

From: [Nathalie \(Aquatic\) Bruneau](#)
To: [Marty, Gary D AGRI:EX](#)
Subject: RE: question ISAV testing
Date: Monday, April 25, 2016 9:27:07 AM

Thanks Gary. This is very helpful!

Have a great day!

Dr Nathalie Bruneau
National Manager - Aquatic Surveillance and Epidemiology
Animal Health Science Directorate
Canadian Food Inspection Agency
1400 Merivale Road, Tower 1
Ottawa ON
Tel: (613) 773-5584
BB: (613) 818-5617
email:Nathalie.N.Bruneau@inspection.gc.ca

>>> "Marty, Gary D AGRI:EX" <Gary.Marty@gov.bc.ca> 2016-04-25 12:16 PM >>>

Hi Nathalie,

I spoke with Jane Pritchard and Tomy Joseph on Friday afternoon. Based on general principles of biosecurity, they did not think it was a good idea for us to test large numbers of samples for ISAV from a region where ISAV is endemic. Otherwise, we are not restricted to BC (e.g., rainbow trout from Ontario would be a minimal biosecurity risk).

We are available to dissect fish, but in my experience sample quality is best if samples are collected where the fish are killed (or die).

If you would like to discuss options, please call me at your earliest convenience.

Best regards,

Gary

Gary D. Marty, Senior Fish Pathologist
Animal Health Centre
Ministry of Agriculture
1767 Angus Campbell Rd.
Abbotsford, BC, V3G 2M3
604-556-3123

From: Nathalie (Aquatic) Bruneau [mailto:Nathalie.N.Bruneau@inspection.gc.ca]
Sent: Thursday, April 21, 2016 1:24 PM
To: Marty, Gary D AGRI:EX
Subject: Re: question ISAV testing

Awesome! Thanks Gary!

Sent from/Envoyé du BlackBerry.

>>> "Marty, Gary D AGRI:EX" <Gary.Marty@gov.bc.ca> 21/04/2016 4:18:14 PM >>>

Hi Nathalie,

Our laboratory director, Jane Pritchard, is out of the office today, as is the director of our Molecular Diagnostics section (Tomy Joseph). They will be back in the office tomorrow. I will consult with them tomorrow and get back to you.

Best regards,

Gary

Gary D. Marty, Senior Fish Pathologist
Animal Health Centre
Ministry of Agriculture
1767 Angus Campbell Rd.
Abbotsford, BC, V3G 2M3
604-556-3123

From: Nathalie (Aquatic) Bruneau [mailto:Nathalie.N.Bruneau@inspection.gc.ca]
Sent: Thursday, April 21, 2016 10:20 AM
To: Marty, Gary D AGRI:EX
Subject: re: question ISAV testing

Hi Gary,

I hope this email finds you well. Based on the discussion between CFIA and your lab on the preparation of the contract for ISAV testing some conditions/restrictions were put forward. I would like to get confirmation as whether my understanding is correct and whether these conditions were only for the contract or would also stand in the event there were other opportunities this year to submit NAAHP samples for ISAV testing.

conditions:

- only tissues could be submitted (no whole fish as no dissection to be carried out at the lab)

- Fish to be tested had to originate from the province of BC

warm regards

Dr Nathalie Bruneau
National Manager - Aquatic Surveillance and Epidemiology
Animal Health Science Directorate
Canadian Food Inspection Agency
1400 Merivale Road, Tower 1
Ottawa ON
Tel: (613) 773-5584
BB: (613) 818-5617
email:Nathalie.N.Bruneau@inspection.gc.ca

Page 04

Withheld pursuant to/removed as

s.17

Page 05 to/à Page 06

Withheld pursuant to/removed as

s.22;s.17

Page 07

Withheld pursuant to/removed as

s.17

Page 08 to/à Page 11

Withheld pursuant to/removed as

s.79

Page 12 to/à Page 14

Withheld pursuant to/removal as

DUPLICATE

Page 15 to/à Page 16

Withheld pursuant to/removed as

s.79

From: [Ahmed Siah](#)
To: [Marty, Gary D AGRI:EX](#)
Subject: RE: PRV strain in your study compered with Kibenge et al.
Date: Saturday, October 15, 2016 10:26:09 PM

Hi Gary,
Yes they do not match 100% Kibenge's sequences based on partial sequences of segment S1.
Archived sequences are under the type BCA1338 (In table 2 of our paper this corresponds to cluster C4).
Regards
Ahmed

-----Original Message-----

From: Marty, Gary D AGRI:EX [<mailto:Gary.Marty@gov.bc.ca>]
Sent: Friday, October 14, 2016 11:45 AM
To: Ahmed Siah <Ahmed.Siah@cahs-bc.ca>
Subject: Re: PRV strain in your study compered with Kibenge et al.

