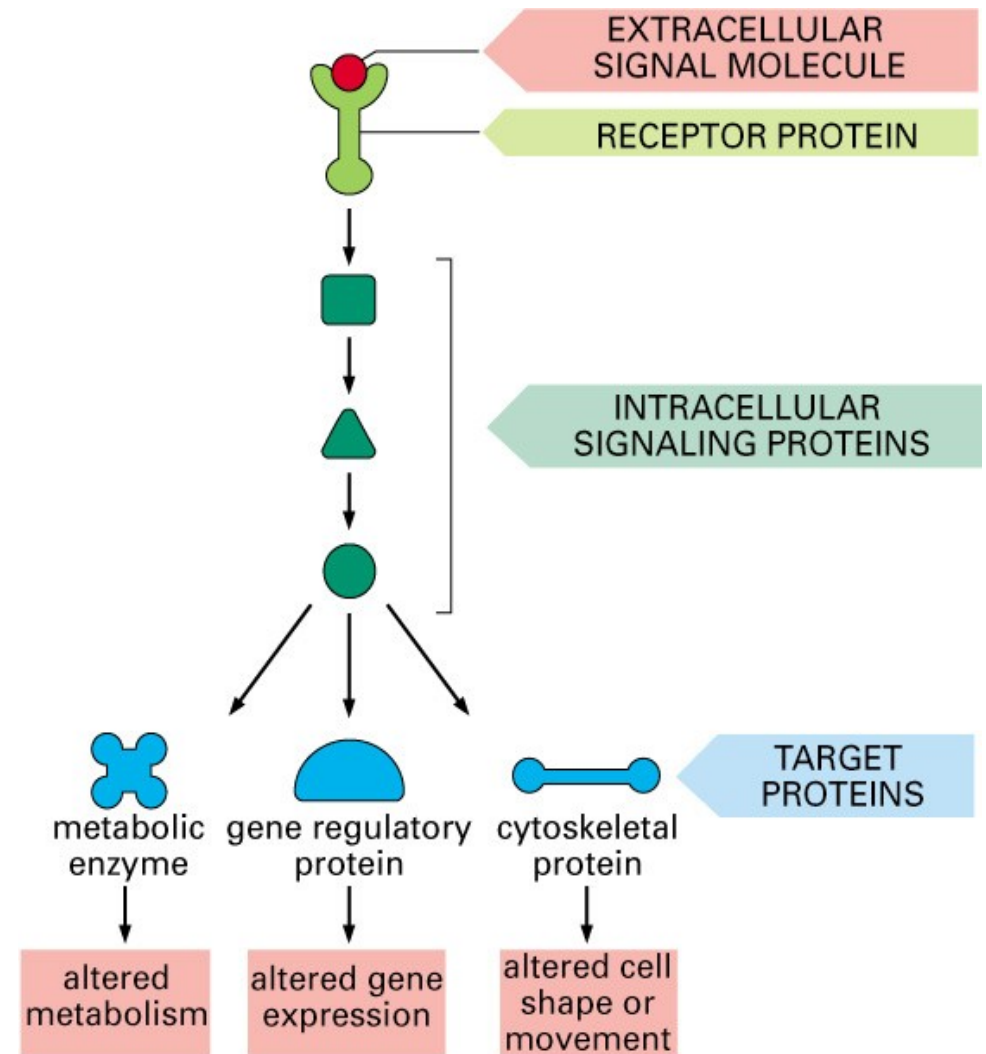


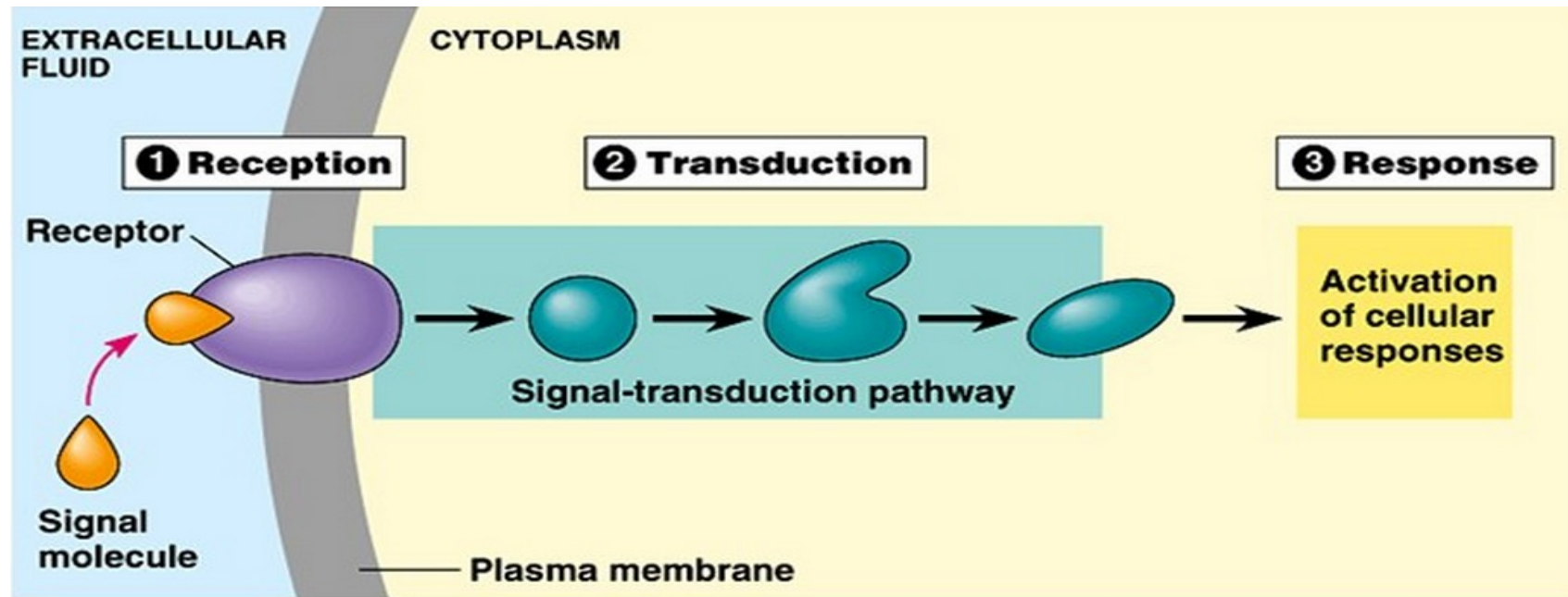
Figure 15-1. Molecular Biology of the Cell, 4th Edition.

