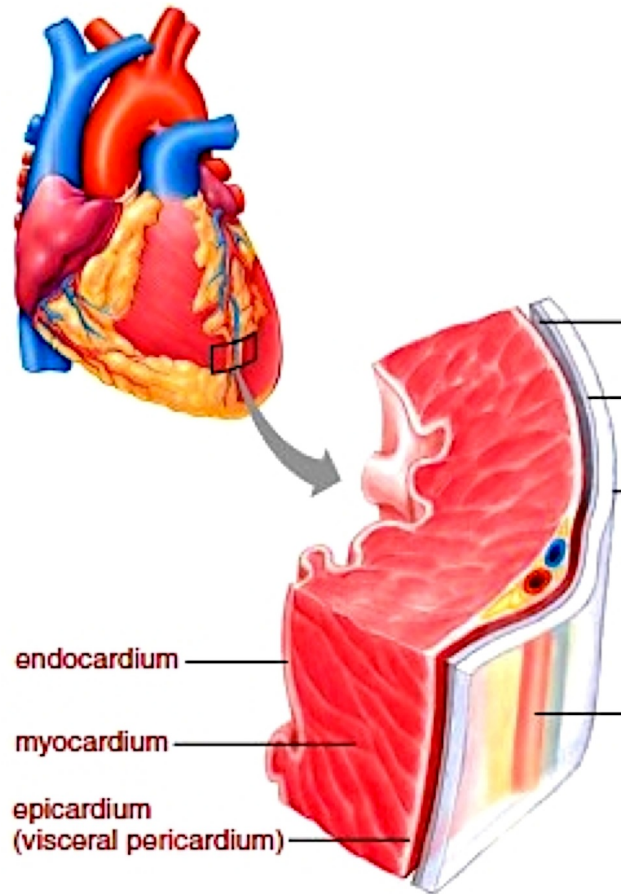


Have HSMI-type lesions been reported in BC?

Introduction

The terms used by the Norwegian scientific community to define HSMI are equivalent to and in some cases identical to those used in the BC farm salmon audits made public by the Cohen Commission. These audits were produced in an era where none thought these records would become public. To understand the world in which these documents were written we can look to the FOI decision documents from the Ecojustice case with T. Buck Suzuki.

These records state that BC veterinarian, Dr. Mark Sheppard, was the sole recipient of these reports. Not even BC enforcement officers were privy to them. Dr. Gary Marty, the BC pathologist who made these reports, is not a licensed vet in BC. Therefore he is not allowed to make the diagnosis of HSMI, but made detailed reporting on specific heart lesions in Atlantic salmon (see below).

