

Case Study: Tumor Treatment using Hydrogen Peroxide in Ornamental Koi Carp

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Introduction

The author's purpose in writing this article is to share the results of a non-scientific experimental treatment that was performed on a pet koi (shiro utsuri) that had developed a cauliflower like tumor growth on the lower underside of its right jaw that was well vascularized.

This tumor was at first very slow growing and was present for more than a year before this treatment protocol was attempted. The koi initially had no difficulty in eating and had shown no other symptoms of distress, nor had it isolated itself from the rest of the koi in the pond. However, by November of 2016 the koi appeared to have trouble eating floating pellet food and by February 2017, the tumor had physiologically changed the facial appearance of the koi. A humane euthanize action was considered as, in the author's opinion, the tumor was inoperable. Even if a local veterinarian could be found and was willing to do the surgery, the cost and disfigurement as a result of the surgery made this option seem impractical. A protocol of hydrogen peroxide injections into the tumor was initiated.

For fish keepers, hydrogen peroxide (3%) is already in common use for debriding fish wounds, and for adding to pond water as a neutralizer for potassium permanganate, and to address low dissolved oxygen for a short term solution in an emergency. Hydrogen peroxide is an inexpensive antiseptic compared to iodine or other products marketed specifically for treatment on fish.

Online literature sources suggest that cancer cells are not able to thrive in an oxygen rich environment and that topical treatment using hydrogen peroxide (HO₂) (7%) is being explored but is not intended for internal use. At this point the author opted to test whether hydrogen peroxide injections into the topical part of the exposed tumor could arrest the growth, shrink the tumor, or kill it.

Protocol/Methodology

A picture of the shiro utsuri before starting the experimental protocol is shown in Figure 1. The koi's right eye is extended from the obvious tumor, and the face is completely distorted. Breathing and eating with this disfigurement was difficult at best. The tumor growth had started on the right underside of the jaw, grew upward into the facial area and spread underneath the jaw to the left side of the face. The koi was removed from the pond and placed in a smaller tank where it could be monitored.



Figure 1. Koi with Tumor prior to Injections

The koi was placed in a large fish safe 18" x 24" plastic bag with enough water to completely cover its body but that it could be restrained from movement. The bag was oriented so the koi could be turned upside down to allow access to the underside of the jaw where the tumor had grown external to the body. A syringe with 3 ccs of hydrogen peroxide (3%) was injected into the tumor through the plastic bag in 4 separate locations of the tumor. Care was taken to inject the hydrogen peroxide only into the fatty part of the tumor and not into the fish's skin. The koi was then released into the tank for observation. The next day, the koi was bowled and examined. A good portion of the underside tumor was missing. Figure 2 shows the koi after the first set of injections. Not much had changed in the appearance of the tumor within the cheek, but on the underside of the fish the tumor had reddened and the tumor had turned a cottage cheese/tapioca-like appearance and color at the injection site in Figure 3.



Figure 2. Koi after First round of HO₂ Injections



Figure 3. Exposed Tumor after first round of Injections (late Feb 2017)

The koi was then released into the tank. Two weeks later, the process was repeated, but the dose was increased to 6 ccs. The tumor was injected in 4 - 6 locations, each with approx. 1-2 ccs each. The hydrogen peroxide was injected only into the external part of the tumor as a conservative approach to avoid the risk of injecting 3 ccs directly into the tumor within the fish's body with the tumor still obscuring a potential injection site. The koi was released back into the tank for about a month. After a month, the tumor within the koi's cheek that was causing the

extended/swollen eye had not receded but there was no evidence that the tumor was re-growing at the previous injection locations.

In early April 2017, the koi was again removed from the tank, placed in a plastic bag and examined for an injection site for the tumor within the cheek. A syringe was filled with 3 cc of hydrogen peroxide and injected in two locations (approximately half a syringe at each injection site). One injection site was from the bottom jaw up into the tumor, and the other injection site was topside forward of the eye and to the right of the nostril.

The koi was released into the tank where for the first time in the treatment protocol the koi showed early signs of distress. The koi initially was at the water surface and on its side but with regular breathing. For about 15 minutes, the koi was held upright at the water surface, nearest the flow of recirculating water into the tank. After a few attempts the koi was still not swimming on its own, but in an hour's time, had righted itself and appeared to be recovering from the initial effects of the injections.

By the next day the koi was much improved and within 3 days the tumor had receded. Figure 4 shows a picture of the koi with its face less distorted and Figure 5 shows the underside location with pink skin coloration.



Figure 4. Koi after several periodic injections (June 25th)



Figure 5. Tumor site 3 months (Jun 25th) after first Injection exhibits a much improved contour

Summary

The koi will be monitored to determine if additional lower dose injections will be needed and whether there is evidence of any regrowth, but the results of this experimental treatment are promising. Before attempting this type of protocol consult with your koi health advisor or veterinarian since dosage, frequency and injection location likely will vary for each fish based on tumor size and location. This method was used only as a last resort to try and save a pet fish that would otherwise have been euthanized. Future studies for this type of tumor treatment in fish should be pursued by the science community.

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