Signal Transduction

<https://youtu.be/IIY1or7gKW0>

Signal Transduction in 3 Steps

- 1) Reception
- 2) Transduction
- 3) Response



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Reception-Transduction-Response

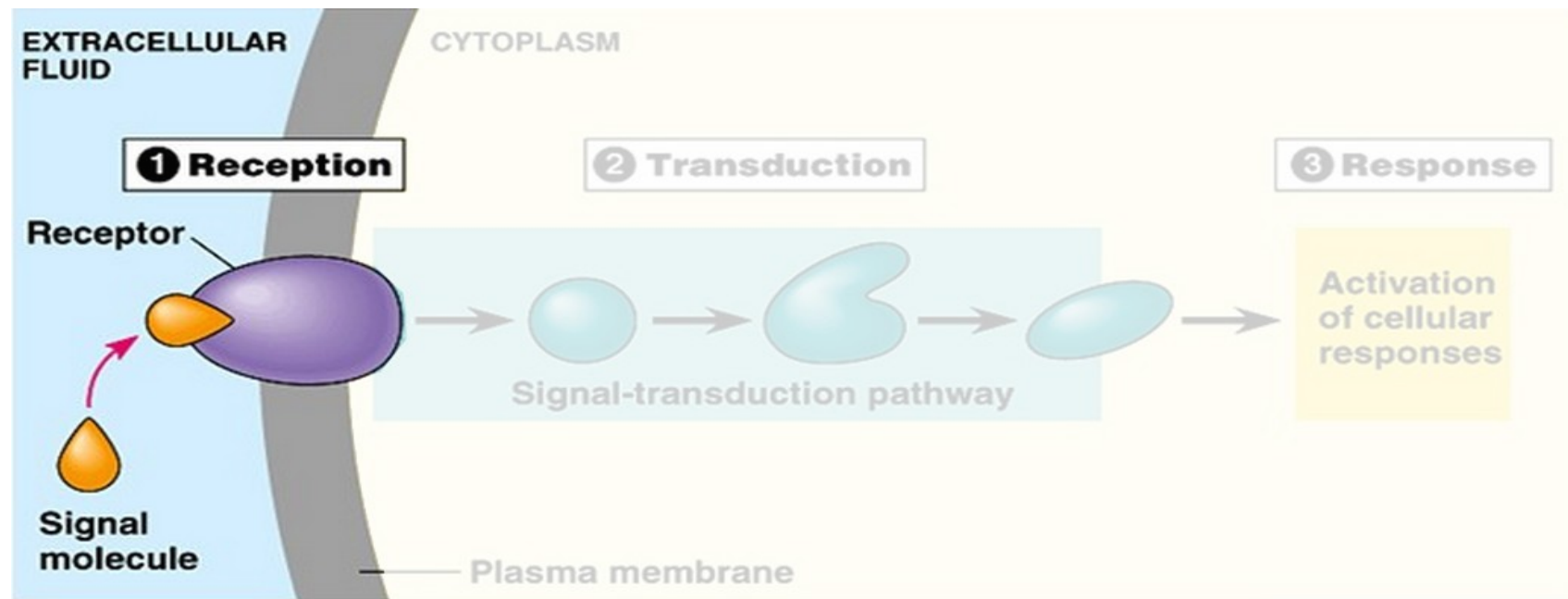
Signal Molecules

Physical signals

Light, electronic, mechanic, UV, heat, volume, osmotic, etc.

Chemical signals

Hormones, neurotransmitters, growth factors, cytokines, odor molecules, ATP, active oxygen, drugs, toxins, etc.



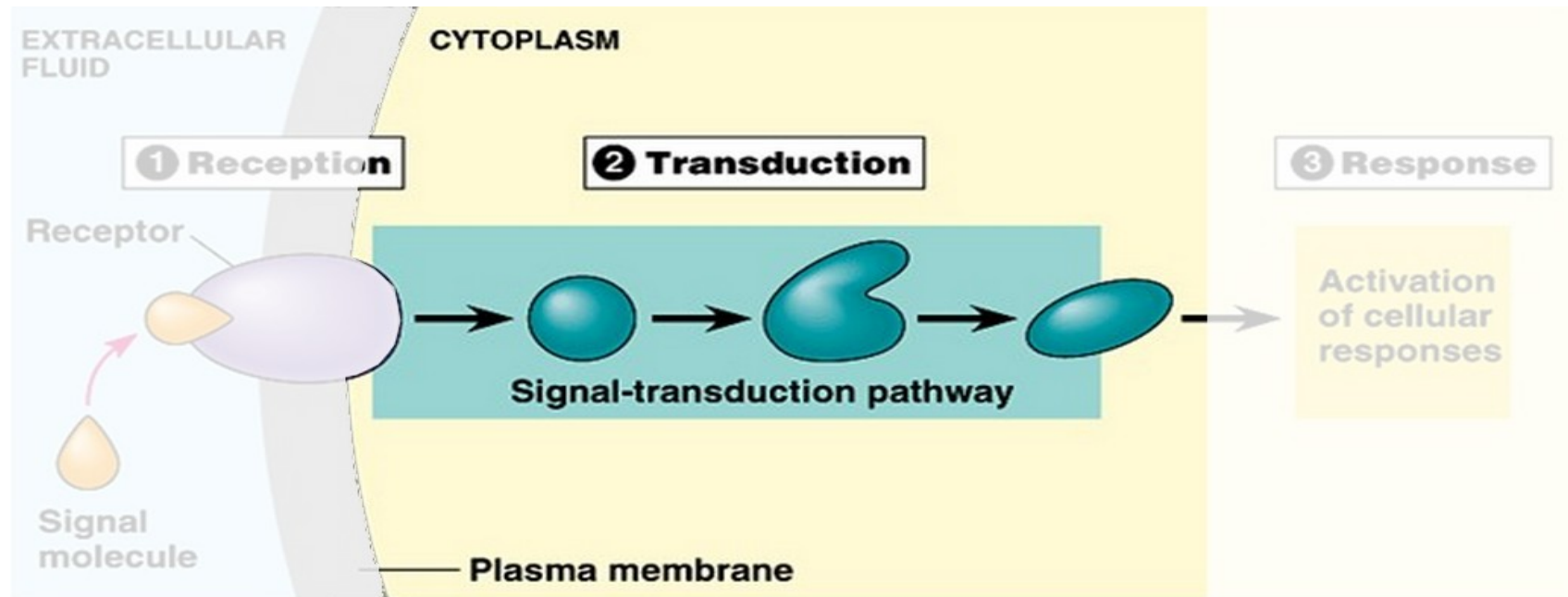
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Reception-Transduction-Response