Hi Ahmed,

Thank you for sending this. Am I correct that none of your sequences exactly matched any of the Kibenge sequences? Also, which of your sequences were from the oldest samples?

Best regards,

Gary

From: Ahmed Siah <Ahmed.Siah@cahs-bc.ca>
Sent: October-14-16 8:47 AM
To: Marty, Gary D AGRI:EX
Subject: RE: PRV strain in your study compered with Kibenge et al.

Hi Gary,
Attached are the nucleotide differences between Kibenge sequences (red) and our sequences.
Regards
Ahmed

-----Original Message-----

From: Marty, Gary D AGRI:EX [<mailto:Gary.Marty@gov.bc.ca>]
Sent: Friday, October 7, 2016 12:57 AM
To: Ahmed Siah <Ahmed.Siah@cahs-bc.ca>
Subject: PRV strain in your study compered with Kibenge et al.

Hi Ahmed,

Have you seen this paper?

Morton, A., and R. Routledge. 2016. Risk and precaution: Salmon farming. Marine Policy 74:205-212.

It included the following statement:

"[34] reported on a strain of PRV in BC that diverged from a Norwegian strain in ~2007. [87] provided evidence on a different strain of PRV in BC, and suggest that it is endemic to BC. "

[34] M.G. Godoy, M.J. Kibenge, R. Suarez, E. Lazo, A. Heisinger, J. Aguinaga, D. Bravo, J. Mendoza, K.O. Llegues, R. Avendaño-Herrera, C. Vera, F. Mardones, F. Kibenge Infectious, salmon anaemia virus (ISAV) in Chilean Atlantic salmon (*Salmo salar*) aquaculture: emergence of low pathogenic ISAV-HPR0 and re-emergence of virulent ISAV-HPR?: HPR3 and HPR14, *Virology J.* 10 (2013) 344.

[87] A. Siah, D.B. Morrison, E. Fringuelli, P. Savage, Z. Richmond, R. Johns, M.K. Purcell, S.C. Johnson, S. Saksida, Piscine reovirus: genomic and molecular phylogenetic analysis from farmed and wild salmonids collected on the Canada/US Pacific coast, *PLoS One* 10 (2015) e0141475. <http://dx.doi.org/10.1371/journal.pone.0141475>.

I am quite sure that the citation listed as [34] is not the correct one for this statement. I think that the correct citation is:

Kibenge, M.J.T., T. Iwamoto, Y. Wang, A. Morton, M.G. Godoy, and F.S.B. Kibenge. 2013. Whole-genome analysis of piscine reovirus (PRV) shows PRV represents a new genus in family Reoviridae and its genome segment S1 sequences group it into two separate sub-genotypes. *Virology Journal* 10:230. doi:10.1186/1743-422X-10-230.)

Assuming that Kibenge et al. (2013) is the correct citation, is the statement in Morton and Routledge (2016) correct? Is the sequence that you reported different from the one reported by Kibenge et al. (2013) for BC samples ?

Best regards,

Gary

Gary D. Marty, Senior Fish Pathologist
Animal Health Centre
Ministry of Agriculture
1767 Angus Campbell Rd.
Abbotsford, BC, V3G 2M3
604-556-3123

Page 19 to/à Page 21

Withheld pursuant to/removed as

s.79

Page 22 to/à Page 23

Withheld pursuant to/removed as

s.17

Page 24

Withheld pursuant to/removed as

s.22;s.17

Page 25

Withheld pursuant to/removed as

s.17

From: [Marty, Gary D AGRI:EX](#)
To: ["Saksida, Sonja"](#)
Subject: RE: unexplained heart disease in BC abstract
Date: Thursday, November 24, 2016 12:53:00 PM
Attachments: [Publicly available information about heart and skeletal muscle lesions similar to Norwegian HSMI.msg](#)

Here you go.

