

Quarantine Protocol for KHV

By Linda Montgomery

At a recent PNKCA (Pacific Northwest Koi Clubs Association) Representatives Meeting one of the Representatives asked “What is the correct quarantine protocol to have a fighting chance against KHV?” I do realize that KHV is a subject that many people may be getting a little tired of hearing about, but it is such a devastating virus and it has hit very hard numerous families in the Pacific Northwest. Many of these families have continually been heard to say that “You need to quarantine any new fish”, but what exactly does that mean?

The quarantine protocol that we used to recommend in the lovely days before KHV reared its ugly head, may no longer apply. The reason it is no longer enough to just keep a new fish (with one of your existing pond fish) in a separate tank with good working filtration at an optimum temperature (72-78 degrees) for a period of 3 months is because we are dealing with a virus of largely unknown characteristics. This disease is specific to common carp and koi and temperature dependant (which means that it may still be present in a fish but not presently visible or active until it reaches a certain temperature), which is the ultimate danger.

So what does this mean, how can you adequately quarantine for this devastating virus? To start with you should have what you have always needed in the past to quarantine your fish:

1. A quarantine system (150 gallon minimum, but recommended 500 gallon and the larger the better) with an established and well functioning filtration system.
2. A heater to keep the temperature optimum for the appearance of the disease you are looking for.
3. Aeration in the tank
4. A ‘control’ fish from your pond (a fish that you are willing to possibly lose)
5. Time and patience

Next you then need to understand why it is no longer enough to keep that fish at an optimum temperature and in good water quality for 3 months. The explanation is really not as complicated as you may think, this virus, as stated before, is temperature dependant, which means that it is triggered or activated at certain temperatures and/or changes in temperature. So what you need to do is increase the temperature in the quarantine tank to an optimum temperature to trigger the virus (72-78 degrees). Then keep this optimum temperature for at least 3- 4 weeks. So far this isn’t very different from the quarantine protocol that has been recommended for years. Now this is where it becomes a little more complicated, the virus can be latent in a fish or the fish can be persistently infected at a low level (no symptoms showing) and not necessarily become activated at 72-78 degrees. How is this possible? There are at least three ways in which this could happen: #1 a fish can be exposed to the KHV virus and can harbor it in their system but for some unexplained reason are not showing symptoms (persistently infected) or #2 the fish got the disease, lived thru it and now has antibodies to the disease (about 10% to 20% typically do for some unknown reason) or #3 the fish was heated up to 86 degrees where the fish was able to successfully survive the disease and the active virus was put into a latent or low level persistently infected state. Any one of these options will complicate our normal quarantine protocol as you now have a situation of

dealing with a 'latent' or 'dormant' virus. The danger of this is that it is possible to give a koi keeper a false sense of security that allows them to believe that their new koi are safe and then introduce them into their existing pond system, when actually they are still harboring the virus. This latent virus is much more unpredictable than the active or diseased state as it lies in wait for the fish to come under stress before becoming active again.

The very best quarantine protocol to detect the virus was given to me by Vicki Vaughn. This protocol involves the serological test that is available thru the University of Georgia and was mentioned in the 2005 Sept/Oct issue of Koi USA. This quarantine protocol is listed below:

Step 1) keep the fish at 70 to 75 degree for 1 month to see if they break

Step 2) If at one month they do not break then they have had adequate time to produce antibodies to KHV if they have been exposed

Step 3) Bleed fish and submit serum to KOILAB and cull fish that are positive. The blood test costs \$30.00.

This quarantine protocol is by far the best option that we have to date in order to identify 100% whether or not a fish has been introduced to KHV. Another option for quarantining which does not involve a blood test, but does involve stressing the fish is listed below. The reason that this other option may work is that now many experts researching this virus believe that not only temperature but 'stress' triggers the virus. So now that we think that stress can trigger the virus as well as temperature, how do we use this information when quarantining our fish? The answer is this: stress our koi. This is such a hard thing to hear as it is something that we as koi keepers have always tried our best *not* to do. This goes against everything we have always been taught in order to keep our fish healthy...we now may need to stress our koi just to keep them safe. In order to try to bring the latent or dormant virus to activation, we now need to put our koi under extreme stress in their quarantine system. More than likely your new koi have already undergone a considerable amount of stress by being shipped or transported, but just to be safe it is recommended to put them through a temperature regime. Everyone has different opinions on how this can be done, but most agree that drastically fluctuating the water temperature is a good way to put koi under extreme stress. **Listed below is one option that may be successful as a new quarantine protocol to accomplish this but certainly is not as reliable as the blood test protocol listed above:**

Step #1: Keep the temperature consistently at 78 degrees for 3-4 weeks

Step #2: If there is no sign of the KHV virus then drop the temperature quickly by 10 degrees (done with a water change w/ correct water conditioners)

Step #3: Leave the temperature at 68 degrees for 2 days.