Relation between proteins:

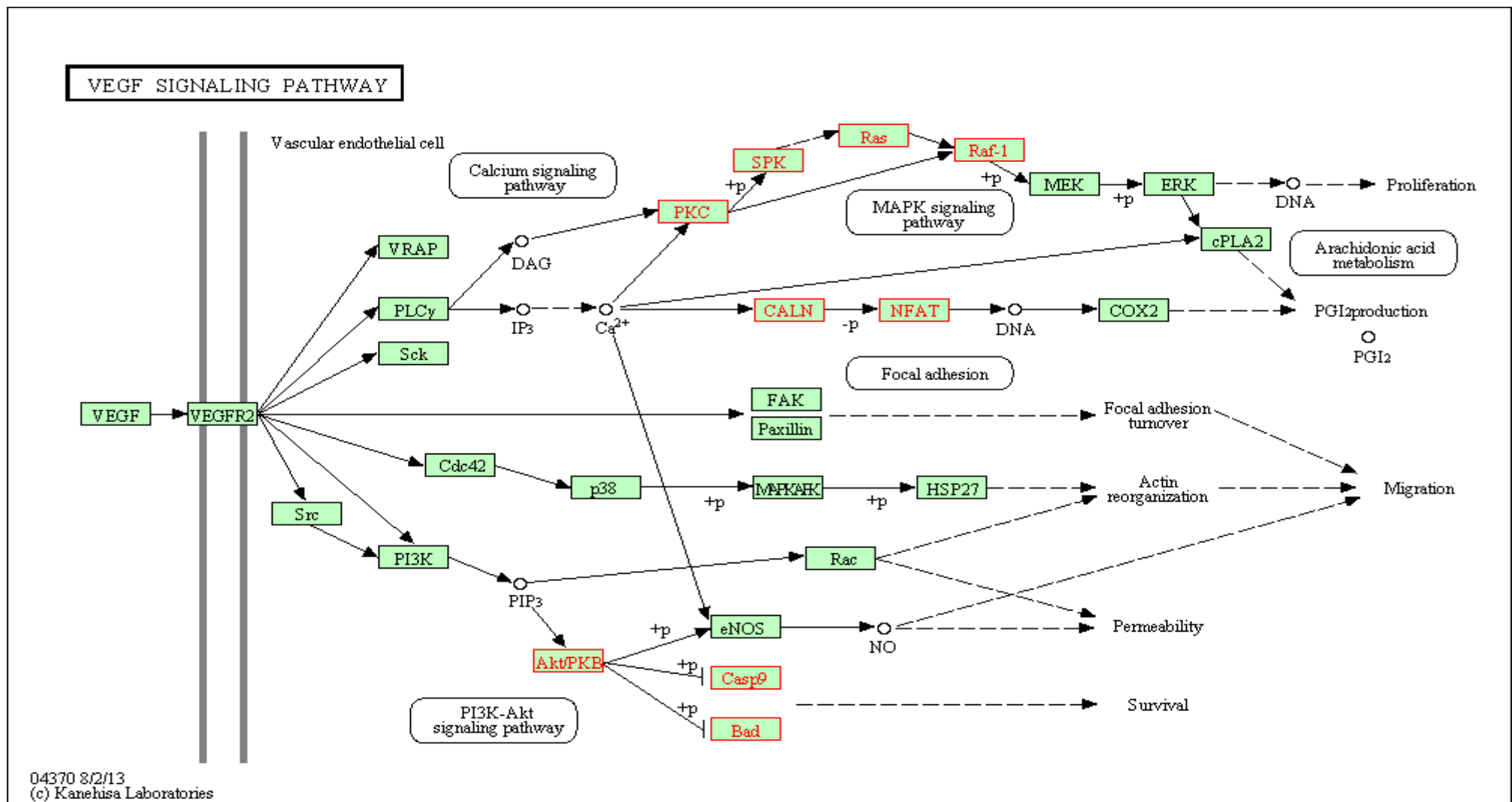
Activation

Inhibition

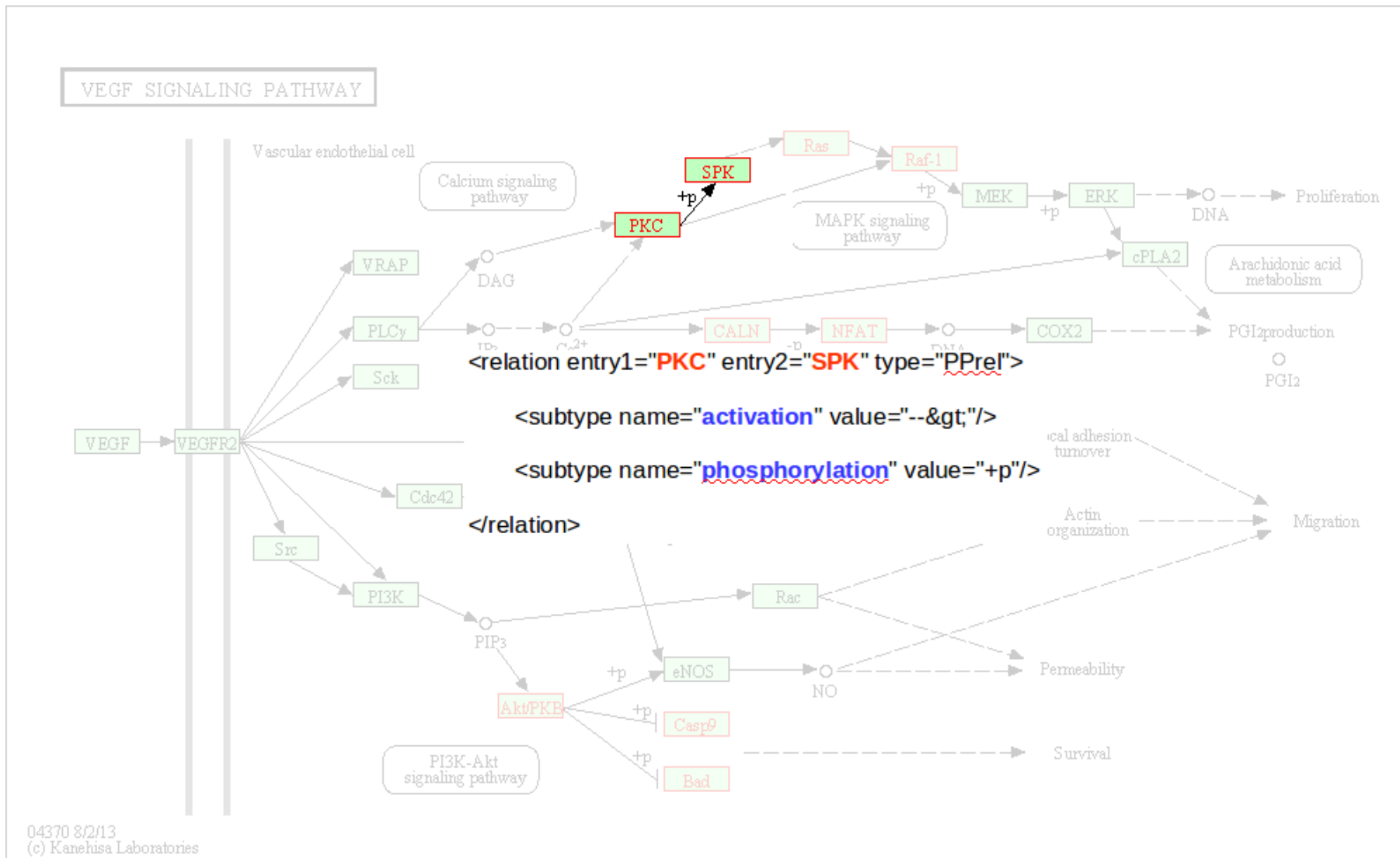


