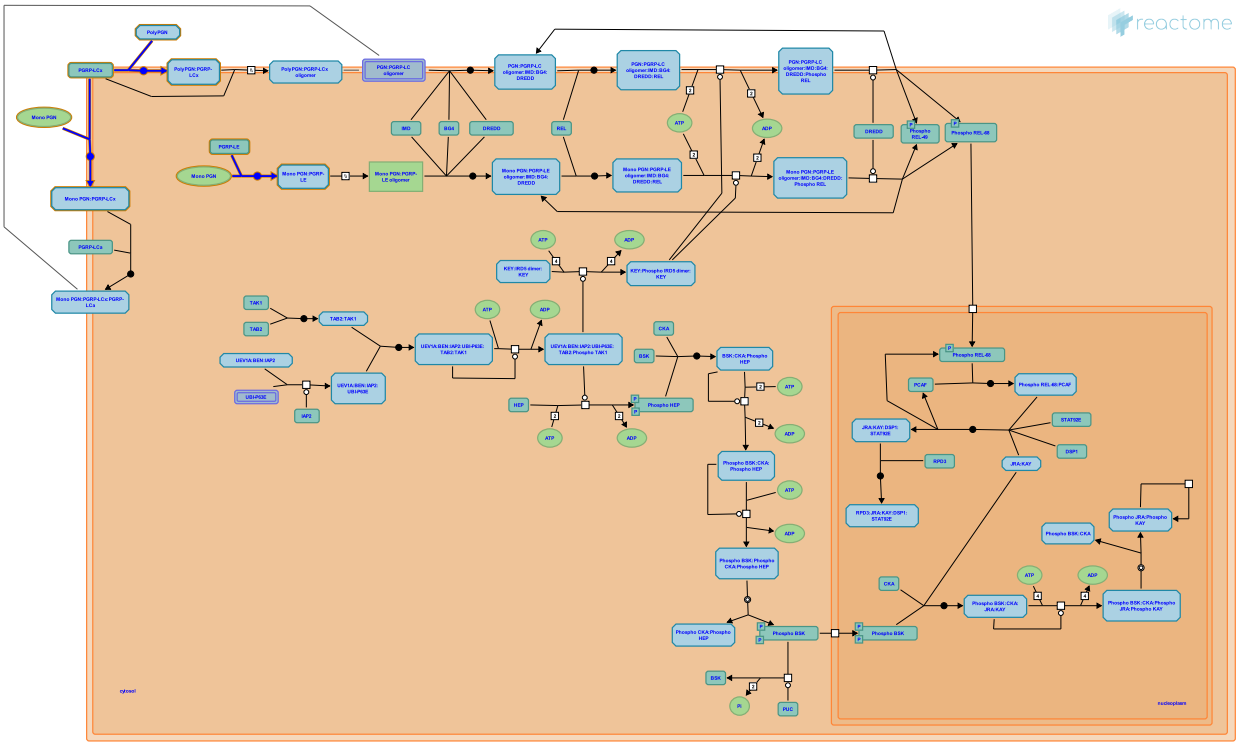
Peptidoglycans (PGN) bind to a peptidoglycan recognition protein receptor, PGRP-LC/LE



Lemaitre, B., Silverman, N., Williams, MG.

European Bioinformatics Institute, New York University Langone Medical Center, Ontario Institute for Cancer Research, Oregon Health and Science University.

This is just an excerpt of a full-length report for this pathway. To access the complete report, please download it at the Reactome Textbook.

06/05/2024

Introduction

Reactome is open-source, open access, manually curated and peer-reviewed pathway database. Pathway annotations are authored by expert biologists, in collaboration with Reactome editorial staff and cross-referenced to many bioinformatics databases. A system of evidence tracking ensures that all assertions are backed up by the primary literature. Reactome is used by clinicians, geneticists, genomics researchers, and molecular biologists to interpret the results of high-throughput experimental studies, by bioinformaticians seeking to develop novel algorithms for mining knowledge from genomic studies, and by systems biologists building predictive models of normal and disease variant pathways.
The development of Reactome is supported by grants from the US National Institutes of Health (P41 HG003751), University of Toronto (CFREF Medicine by Design), European Union (EU STRP, EMI-CD), and the European Molecular Biology Laboratory (EBI Industry program).

