Analyzing Collagen Alpha 1(XI) Using a Zebrafish Model System

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ABSTRACT
Zebras are (Dario rerio) are progressively becoming more popular as a model organism for research. The use of zebrafish is advantageous for several reasons. Zebras are small in size, have high fecundity, rapidly generate, are transparent during development and are easily maintained in large numbers.

Using zebras as a model organism, the aim of this project is to determine the function of Collagen Type XI alpha I (COL11A1) during early development. To begin with, it is imperative that the zebras are kept healthy. In order to control the water quality and nutrition, we control the water system also has a UV light in order to grow nitrogen-fixing bacteria.

In humans, mutations in COL11A1 are associated with the birth defects of Type II Stickler syndrome (Fig. 2) and Marshall’s syndrome (Fig. 3). The manifestations of Stickler syndrome include flattened facial appearance caused by underdeveloped bones in the middle of the face, as well as abnormal frontal sinuses, and intercranial calcifications.

The female and male zebrafish are housed separately in 10L, 3L, and 1.5L tanks (Fig. 6). Ten liter tanks house 12 to 14 fish, 3L tanks house 6 to 8 fish, and 1.5L tanks house 4 to 5 fish. The number of fish per tank also depends on the sex of the zebrafish. Male zebrafish are smaller than female zebrafish, and therefore do not require as much space.

The zebrafish system constantly circulates artificial pond water through three different filters: a prefiltre, a cartridge filter, and a carbon filter. The prefiltre is replaced once a week. The cartridge filter is replaced once a week. The carbon filter is replaced once a month. The temperature of the water is maintained at approximately 28°C by a water heater.

In situ hybridization is also performed. Embryos with various hpf (hours post fertilization) times are exposed to a solution of -sense RNA riboprobe. The presence of the target mRNA will be identified by color development by targeting the riboprobe, which are labeled with a fluorophore. The presence of the target mRNA will be visualized by color development by targeting the riboprobe, which are specially labeled. Alternatively, a direct fluorescent labeled riboprobe could be used, and signal can be detected by fluorescent microscope.

REFERENCES


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By determining when and where Collagen Type XI alpha I is expressed during early development, and the purpose that it serves, we are gaining insight into the birth defects of Type II Stickler Syndrome and Marshall syndrome.