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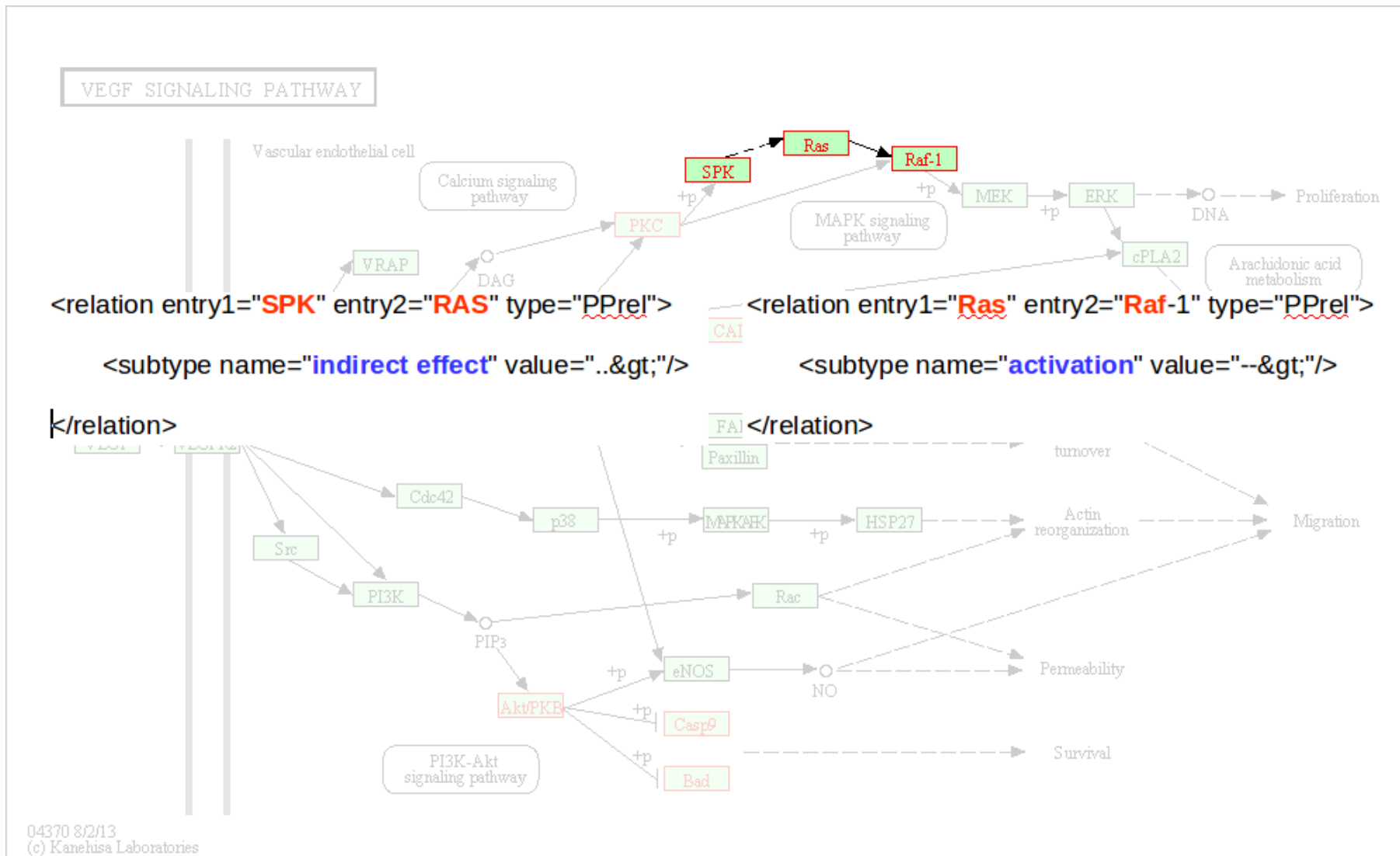
An Example



