RE FINAL unblinded FR sockeye histopathology results 2011-2111

From: Marty, Gary D AGRI:EX
Sent: Monday, June 27, 2011 11:16 AM
To: 'Miller-Saunders, Kristi'
Subject: RE: FINAL "unblinded" FR sockeye histopathology results 2011-2111

Hi Kristi,

Our 2009 Fish Health Annual report contains some information to help answer this question about causes of mortality:

http://www.agf.gov.bc.ca/ahc/fish_health/Fish_Health_Report_2009.pdf

A search for "infectious" will provide a gist of the issue in the report. Among the program Audits of Atlantic salmon farms (~25/quarter), only about 20% of the Audits had an infectious disease. Our Audits do not sample fish that die from predation or environmental events (e.g., toxic algal bloom or low dissolved oxygen).

Hepatic sinusoidal congestion (red spots in the liver) has many causes among farm salmon worldwide, one of which is ISAV. Among 2,434 livers examined by histopathology as part of the BC Fish Health Audit program since 2006, 188 (7.7%) had moderate or severe sinusoidal congestion; all tested negative by PCR for ISAV (as did the tested tissues from all 2,434 fish). Therefore, I classify ISAV as a "zebra" in BC (i.e., common in other parts of world, of concern in BC, but it does not occur in BC). In BC, VHSV is the most common identified cause of hepatic sinusoidal congestion. Often the cause is unknown and I am confident that some and perhaps many of the unknown causes are infectious diseases. Therefore, we have lots of opportunity for new investigative work in BC; note, however, that these unknown causes tend to be sporadic and affect only a small number of fish at a given farms at any one time.

Marine anemia is probably better characterized as a syndrome (a set of symptoms that occur together) rather than a specific disease; with a syndrome, the cause is not necessarily known, and it might have more than one cause. Early work found some evidence of a retrovirus associated with marine anemia, but no virus was ever cultured, and no viral sequence was identified. Since the early 1990s, all relation to a retrovirus has disappeared and the only known pathogen associated with "marine anemia" is Nucleospora salmonis.

I haven't investigated sockeye salmon mortality events, so I cannot comment specifically. However, in general it is easier to determine the cause of acute mortality events among fish in freshwater (i.e., when you find moribund and freshly dead fish) than for marine mortality events or chronic mortality events in freshwater (i.e., when you have no moribund or dead fish to examine). I suspect that we still have much to learn about causes of the acute mortality in the ocean and chronic mortality events.

I also think that gene microarray technology has the potential to help discover new relations of fish health and mortality. The greatest opportunity to advance science will come by combining the best research methods in investigative medicine with gene microarray work. I am encouraged to hear that you are working with Kyle Garver to determine if the gene signature is associated with a filterable agent.

Over the past decade, I have been able to lead teams generating significant

new findings by combining diagnostic pathology and mathematical modelling, and I think that combining diagnostic pathology with molecular work could also substantially advance our knowledge over the next decade.

These types of discussions among scientists with different areas of expertise require a lot of back and forth that is best done in person or, perhaps, via the phone. [E-mail exchanges are relatively slow, but they have the advantage in that they provide a record for review.] Feel free to call me to chat further.

Best regards,

Gary

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-----Original Message-----
From: Miller-Saunders, Kristi [mailto:Kristi.Miller@dfo-mpo.gc.ca]
Sent: Monday, June 27, 2011 10:20 AM
To: Marty, Gary D AGRI:EX
Subject: RE: FINAL "unblinded" FR sockeye histopathology results 2011-2111

In general, what percentage of mortality events in aquaculture are NOT ascribed to a specific pathogenic organism?

Christine McWilliams made the rather bold statement at a meeting that all pathologies relating to sockeye salmon mortality events could be ascribed to known pathogens, and in her view, all pathogens affecting sockeye are already characterized; i.e. there is no room for "novel undescribed" pathogens. Do you agree with this viewpoint? It would seem to me that there are likely mortality events (e.g. the jaundice syndrome in cultured Chinook here and in Chile, possibly marine anemia--but I know that you don't believe it truly exists) that we don't fully understand, that uncharacterized pathogens, especially viruses that are hard to visualize and sometimes difficult to culture, could be involved in some cases.

In some of your reports, you have used the term ISA-ish. Do you think that fish that carry the pathology associated with your use of this term might be affected by an undescribed pathogen?

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-----Original Message-----
From: Marty, Gary D AGRI:EX [mailto:Gary.Marty@gov.bc.ca]
Sent: June 27, 2011 10:06 AM
To: Miller-Saunders, Kristi
Subject: RE: FINAL "unblinded" FR sockeye histopathology results 2011-2111

Hi Kristi,

An important part of my role as a diagnostic pathologist is to point out the most likely for a lesion that I diagnose; this is commonly referred to in medicine as my primary differential among a list of differentials.

Autoimmune disorders can cause or facilitate development of a wide variety of lesions, and the pathogenesis of these lesions is poorly understood even in widely studies species like humans. I suppose that it is possible that an autoimmune disorder could cause adhesions in fish, but that would be very low on my list of differentials. Instead, I would focus more on things like parasites that are much more common (likewise, when I hear hoof beats in BC, I think of horses before I think of zebras).

Best regards,

Gary

-----Original Message-----
From: Miller-Saunders, Kristi [mailto:Kristi.Miller@dfo-mpo.gc.ca]
Sent: Monday, June 27, 2011 9:39 AM
To: Marty, Gary D AGRI:EX
Subject: RE: FINAL "unblinded" FR sockeye histopathology results 2011-2111

If adhesions reflect chronic inflammation, is there any way that they could be associated with an autoimmune disorder?

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-----Original Message-----
From: Marty, Gary D AGRI:EX [mailto:Gary.Marty@gov.bc.ca]
Sent: June 27, 2011 9:34 AM
To: Miller-Saunders, Kristi

Subject: RE: FINAL "unblinded" FR sockeye histopathology results 2011-2111

Hi Kristi,

Adhesions are part of chronic inflammation, usually in response to foreign material in the peritoneal/coelomic cavity. In farm fish, adhesions are common after injected vaccination. In wild fish, I suspect that adhesions are most commonly a reaction to parasites (e.g., Anisakis spp.), but adhesions can also result from a bacterial infection or from a ruptured yolk sac. By the time that adhesions form (late in the inflammatory process), the inciting cause is often not obvious because the parasite (or other cause) has been mostly dissolved, but the reaction to molecular remnants remains.

Best regards,

Gary

-----Original Message-----
From: Miller-Saunders, Kristi [mailto:Kristi.Miller@dfo-mpo.gc.ca]
Sent: Wednesday, June 22, 2011 9:48 AM
To: Marty, Gary D AGRI:EX
Subject: RE: FINAL "unblinded" FR sockeye histopathology results 2011-2111

Out of curiosity, when we observe the adhesion of organs within the body cavity of fish, what are potential causes of this? Is this something that carries a common histological signature, or can you even tell?

Kristi Miller