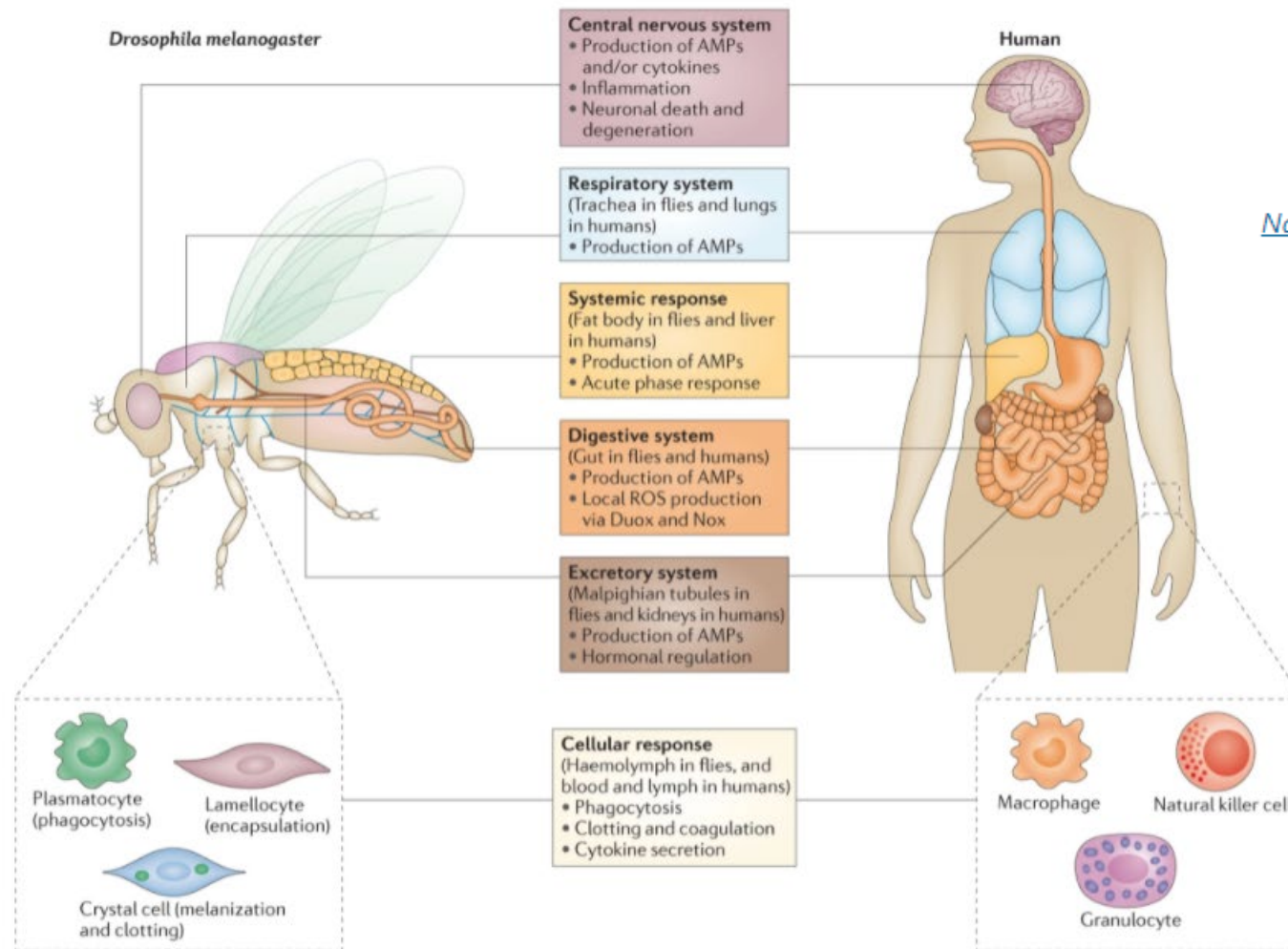


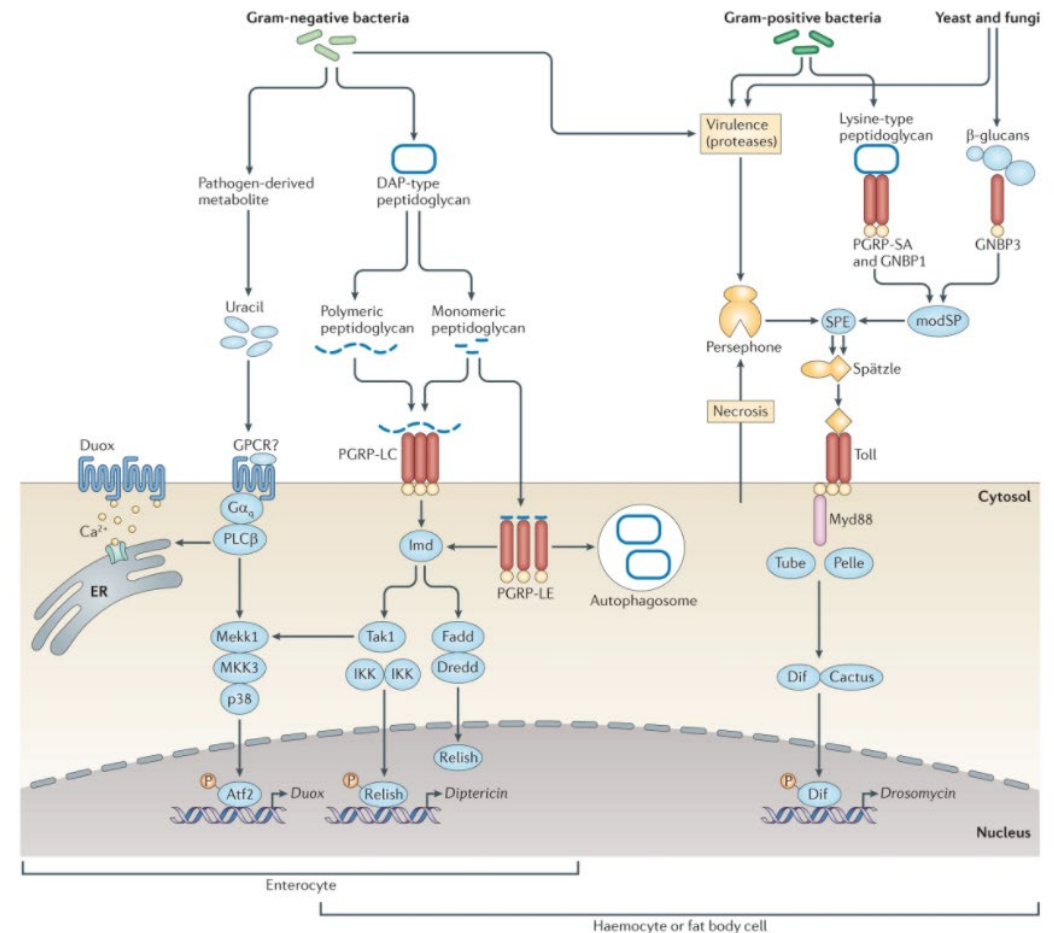
Immunity in Drosophila



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Drosophila innate immune signaling

- Drosophila provided the premise for TLR discovery (Toll pathway)
- In addition the IMD pathway has analogy to the TNF signaling pathways in mammals
 - Degeneracy
 - NFKb type responses, MAPK
 - “Cytokine” activation and secretion
 - Spatzle~IL-17



Cytokines in *Drosophila*

- Multiple analogs of basic cytokine families
- Possible insights into effector/sensor functional roles that led to signaling evolution
- Much more tractable model than any mammalian system
- No adaptive immune system

Table I. Current overview of *Drosophila* cytokines.

<i>Drosophila</i> cytokine(s)/cytokine-like factor(s)	Mammalian/vertebrate homolog	Tissue(s) expressed/secreted from	Pathway/process affected	Refs.
Upds (1, 2, 3)	Similarities to mammalian type I cytokines and vertebrate leptins	Secreted from hemocytes, expressed in larval lymph glands	JAK/STAT	[64], [73], [74], [75], [79], [80]
Spätzle	Vertebrate NGF, similarities to mammalian IL-17F	Hemocytes, other tissues? secreted into the hemolymph	Toll	[84], [85], [86], [87], [88], [89]
Eiger	TNF	Can be secreted from S2 cells, in vivo tissue expression & secretion still unclear	JNK	[97], [98], [99]
Pvfs (1, 2, 3)	Similar VEGF/PDGF domain to mammalian family members	Embryonic hemocytes, expressed in many tissues partly redundantly	PVR	[113], [114], [115], [117], [118]
GBP	Speculation about similarity with a motif in the mammalian EGF peptide family	Fat body, CNS, integument, (hemocytes)	JNK, Ca ²⁺ signaling, PVR, ERK (switch to coordinate between humoral and cellular immunity)	[119], [121], [122]
Edin	-	Fat body, secreted into the hemolymph	Plasmatocyte numbers and mobilization	[57], [62], [103], [123], [124]