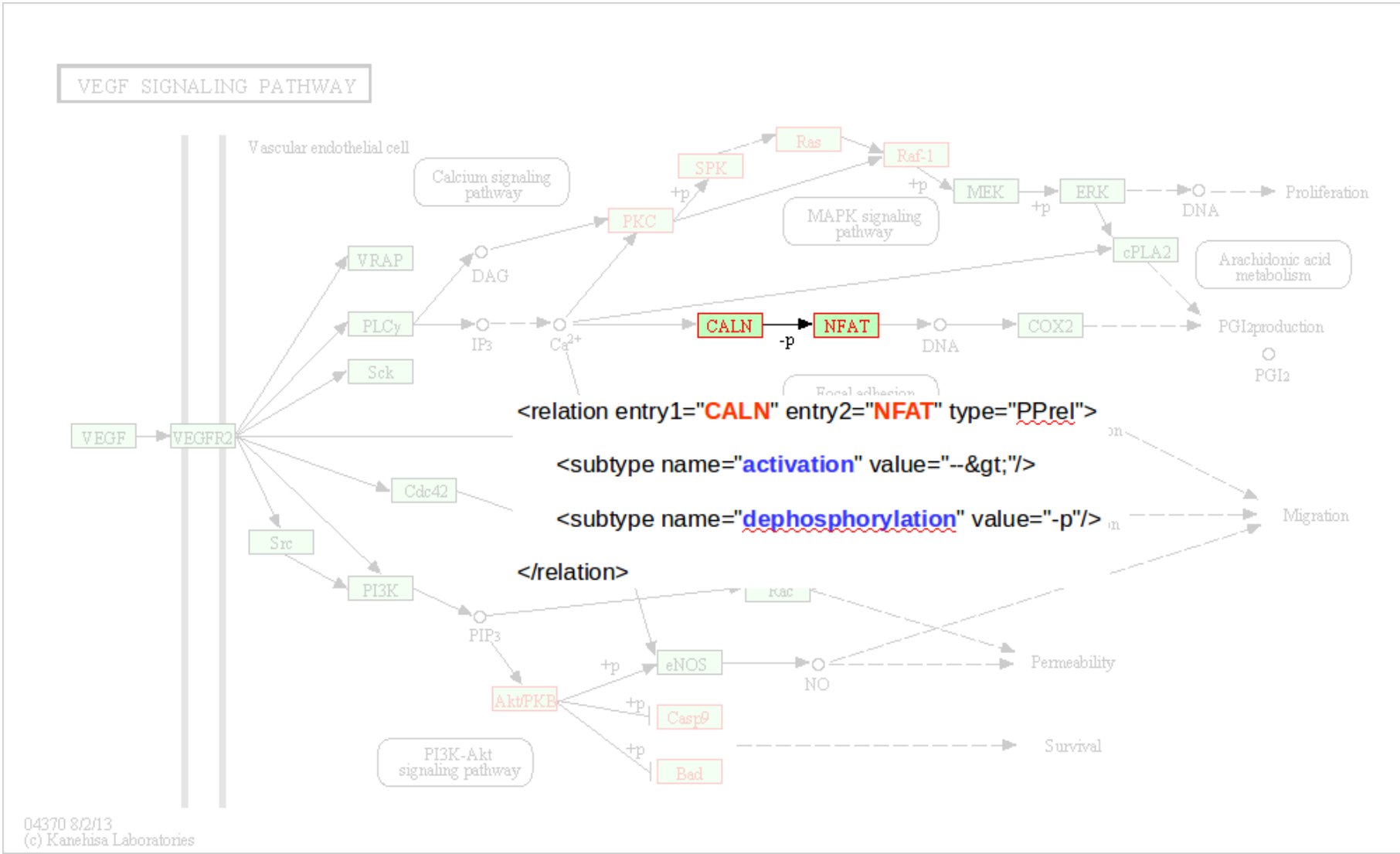
Phosphorylation



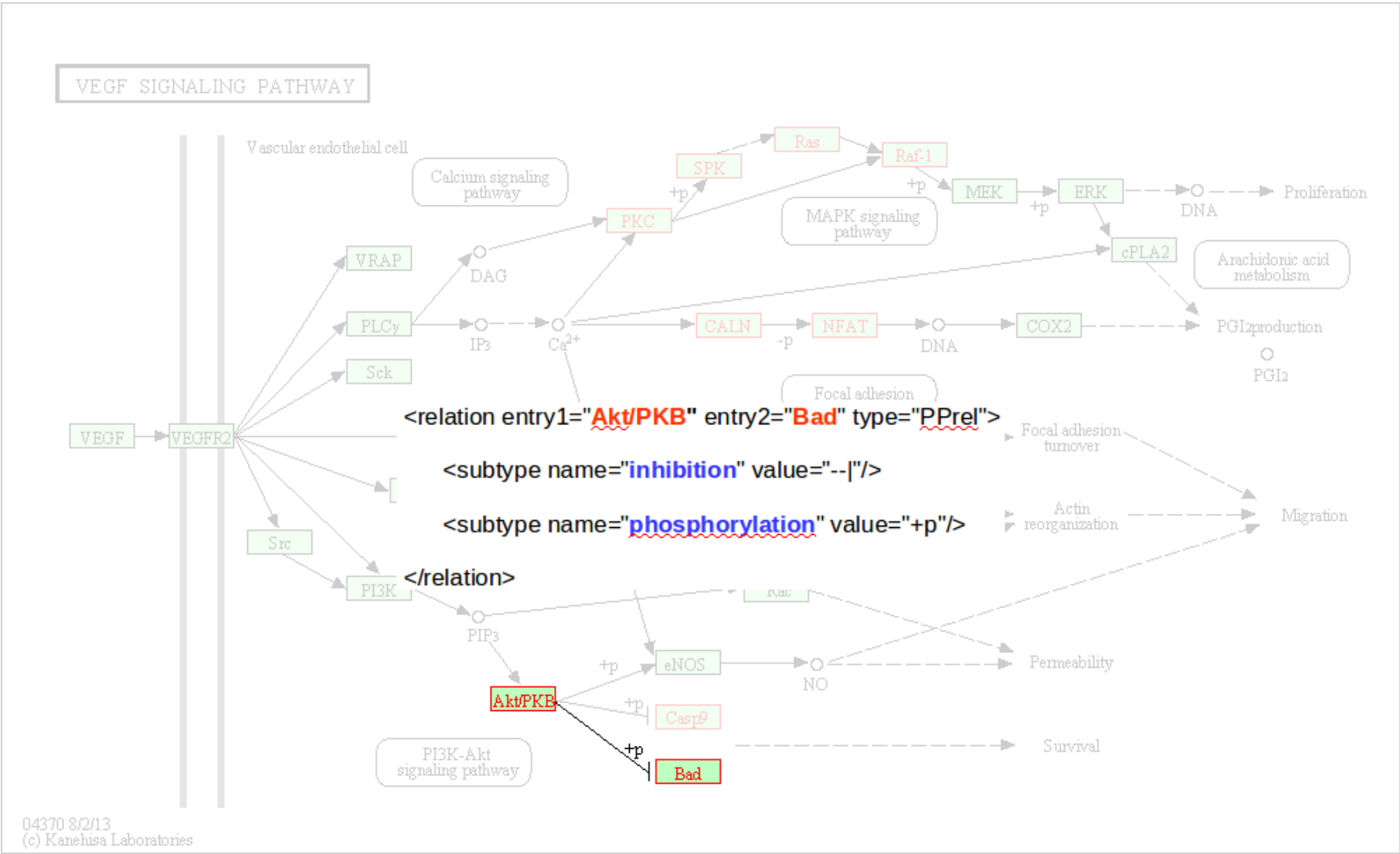
Indirect Effect & Activation



Dephosphorylation



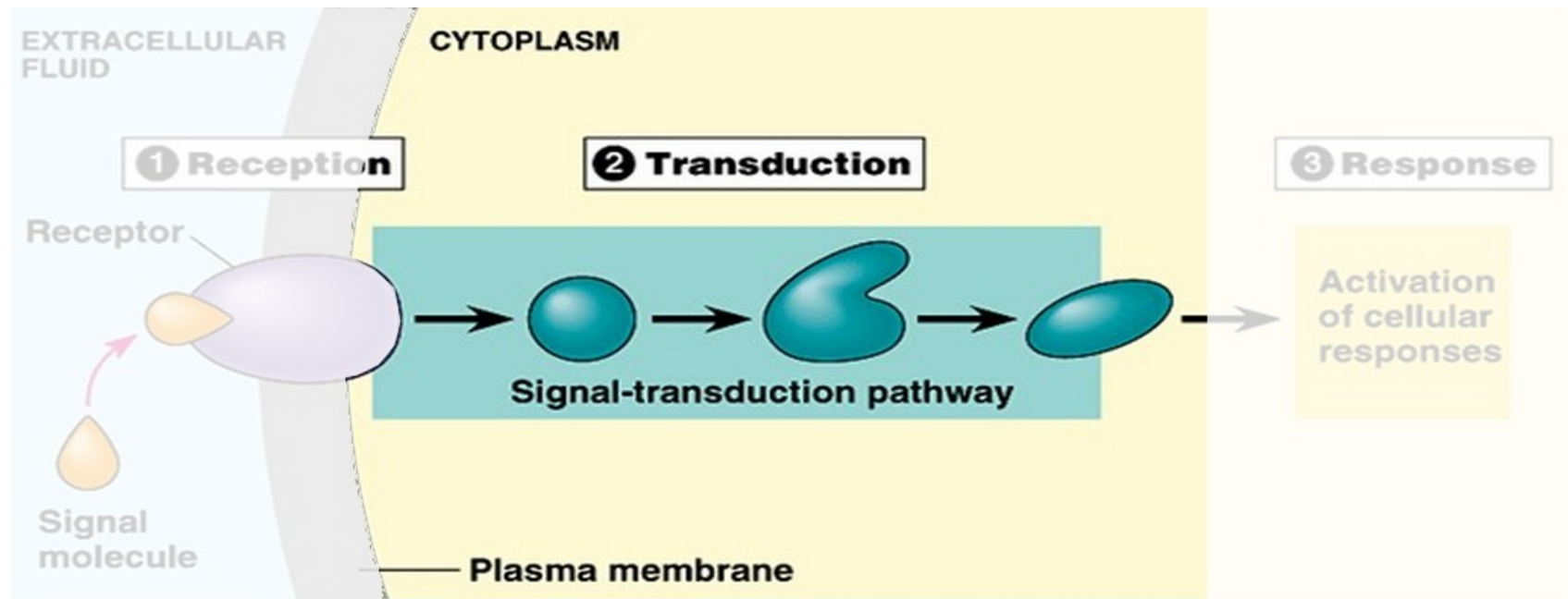
Phosphorylation



Reception-Transduction-Response