Literature references

Fabregat, A., Sidiropoulos, K., Viteri, G., Forner, O., Marin-Garcia, P., Arnau, V. et al. (2017). Reactome pathway analysis: a high-performance in-memory approach. *BMC bioinformatics, 18*, 142. ↗

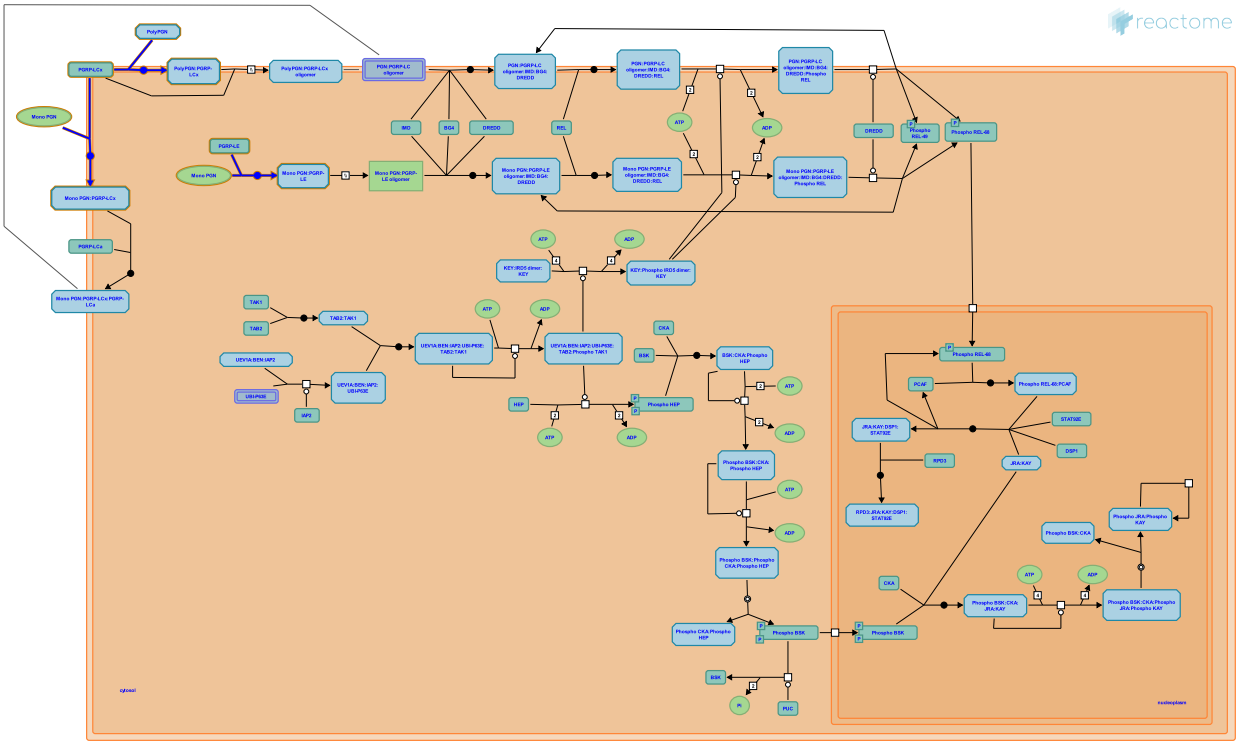
Sidiropoulos, K., Viteri, G., Sevilla, C., Jupe, S., Webber, M., Orlic-Milacic, M. et al. (2017). Reactome enhanced pathway visualization. *Bioinformatics, 33*, 3461-3467. ↗

Fabregat, A., Jupe, S., Matthews, L., Sidiropoulos, K., Gillespie, M., Garapati, P. et al. (2018). The Reactome Pathway Knowledgebase. *Nucleic Acids Res, 46*, D649-D655. ↗

Fabregat, A., Korninger, F., Viteri, G., Sidiropoulos, K., Marin-Garcia, P., Ping, P. et al. (2018). Reactome graph database: Efficient access to complex pathway data. *PLoS computational biology, 14*, e1005968. ↗

Peptidoglycans (PGN) bind to a peptidoglycan recognition protein receptor, PGRP-LC/LE ↗

Stable identifier: R-DME-209171



Spatzle (SPZ) dimer binding leads to Toll (TL) receptor homodimerisation and activation.

Literature references

Leclerc, V., Reichhart, JM. (2004). The immune response of Drosophila melanogaster. *Immunol Rev, 198*, 59-71. ↗

Editions

2007-07-11	Authored	Williams, MG.
2007-07-12	Edited	Williams, MG.
2008-06-20	Reviewed	Lemaitre, B., Silverman, N.