Gary

From: Saksida, Sonja [<mailto:Sonja.Saksida@dfo-mpo.gc.ca>]
Sent: Thursday, November 24, 2016 12:52 PM
To: Marty, Gary D AGRI:EX
Subject: RE: unexplained heart disease in BC abstract

Yes please

Sonja Saksida DVM, MSc
Lead Veterinarian - Pacific Region
Fisheries and Oceans Canada | Pêches et Océans Canada
Telephone | Téléphone: 902 210 8912

Sonja.Saksida@dfo-mpo.gc.ca

From: Marty, Gary D AGRI:EX [<mailto:Gary.Marty@gov.bc.ca>]
Sent: Thursday, November 24, 2016 10:46 AM
To: Saksida, Sonja
Subject: unexplained heart disease in BC abstract

Hi Sonja,

The abstract that we discussed in our recent phone conversation is what I included in the “**Public reporting #1:**” section of my Thu 2016-05-19 10:01 AM e-mail to you, Stewart, Kristi, and Ian. Let me know if you need me to resend.

Best regards,

Gary

Wilson, John FIN:EX

From: Marty, Gary D AGRI:EX
Sent: Thursday, May 19, 2016 10:01 AM
To: Stewart Johnson (Stewart.Johnson@dfo-mpo.gc.ca); Kristi Miller-Saunders; 'Saksida, Sonja'; 'Keith, Ian'
Cc: Snyman, Heindrich N AGRI:EX
Subject: Publicly available information about heart and skeletal muscle lesions similar to Norwegian HSMI

Hi Stewart, Kristi, Sonja, and Ian,

Thank you for the opportunity to participate in the Context Advisory Committee meeting. I think this study provides a great opportunity to better describe this disease. The project is very fortunate to have timed its extensive sampling to cover one of only 2 – 3 outbreaks of this HSMI-like disease that has occurred in BC since I began working for the BC Ministry of Agriculture in 2004. In my experience, other cases of idiopathic cardiomyopathy tend to be sporadic: affecting only 1 or 2 fish per Audit or private submission. If this disease is caused by an infectious agent, the sporadic occurrence of the disease within affected farms is evidence that the cause is not highly infectious. The other feature of this disease (or diseases) that is difficult to explain by an infectious process is that the major outbreaks, like that documented by the SSHI in 2013, have occurred in a single channel (it is not clear to me if they occurred on the same farm or adjacent farms).

As I mentioned during the meeting, public reporting of inflammation in the heart and skeletal muscle of BC farmed Atlantic salmon is not new. What is new is that the case definition by Dr. Miller's group seems to be different than what has been used in BC by me, the salmon farm veterinarians, and DFO veterinarians.

To summarize, the relation of PRV to unexplained heart disease in BC farmed salmon was first reported in June 2013 at a scientific meeting. The combination of heart and skeletal muscle lesions was first reported in October 2013 in an expert report as part of the ongoing PRV legal case. Information about heart and skeletal muscle inflammation in BC farm salmon was also summarized and updated in 2015.

To help put the new work in perspective, here are details of three examples of public reporting of heart lesions in BC farmed salmon:

Public reporting #1: Marty, G.D. and J. Bidulka. Piscine reovirus (PRV) is common but unrelated to disease among farmed Atlantic salmon in British Columbia. Annual meeting of the Fish Health Section of the American Fisheries Society; June 19-20, 2013 (Port Townsend, WA).

Piscine reovirus (PRV) is a putative viral sequence first identified in 2010 in association with the European disease heart and skeletal muscle inflammation (HSMI). Although the cause of HSMI has not been confirmed, and HSMI does not occur in British Columbia, unexplained heart disease kills about 2% of the freshly dead farmed Atlantic salmon sampled as part of the British Columbia Fish Health Auditing and Surveillance Program. To determine the relation of PRV to unexplained heart disease, we developed and analytically validated qPCR tests for PRV, one each for the L1 and L2 genes. Both tests were used to analyze 107 archived pooled samples from 402 fish collected during 76 farm audits in 2009; histopathology was done on eight major organs from each fish. Five of the 76 audits included one fish that died from unexplained heart disease, and 80% (4/5) of the pooled samples containing these fish were positive for PRV (Ct values ranging from 21.5 – 30.3). Among the 71 other audits, 79% (56/71) were positive for PRV (Ct values ranging from 22.5 – 37.4). The segment amplified by our L2 gene primers is identical in British Columbia and Europe (100% match, 12 BC samples sequenced). We also tested 39 pooled samples from 137 farmed Atlantic salmon that had been submitted

