

Ontologies in the Fish Tank: Using the Zebrafish Anatomy Ontology with Other OBO Ontologies to Annotate Expression and Phenotype

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The Zebrafish Anatomy Ontology (ZFA) was created by the Zebrafish Model Organism Database (ZFIN) to facilitate curation of gene expression and phenotypes. The ZFA is an OBO Foundry ontology that contains 2648 terms and is 100% is_a parent complete. The ontology is updated with new terms, relationships and definitions on a regular basis, with pre-versions available prior to the update. (http://www.obofoundry.org/cgi-bin/detail.cgi?id=zebrafish_anatomy)

The ZFA is primarily used to curate expression and phenotype data and provides a canonical description of anatomical structures that facilitates cross-species comparisons. Curators use the ZFA to accurately capture gene expression data as they are described in the primary literature. ZFIN curators are able to compose gene expression statements in the curator interface using a ZFA term by itself, or using more specific post-composed terms created by coupling a ZFA term with a GO-cellular component (GO-CC) or Spatial Ontology (BSPO) term. Gene expression data comprised of annotations that utilize the ZFA, GO-CC, and BSPO, along with the Zebrafish Stage Ontology (ZFS), are provided on gene, genotype, and figure pages in ZFIN and are searchable and downloadable.

Additionally, ZFIN utilizes the ZFA to capture morphological phenotype statements that describe the effects of mutant or knocked-down gene products. ZFIN curators are able to represent entities (E) using the ZFA in conjunction with BSPO, GO-CC, GO-molecular function (GO-MF) and Cell type (CL) ontologies to produce post-composed statements. These entity statements are combined with Phenotypic quality (Q) terms (PATO) to create the E+Q[+E] phenotype description. The E+Q[+E] phenotype description, combined with the genotype, environment, and stages from the ZFS comprise a phenotype statement. Phenotype data can be accessed from the gene, morpholino, genomic feature, genotype, and figure pages and is available for download.

ZFIN is currently working toward adding the Mouse Pathology ontology (MPATH) and the Neuro Behavior Ontology (NBO) to be used in conjunction with ZFA and PATO for the curation of cancer and behavior phenotypes. ZFIN works to actively incorporate new ontologies to be used in the curatorial process that allow ZFIN curators to capture robust annotations that can be successfully used in cross-species comparisons by the wider community.