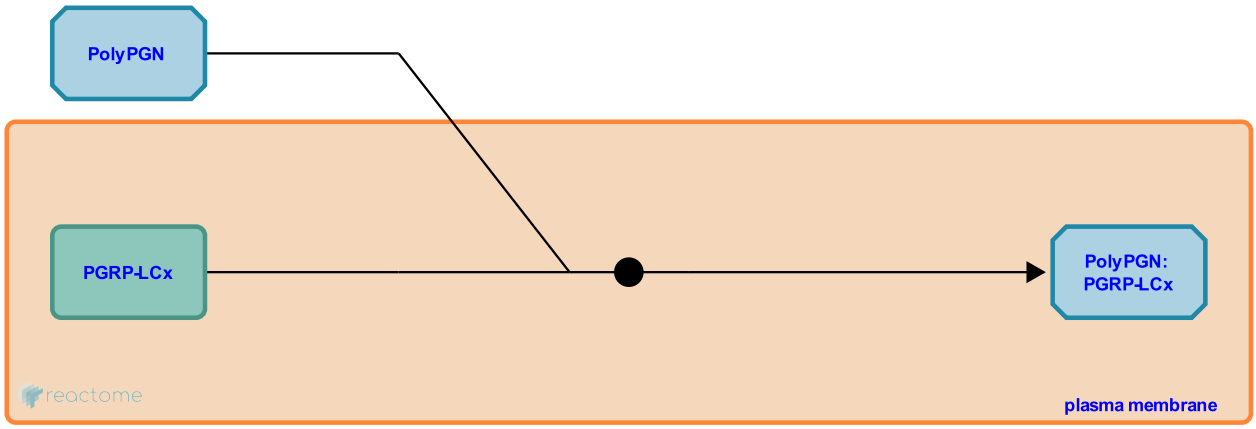
Polymeric PGN binds to PGRP-LCx at the plasma membrane ↗

Location: Peptidoglycans (PGN) bind to a peptidoglycan recognition protein receptor, PGRP-LC/LE

Stable identifier: R-DME-209377

Type: binding

Compartments: plasma membrane, extracellular region



Peptidoglycan recognition protein, PGRP-LCx, receptor exhibits strong affinity for both polymeric and monomeric peptidoglycans.

Literature references

Hakansson, J., Mellroth, P., Schultz, N., Karlsson, J., Goldman, WE., Steiner, H. (2005). Ligand-induced dimerization of Drosophila peptidoglycan recognition proteins in vitro. *Proc Natl Acad Sci U S A, 102*, 6455-60. ↗

Harley, W., Kaneko, T., Silverman, N., Mellroth, P., Golenbock, D., Goldman, WE. et al. (2004). Monomeric and polymeric gram-negative peptidoglycan but not purified LPS stimulate the Drosophila IMD pathway. *Immunity, 20*, 637-49. ↗

Leulier, F., Ryu, JH., Lemaitre, B., Pili-Floury, S., Boneca, IG., Herve, M. et al. (2004). Peptidoglycan molecular requirements allowing detection by the Drosophila immune deficiency pathway. *J Immunol, 173*, 7339-48. ↗

Editions

2007-07-11	Authored	Williams, MG.
2008-06-20	Reviewed	Lemaitre, B., Silverman, N.
2014-05-20	Edited	Williams, MG.

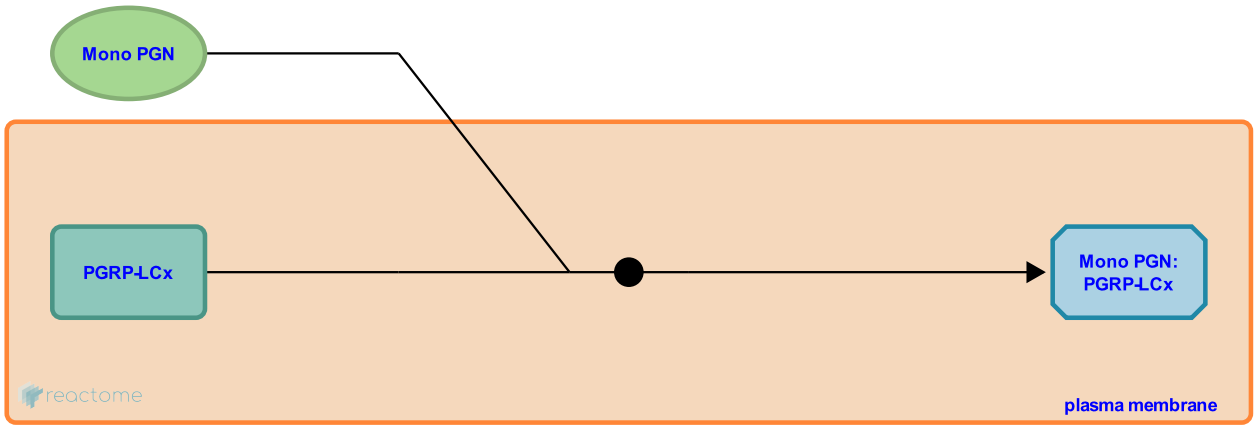
Monomeric PGN binds to PGRP-LCx at the plasma membrane ↗

Location: Peptidoglycans (PGN) bind to a peptidoglycan recognition protein receptor, PGRP-LC/LE

Stable identifier: R-DME-209355

Type: binding

Compartments: plasma membrane, extracellular region



Peptidoglycan recognition protein, PGRP-LCa receptor shows only a low affinity for peptidoglycans (PGN). However, PGRP-LCx receptor exhibits strong affinity for them.