ACTIVATION: Activation, phosphorylation, indirect expression, dephosphorylation, glycosylation.

INHIBITION: Inhibition, ubiquitination, methylation.

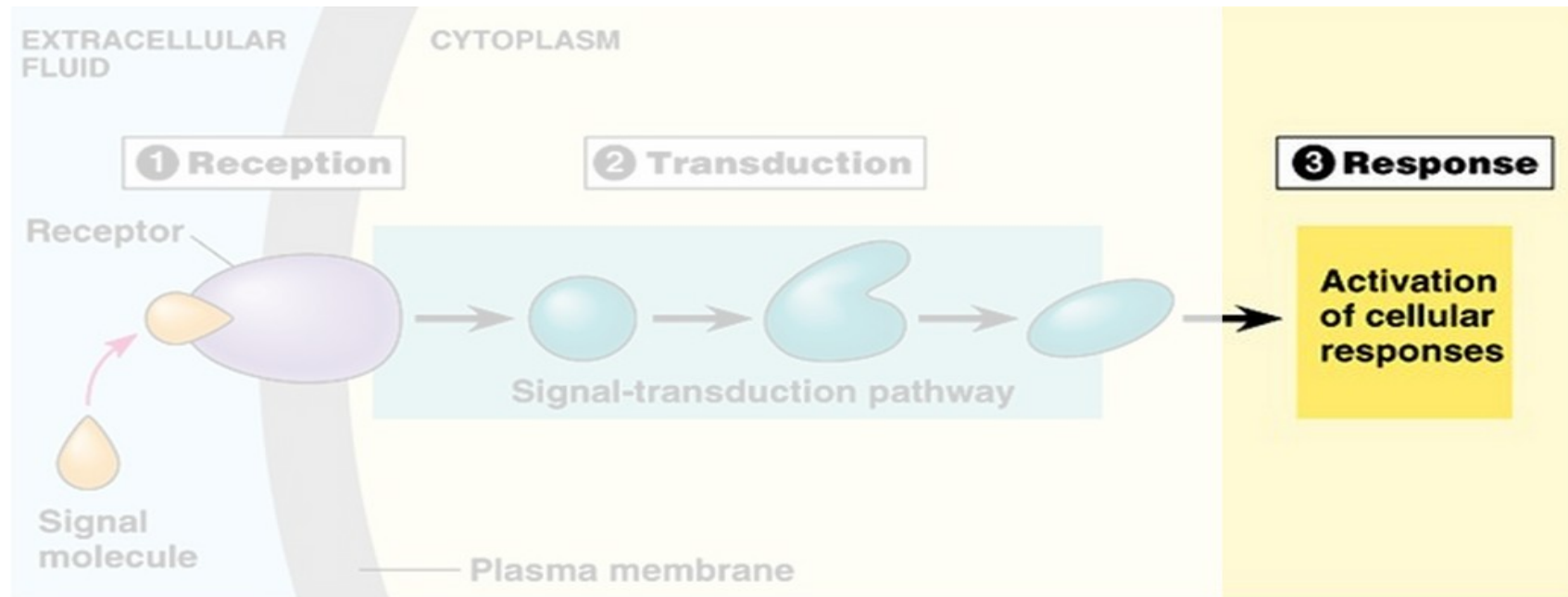


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Reception-Transduction-Response