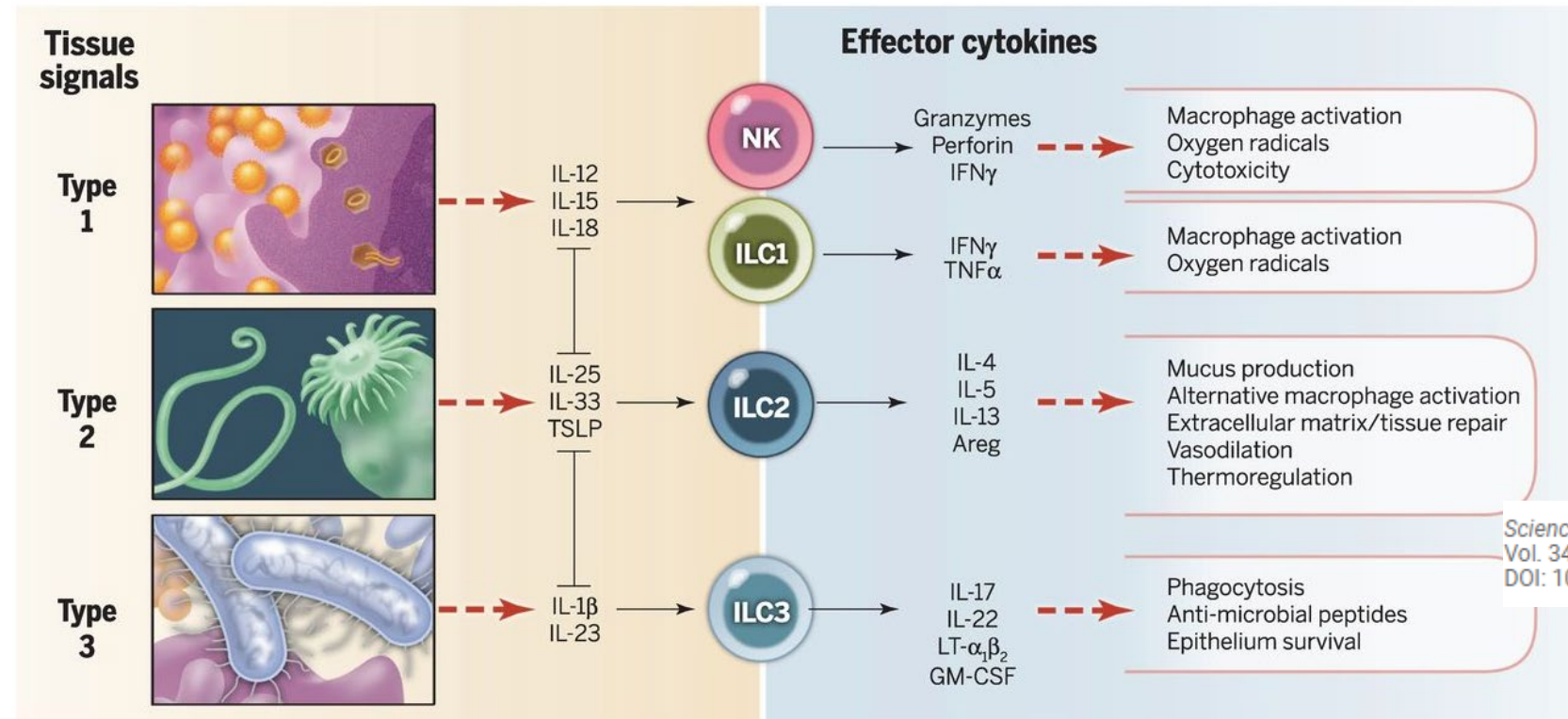
Zebrafish as a model for adaptive immunity

Single-cell transcriptional analysis reveals ILC-like cells in zebrafish

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