directly from farm veterinarians for health screening before transfer. Using the qPCR test for the L1 gene, 77% of the pooled samples were PRV positive (Ct values ranging from 21.5 – 38.2), and the sample with the most abundant PRV had no significant inflammatory heart lesions. We conclude that PRV is common among farmed Atlantic salmon in British Columbia, but PRV is not associated with any cause of mortality, including unexplained heart disease.

Public reporting #2: Affidavit of Dr. Gary D. Marty sworn October 30, 2013, in Morton v. Minister of Fisheries and Oceans et al, Federal Court No. T-789-13

21. Have you tested fish for PRV and/or HSML with results that contradict the results of your testing for MHC?

I have not tested fish for PRV and/or HSML with results that contradict the results of my testing for MHC, but I have tested fish in which the suite of lesions was different than the groups of fish I examined from MHC or DFO.

As described in my answer to question #4, among all the testing I have done for HSML (e.g., the BC Fish Health Auditing and Surveillance Program), I occasionally diagnose “unexplained heart lesions” as the cause of death. However, the prevalence of PRV in tested cases (80%) is the same as the prevalence of PRV among (i) groups of fish that die of other causes and (ii) healthy fish that are sampled for pretransfer screening.

In two cases submitted directly by a BC fish farm company other than Marine Harvest (one case in 2011 and one case from a different farm in 2013), I diagnosed unexplained heart lesions as the cause of death in all of the fish in the sample group. These cases were not tested for PRV, but based on other data there is an 80% chance that they would be PRV positive. In this year’s case, I requested a second submission that included skeletal muscle for histopathology (skeletal muscle is not included in routine submissions for diagnostic purposes). One of the 10 fish included in the second submission had severe heart lesions but no skeletal muscle inflammation; therefore, this fish did not have HSML. Three other fish had moderate to severe heart lesions along with mild inflammation of skeletal muscle; therefore, these fish had inflammation of the heart and skeletal muscle, which are two features of HSML. However, the farm’s veterinarian told me that the fish did not have clinical signs consistent with the description of the European syndrome HSML (see Dr. Nylund’s expert report, answer to his question 24). Because these BC fish did not have all features of the European syndrome HSML (i.e., clinical features are different), it is not appropriate to diagnose HSML in these fish. Without consistent clinical signs, a diagnosis of HSML in these fish is likely to result another example of the diagnostic “confusion” described by Dr. Nylund in his expert report (i.e., the response to his question 22). The submission form submitted with the second BC sample included a history that stated, “As environmental conditions improved, mortality dropped significantly. Mortality is now low normal with no clinical signs of disease.” The cause of the heart lesions in these fish remains unknown, but all the information I have better fits “transient adverse environmental conditions” (e.g., exposure to algal toxins) as the cause of disease rather than PRV. Also, if BC strains of PRV were causing HSML, it is not plausible to have 80% of BC Atlantic salmon infected with PRV every year since 2006, but have only two cases of HSML during that same period.

This expert report was entered into evidence and is available to the public. In the 2.5 years since I produced this document, I have not seen any information that compels me to change my response to this question (# 21).

Public reporting #3: DFO. 2015. Assessment of the Occurrence, Distribution and Potential Impacts of Piscine Reovirus on the West Coast of North America. DFO Can. Sci. Advis. Sec. Sci. Resp. 2015/037.

Source: http://www.dfo-mpo.gc.ca/csas-sccs/publications/scr-rs/2015/2015_037-eng.html

From page 9: “Because skeletal muscle was not sampled as part of the Audit Program until 2013, only since 2013 have we been able to determine that few cases of idiopathic cardiomyopathy in BC match the pattern of microscopic lesions

associated HSMI in Norway. For example, of the 1,013 Audit Program Atlantic Salmon sampled from 2014 and 2015, only two of the fish (0.2%) had both moderate skeletal muscle inflammation and significant cardiomyopathy.