Explanation: The huge temperature change is very hard on the koi and will put them under extreme stress which will help to trigger the virus to become active. To make sure that you accomplish this you need to put any new fish under this temperature change procedure a couple of times.

Step #4: Raise the temperature back up quickly to 78 degrees, leave for 2 days

Step #5: Drop the temperature down to 68 degrees again for 2 days

Step #6: Then raise the temperature back up to the optimum temperature (72-78 degrees) to finish the remainder of the quarantine period.

At this point you have done all you can to activate the virus and if a latent virus is present it should become active.

Step #7: After this temperature regime you then add a 'control' fish from your existing pond system and finish the quarantine procedure for a minimum of 3 months.

NOTE: Be cautioned that this protocol is an experimental one! *Before doing this procedure you need to ask yourself, 'does the risk of temperature cycling, which could precipitate bacteria and parasite disease, out-weigh the benefit of finding KHV latent infected fish?' *Another experimental option that would accomplish the same effects as the temperature cycling would be a fluctuation in pH. Fluctuations in pH also stress your fish and would potentially obtain the same result as the temperature cycling.*

Many of you may have heard that the KHV virus can be 'killed' or 'put in remission' at 86 degrees. This is may be true to a certain extent; it does enable most of the fish to survive the virus but it is not known if it actually kills the virus. As previously mentioned, the virus can possibly still exist in the body of the fish (in a latent state) somewhere (they believe possibly in the brain of the fish) but it is believed that it can then develop into an active state when the fish is exposed to stressful conditions. This is not known for sure, there are so many 'unknowns' with this virus, but we need to assume the worst to be able to protect our koi. What this means is this: **You do not want to use this 86 degree temperature in your quarantine protocol. This will not allow you to identify the virus which would defeat the whole purpose of quarantining! Remember the basic concept in quarantining any new fish is to identify what pathogens are in or on the fish in order to know what to do to prevent its introduction into your existing pond system.** So this means that this temperature should only be used to save fish once it is diagnosed that they have the active virus and you choose to make the hard and controversial decision to save the fish. The reason is this: if you up the temperature in your quarantine to 86 degrees and the new fish have been infected with the KHV virus, you put the virus in remission and you would not know that your new fish have the virus (now latent in them) and you could introduce them into your pond believing them to be safe. *Remember the purpose of quarantining your new fish is to identify and discover any pathogen or disease that could be introduced into your established pond system.*

I know that understanding the KHV virus is extremely hard and not the most interesting or entertaining of reading material, but if we don't take the time to understand this virus we will not be able to protect our koi from being infected by it. There is much that they are still learning about this virus and information is always changing. This virus has already devastated a numerous families in our area and before a vaccine is developed will undoubtedly devastate many more, so please take the time to read and learn as much as you can about this virus to be better able to protect your beautiful koi.

*I have tried to compile the information from as many well-informed people as I could about KHV and share with our readers one option of a quarantine protocol that will help to discover this devastating disease. Jeff Thomas, who is a KHA and the person that I rely on the most for advise in fish health, helped me a lot with this article and the temperature cycling quarantine protocol. Thanks so much Jeff!

As mentioned earlier in the article, there is still much to learn about this virus, and there is a good possibility that the quarantine protocol will need to be changed in the future as we learn more, but at the present time this information is the best we have to offer. A good thing to remember as my friend, Vicki Vaughn says **“Viruses do not read books nor follow our protocols and it is their job to mutate and survive and adapt. Sooo... whatever quarantine procedure you choose to use will be ineffective in a short period of time.”** I know that is discouraging information but unfortunately very, very true. Whatever the quarantine protocol you decide to use to try to expose KHV will only work for a short period of time, as viruses change and adapt to survive. So, we have to be just like the virus we are trying to expose...we need to change and adapt with it to protect our koi!