Cellular Function:

Apoptosis, Survival, Growth, Migration, Proliferation, Differentiation, Cell Cycle, Metabolism(Catabolism and Anabolism), etc



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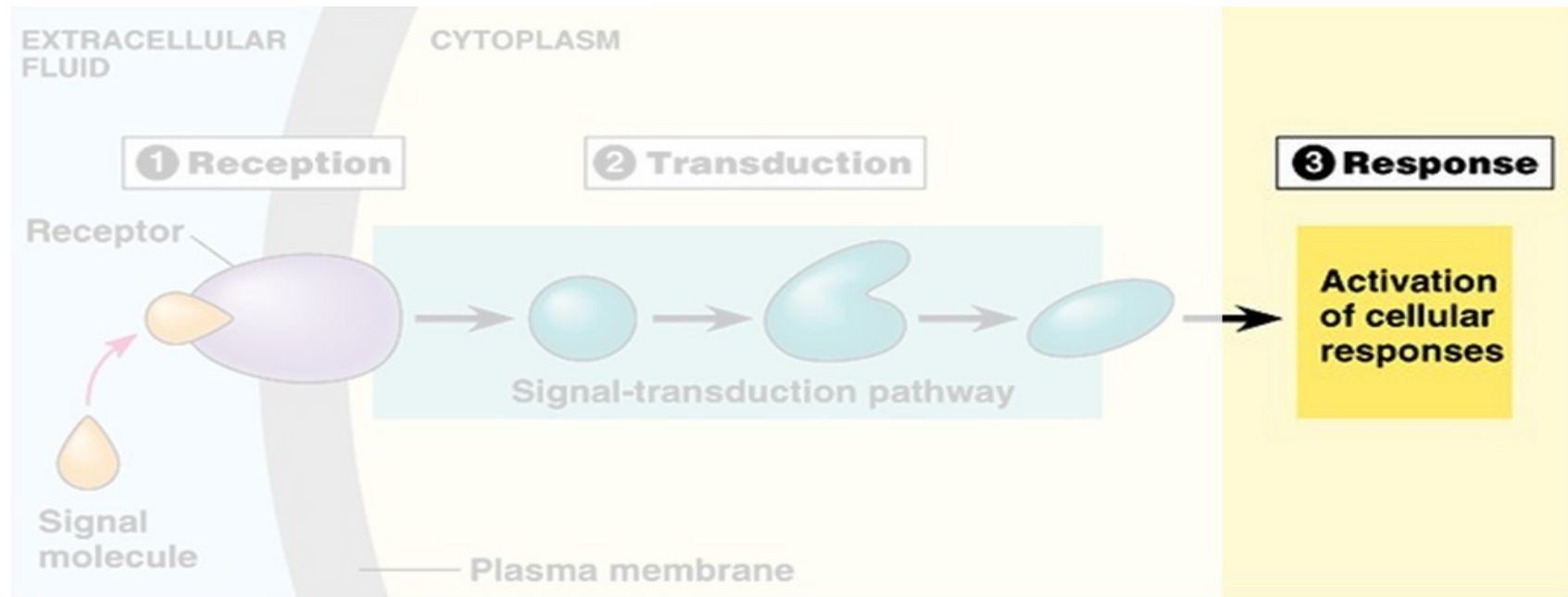
Reception-Transduction-Response