Although some pathologists have summarized lesions present in samples from the audit program as "HSMI-like" or "consistent with HSMI", these diagnoses have not been consistent with a clinical pattern that matches HSMI."

From page 10: "...in British Columbia clinical signs are not seen in farms with idiopathic cardiomyopathy."

From page 12: "Over the past decade, about 2% of BC farmed salmon die each year of heart disease of unknown cause (idiopathic cardiomyopathy). However, the clinical features and microscopic lesions with these deaths do not match heart diseases described in Norway, including HSMI, CMS, PD, and the recently described disease of Rainbow Trout. More recently with inclusion of skeletal muscle in the audit samples, about 10% of these fish (0.2% of the total) have also been found to have significant inflammation of skeletal muscle, as well as heart lesions. The cause or causes of this heart disease are unknown, however, even if the 2% are dying of an infectious disease, the low prevalence supports the conclusion that the disease is not highly infectious to Atlantic Salmon."

From "Key uncertainties", page 13: "Over the years, idiopathic cardiomyopathy has been reported in audit samples in British Columbia. More recently, with inclusion of skeletal muscle in the audit samples, some fish have also been found to have inflammation of skeletal muscle, as well heart lesions (e.g., two of the 1,013 Audit samples in 2014 and 2015). The cause or causes of these lesions is unknown and merits further study. Additional information is needed from the histopathologists who have examined these samples to understand how existing cardiomyopathies and muscular pathologies are differentially diagnosed from HSMI."

From the Conclusions on page 13: "HSMI has not been reported on BC salmon farms. However, idiopathic cardiomyopathy has been reported in about 2% of the audit samples in British Columbia. More recently with inclusion of skeletal muscle in the audit samples, about 10% of these fish (0.2% of the total) have also been found to have significant inflammation of skeletal muscle, as well as heart lesions. The cause or causes of these lesions are unknown, but the combination of clinical and microscopic features does not fit the diagnosis of HSMI as described in Norway."

You are welcome to forward all or part of this e-mail.

Best regards,

Gary

Gary D. Marty, Senior Fish Pathologist
Animal Health Centre
Ministry of Agriculture
1767 Angus Campbell Rd.
Abbotsford, BC, V3G 2M3
604-556-3123

Mayers, Neil A AGRI:EX

Subject: FW: FOI 2016 - 65277

Neil A. Mayers, MA

From: Mack, James AGRI:EX
Sent: Monday, January 16, 2017 9:55 AM
To: Mayers, Neil A AGRI:EX; Scott, Melissa AGRI:EX
Subject: FOI 2016 - 65277

From: Mack, James AGRI:EX
Sent: Monday, June 20, 2016 12:15 PM
To: Sturko, Derek AGRI:EX
Cc: Hodson, Georgina AGRI:EX
Subject: Fwd: Information regarding "detection" of HSMI

See below for Gary's summary of weaknesses in morton's op-Ed piece.

Decision was not to do a comms response. Let me know if you want a note to the minister on this.

Sent from my iPhone

Begin forwarded message:

From: "Boelens, Robert GCPE:EX" <Robert.Boelens@gov.bc.ca>
Date: June 18, 2016 at 7:55:13 PM PDT
To: "Bill, Karen F AGRI:EX" <Karen.Bill@gov.bc.ca>, "Phelps, Blair GCPE:EX" <Blair.Phelps@gov.bc.ca>, "Sturko, Derek AGRI:EX" <Derek.Sturko@gov.bc.ca>, "Townsend, Dave H GCPE:EX" <Dave.H.Townsend@gov.bc.ca>, "Mack, James AGRI:EX" <James.Mack@gov.bc.ca>
Subject: Fw: Information regarding "detection" of HSMI

As the article explicitly calls on fed govt / DFO to act, I suggest first step as checking in with DFO comms to see if they are planning on a response. Pls let me know if you agree, and i'll convey msg to gary.

Sent from my BlackBerry 10 smartphone on the TELUS network.