Literature references

Chelliah, Y., Deisenhofer, J., Chang, CI., Borek, D., Mengin-Lecreulx, D. (2006). Structure of tracheal cytotoxin in complex with a heterodimeric pattern-recognition receptor. *Science, 311*, 1761-4. ↗

Hakansson, J., Mellroth, P., Schultz, N., Karlsson, J., Goldman, WE., Steiner, H. (2005). Ligand-induced dimerization of Drosophila peptidoglycan recognition proteins in vitro. *Proc Natl Acad Sci U S A, 102*, 6455-60. ↗

Yano, T., Kaneko, T., Silverman, N., Lim, JH., Kurata, S., Peach, C. et al. (2006). PGRP-LC and PGRP-LE have essential yet distinct functions in the drosophila immune response to monomeric DAP-type peptidoglycan. *Nat Immunol, 7*, 715-23. ↗

Harley, W., Kaneko, T., Silverman, N., Mellroth, P., Golenbock, D., Goldman, WE. et al. (2004). Monomeric and polymeric gram-negative peptidoglycan but not purified LPS stimulate the Drosophila IMD pathway. *Immunity, 20*, 637-49. ↗

Wakatsuki, S., Chelliah, Y., Deisenhofer, J., Ihara, K., Chang, CI., Mengin-Lecreulx, D. (2005). Structure of the ectodomain of Drosophila peptidoglycan-recognition protein LCa suggests a molecular mechanism for pattern recognition. *Proc Natl Acad Sci U S A, 102*, 10279-84. ↗

Editions

2007-07-11	Authored	Williams, MG.
2008-06-20	Reviewed	Lemaitre, B., Silverman, N.
2014-05-20	Edited	Williams, MG.

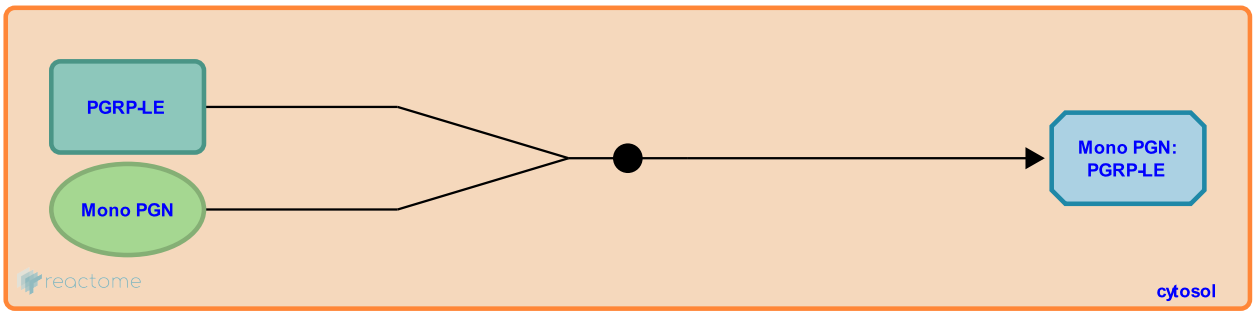
Monomeric PGN binds to PGRP-LE in the cytosol ↗

Location: Peptidoglycans (PGN) bind to a peptidoglycan recognition protein receptor, PGRP-LC/LE

Stable identifier: R-DME-214410

Type: binding

Compartments: cytosol



Peptidoglycan recognition protein, PGRP-LE receptor contains no predicted transmembrane domain or signal sequence and so is predicted to be an intracellular receptor. The recognition of the monomeric diaminopimelic acid (DAP)-type peptidoglycan (PGN) tracheal cytotoxin, TCT by PGRP-LE occurs intracellularly. However, it is postulated that the PGRP domain of a truncated PGRP-LE can also function outside the cell in a CD14-like manner by presenting DAP-type PGNs to cell surface PGRP-LC receptors.

Literature references

Yano, T., Kaneko, T., Silverman, N., Lim, JH., Kurata, S., Peach, C. et al. (2006). PGRP-LC and PGRP-LE have essential yet distinct functions in the drosophila immune response to monomeric DAP-type peptidoglycan. *Nat Immunol, 7*, 715-23. ↗

Yano, T., Silverman, N., Lim, JH., Kurata, S., Oshima, Y., Kim, HE. et al. (2006). Structural basis for preferential recognition of diaminopimelic acid-type peptidoglycan by a subset of peptidoglycan recognition proteins. *J Biol Chem, 281*, 8286-95. ↗

Editions

2007-07-11	Authored	Williams, MG.
2008-06-20	Reviewed	Lemaitre, B., Silverman, N.
2014-05-20	Edited	Williams, MG.

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