Cellular Functions

Apoptosis, Survival, Growth, Migration, Proliferation, Differentiation, Cell Cycle, Metabolism(Catabolism and Anabolism), etc.

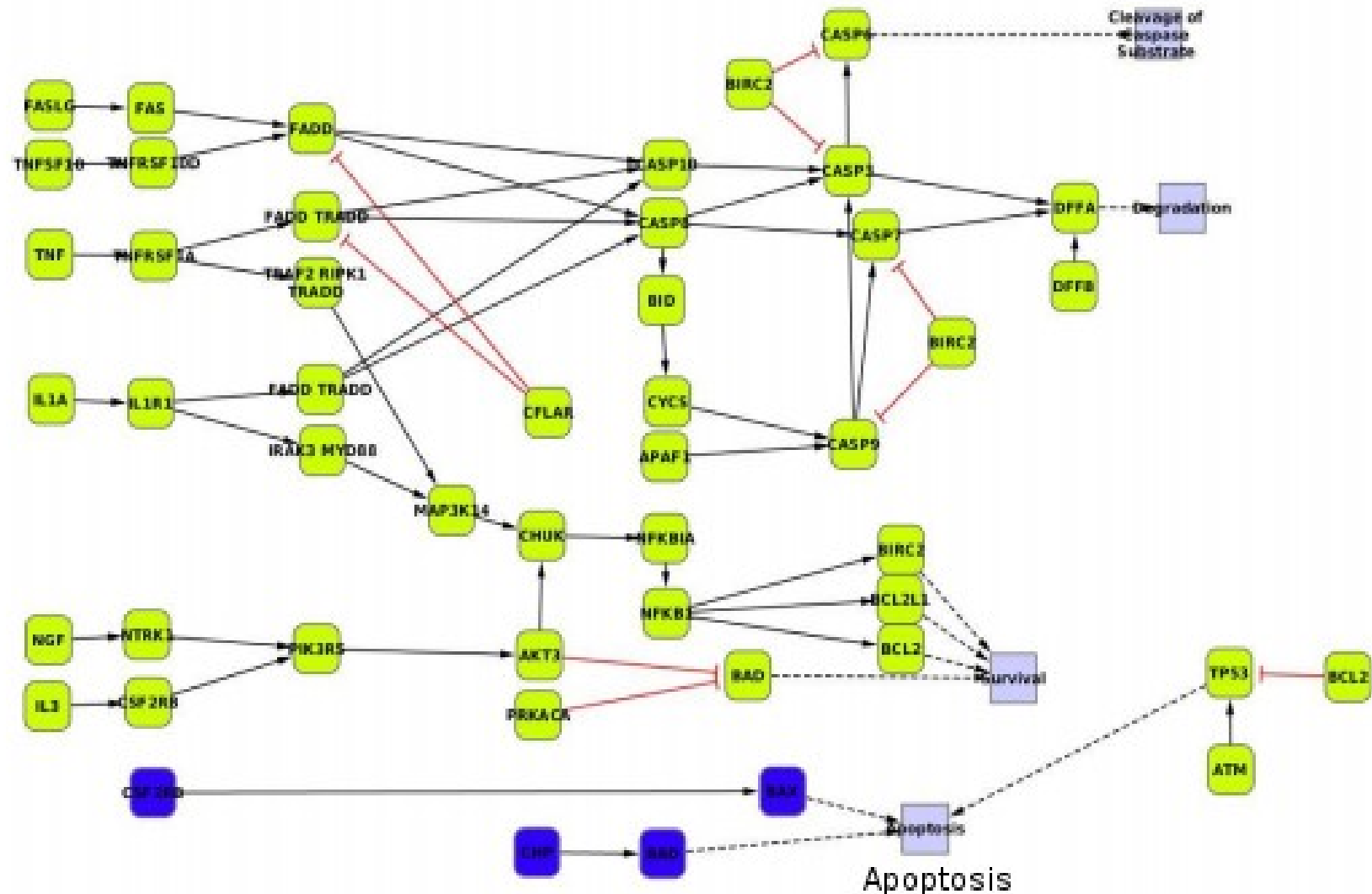
Diseases

Cancer, Diabetes, Cystic fibrosis, etc.



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Subpathway with Apoptosis Function



Signaling Pathway Databases



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Pathways for the People

- KEGG
- Reactome
- Wikipathways
- Biocarta
- NCI-PID
- Signalink



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