From: Marty, Gary D AGRI:EX <Gary.Marty@gov.bc.ca>
Sent: Saturday, June 18, 2016 6:09 PM
To: Boelens, Robert GCPE:EX; Townsend, Dave H GCPE:EX; Phelps, Blair GCPE:EX
Cc: Pritchard, Jane AGRI:EX; Snyman, Heindrich N AGRI:EX
Subject: RE: Information regarding "detection" of HSMI

Hi Robert, Dave, and Blair

“Red eyes” is a classic symptom of Ebola Hemorrhagic Fever, but that does not mean that every person with red eyes has Ebola. They might just have seasonal allergies.

Likewise, inflammation of the heart and muscles are classic microscopic features of the disease syndrome HSMI among affected farmed Atlantic salmon in Norway. However, that does not mean that BC salmon with inflammation in the heart and muscles have HSMI. They might have another disease.

One reason that the salmon farming industry continues to submit diagnostic samples directly to the BC Animal Health Centre, even though they are not required to do so, is that I have a history of educating the public on matters of fish health. This education is particularly important when incorrect or misleading information is published in the mainstream media. Yesterday’s guest opinion piece in the Vancouver Sun is a good example:

<http://vancouversun.com/opinion/opinion-save-our-salmon-get-diseased-fish-out-of-the-pacific-ocean>

Here are some examples of incorrect or misleading excerpts from the article:

1. Lead sentence (emphasis mine): “The government recently made an announcement that could critically impact wild salmon: Atlantic salmon on at least one farm off the B.C. coast **have a** serious disease called Heart and Skeletal Muscle Inflammation (HSMI).”
 - a. This statement is not correct. The DFO press release did not **definitively** diagnose HSMI, nor did they provide any evidence that the affected farm currently **has** HSMI. Instead, the DFO press release says that scientists had “diagnosed a **potential** Heart and Skeletal Muscle Inflammation (HSMI) in farmed Atlantic salmon samples collected from a B.C. aquaculture facility in **2013-2014**”.
2. “Scientific evidence suggests that HSMI — the disease scientists have found in farmed salmon — poses a serious threat to wild populations.”
 - a. This statement is misleading. The DFO press release states, “To date, HSMI has not been diagnosed in wild Pacific salmon and has only been observed in farmed Atlantic salmon”.
3. “...when lawyers from Ecojustice helped me take the department to Federal Court over its aquaculture licensing practices, the DFO insisted PRV did not threaten wild salmon. The court ruled in my favour...”
 - a. This statement is misleading. The court decision clearly stated, “...the Court is not arbitrating on the PRV/HSMI debate.” Further, peer-reviewed science published since this court case reported no evidence of disease in BC Chinook and sockeye salmon that were exposed to PRV under controlled laboratory conditions.
4. “We must remove diseased salmon from open-net pens in the Pacific Ocean — before it is too late.”
 - a. This statement is misleading. Peer-reviewed science informs us that PRV has been common amongst BC salmon—farmed and wild-source (e.g., hatcheries)—since 1987. Since that time we have had the greatest return of Sockeye salmon to the Fraser River in the past 100 years (in 2010).
5. “In light of the discovery of HSMI in B.C. waters”
 - a. This statement is misleading. No new disease was discovered by DFO. As Ms. Morton has been publicizing since 2012, I have been identifying fish with inflammation in the heart that is similar to fish with HSMI since at least 2008 (e.g., http://alexandramorton.typepad.com/alexandra_morton/2012/04/for-the-record.html). The only new thing about the DFO press release is that some DFO scientists are now saying that those fish had HSMI. The disease has been known for at least a decade; what is new is the name.
6. “But now that we all agree HSMI is in B.C. waters”

- a. This statement is misleading. The clinical signs among BC salmon with inflammation in their heart and muscles do not match the clinical signs of fish with HSMI in Norway. Therefore, none of the BC veterinarians that care for BC salmon, regulate BC salmon farms, or provide diagnostic services for BC veterinarians, agree that the affected BC salmon have HSMI. However, we do all agree that some BC Atlantic salmon have inflammation in their heart and muscles is similar to the Norwegian disease HSMI.

Advice on how to proceed?

Best regards,

Gary

Gary D. Marty, Senior Fish Pathologist
Animal Health Centre
Ministry of Agriculture
1767 Angus Campbell Rd.
Abbotsford, BC, V3G 2M3
604-556-3123