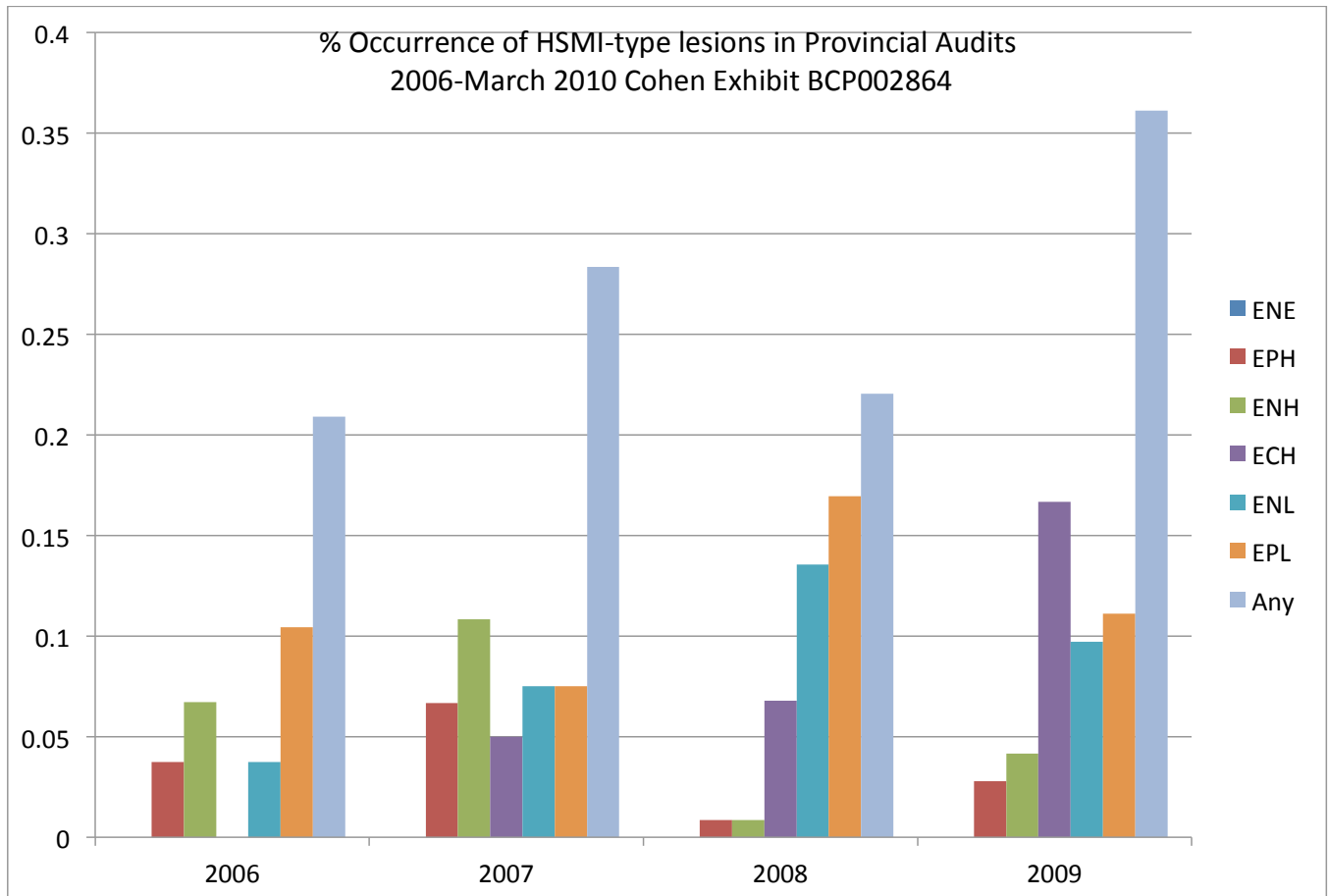


The table below compares terms used by Dr. Marty in the provincial farm salmon audits vs terms used by Norwegian scientists to diagnose HSMI. Dr. Marty tends to use precise language labeling different types of “epicarditis.” For example, while the Norwegians will say “inflammation,” Gary says inflammation in specific white blood cells. Mikalsen et al 2012, confirms the inflammation she reports is indeed in specific white blood cells that are known to attack cells that contain a virus.

Comparison of terms

Gary Marty	Kongtorp	Finstad 2012	Mikalsen 2012
Myocardial necrosis 2013-3409 sockeyesalmonHisto9361.xlsx	Myocardial fibres degenerative,	myocardial necrosis	myocardial degeneration
Endocarditis histiocytic BCP002864		Endocarditis	
Endocarditis, lymphoplasmacytic BCP002864		Endocarditis	inflammation of inner lining of the heart
Epicarditis, histiocytic BCP002864	extensive epicarditis	epicarditis	
Epicarditis, lymphoplasmacytic BCP002864	epicarditis	epicarditis	
Myocarditis, perivascular and intramural, mild, focal, granulomatous BCP002864	serious myocarditis	no mention	CD8+ T cell myocarditis.

Graph of HSMI Lesion Occurrence in BC Farmed Salmon Audit Data



Terms

ENE = Endocarditis, eosinophilic (heart)

EPH = Epicarditis, histiocytic

ENH = Endocarditis, histiocytic

ECH = Endocardial cell hypertrophy

ENL = Endocarditis, lymphoplasmacytic

EPL = Epicarditis, lymphoplasmacytic

ANY = Any one of these occurring alone or together

As you can see above, HSMI-type lesions, as a whole, are generally increasing in BC farmed salmon audits. These fish were “fresh silvers,” fish that had recently died. So these were not

healthy fish. This data is difficult to interpret as we don't know the age of the fish. For example, if 2008 sampled a larger percentage of freshly transferred smolts, the decline could be an artifact of that.

Definition of terms

T cell - a lymphocyte of a type produced or processed by the thymus gland and actively participating in the immune response.

CD8 T cell - T cell with CD8 receptor that recognizes antigens on the surface of a virus-infected cell and binds to the infected cell and kill it

Myocarditis - inflammation of the heart muscle.

Myositis - inflammation and degeneration of muscle tissue. (this relates to skeletal muscle)

Epicarditis – inflammation of the outer lining of the heart

Endocarditis - inflammation of the endocardium (the thin, smooth membrane that lines the inside of the chambers of the heart and forms the surface of the valves)

cytoplasmic vacuoles – a small cavity in the cytoplasm of a cell

cytoplasm - the material or protoplasm within a living cell, excluding the nucleus.

White blood cell - less technical term for [leukocyte](#).

Lymphocyte - a form of small leukocyte (white blood cell) with a single round nucleus

Histiocytic – A type of white blood cell, also called a macrophage, that is created by the bone marrow. They usually stay in place, but when histiocytes are stimulated by infection or inflammation they become active, attacking bacteria and other foreign matter in the body.
<http://www.medterms.com/script/main/art.asp?articlekey=11477>

Lymphohistiocytosis - Proliferation or infiltration of lymphocytes and histiocytes

Karyomegaly - The condition of having an enlarged cell nucleus

Myocyte – type of cell in muscle tissue. There are specialized form: cardiac, skeletal and smooth

Citations

Finstad, Ø.W., Falk, K., Lovoll, M., Evensen, O., and Rimstad, E. 2012. Immunohistochemical detection of piscine reovirus (PRV) in hearts of Atlantic salmon coincide with the course of heart and skeletal muscle inflammation (HSMI). *Veterinary Research*, 43: 27

Mikalsen, A. B., Haugland, O., Rode, M., Solbakk, I. T., and Evensen, O. 2012, Atlantic Salmon Reovirus Infection Causes a CD8 T Cell Myocarditis in Atlantic Salmon (*Salmo salar* L.). *PLoS ONE* 7(6)

Kongtrop, R.T., Kjerstad, A., Taksdal, T., Guttvik, A. and Falk, K. 2004. Heart and skeletal muscle inflammation in Atlantic salmon, *Salmo salar* L.: a new infectious disease. *Journal of Fish Diseases* 2004, 27, 351–358

BC farm salmon audit citations are included in the table.