Looking for potential phenotype modifiers

Phenotype annotations in ZFIN include morphological alterations and changes in gene expression in mutant or knockdown fish as well as fish exposed to various experimental treatments. Often, new insights can come from understanding what genes or treatments modify the phenotype of specific mutants. ZFIN records phenotypic modification (i.e., genetic interaction) as either "ameliorated" (partial or complete rescue) or "exacerbated" (made worse).

These genetic interaction annotations are currently best found in ZFIN using the single box search.

Example 1: Filtering approach for ameliorated phenotypes

1. Go to the ZFIN single box search page (https://zfin.org/search)
2. Select "Phenotype" from the pulldown menu of data types
3. Search for "ameliorated"

   At this point all the phenotype results with ameliorated phenotypes are shown. On 3/5/2020 there are 2470 records.

4. An example phenotype result showing the ameliorated phenotypes

5. From there, use the filters on the left side of the search results page to focus the result set on results of interest.
6. You can filter by:
   a. Phenotypic Gene: the disrupted gene involved in the phenotype
   b. Phenotype Statement: the phenotype trait, like "eye decreased size"
   c. Stage: the developmental stage at which the phenotype was observed
   d. Manifests In:
      anatomy: the anatomical structure affected in the phenotype
      biological process: the biological process affected in the phenotype
      cellular component: the cellular component affected in the phenotype
      molecular function: the molecular function affected in the phenotype
      misexpressed gene: genes having altered expression as part of the phenotype
   e. Genotype: the genotype involved in the phenotype
   f. Sequence Targeting Reagent (STR): morpholinos, TALENs or CRISPRs that were involved in the phenotype
g. Is Monogenic: Yes or No. indicates if there is only one affected gene

h. Conditions: the experimental treatment involved in the phenotype

i. Has Image: only include results that have image

The same basic approach can be used for exacerbated phenotypes by searching for “exacerbated” rather than “ameliorated”

**Example 2: Searching for ameliorated phenotypes for the fkrp gene**

1. Go to the ZFIN single box search page (https://zfin.org/search)
2. Select “Phenotype” from the pulldown menu of data types
3. Search for “fkrp ameliorated”
4. On 3/5/2020 there are 24 ameliorated phenotypes involving the fkrp gene
5. You can then use the filters on the left side of the results to further focus the result set on records of interest.
   a. The same basic approach can be used for exacerbated phenotypes. Note that fkrp does not have any exacerbated phenotypes.
   b. Example: Search for “atg5 exacerbated”