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1	Case 2009-0112 Histopathology (MH cases 7060, 7061)								LIVER -											KIDNEY -					HKN = head kidney; Y = yes, examined; NP = not present on the slide																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
2	Pathologist = Dr. Gary D. Marty											VAC = vacuoles in hepatocyte cytoplasm									TKN = trunk kidney; Y = yes, examined; NP = not present on the slide																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3	Client # = writing on submitted cassette											LIP = lipidosis									ISH = interstitial (hematopoietic) cell hyperplasia																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4	AHC case number = # assigned by the Animal Health Centre, Abbotsford											BPH = biliary preductular cell hyperplasia									TEP = tubular epithelial protein (intracytoplasmic)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										</

"Most significant lesions" abbreviations in alphabetical order		
#	Abbreviation	Expanded text
1	BPC	Basophilic cytoplasm (hepatocytes); BPC is normal in mature females producing protein for deposition in their eggs. In juvenile salmon it might be related to increased protein needed as part an inflammatory response.
2	BPH	Biliary preductular cell hyperplasia (liver); BPH is evidence of exposure to toxins. The toxins could be produced inside the fish (e.g., bacterial toxins) or come from outside the fish (e.g., from the water or the feed).
3	EHP	Endothelial cell hypertrophy, with eosinophilic granules (spleen); EHP probably is the spleen equivalent of EGC: evidence of systemic immune stimulation; probably resulting from inflammatory cell mediators released into the circulation (e.g., with certain bacterial infections).
4	FPL	Focal/multifocal parenchymal leukocytes (liver); FPL are foci of chronic immune stimulation (e.g., the result of a bacterial infection).
5	GLF	Gill lamellar fusion; GLF decreases the available surface area for gas transfer. Gill lamellar fusion may be a result of physical damage from exposure to a parasite or diatoms (e.g., <i>Chaetoceros</i> spp.). GLF has been associated with exposure to heavy metals and with hypoxia (thought to be from fish gasping for oxygen at the water-air interface).
6	GLH	Gill lamellar hyperplasia/hypertrophy; GLH decreases the efficiency of gas exchange. Common causes of include physical and chemical irritants in the water, including parasites (e.g., <i>Paramoeba</i> spp.).
7	GR	(HGR or SGR) Granulomatous inflammation (no confirmed cause); differentials for granulomatous inflammation include a reaction to a vaccine and chronic bacterial disease (e.g., <i>Yersinia ruckeri</i> or <i>Renibacterium salmoninarum</i> infection).
8	GRP	Golden renal pigment (probably lipofuscin); GRP is a nonspecific change that can result from a variety of insults, including rancid feed, low levels of antioxidants in the feed, chronic infections, and exposure to organic contaminants. When tubular epithelial cells are involved, variation in size of nuclei and cytoplasm is evidence of cellular degeneration and regeneration, and it is consistent with persistent damage to the tubules.
9	IPC	Intratubular (luminal) protein casts (kidney); IPCs result from glomerular or tubular dysfunction; either excess protein leaks through glomeruli or tubules are unable to reabsorb protein. This lesion sometimes is associated with VHSV infection.
10	IPR	Intestinal peritonitis or peritonitis of adjacent mesenteries; IPR is consistent with a reaction to foreign material; it is common in fish that have been vaccinated. Vacuoles (when present) probably represent lipophilic vaccine material that was removed during tissue processing (alcohol and xylene remove lipid from tissues before staining). Peritonitis can also result from a bacterial infection (e.g. <i>Yersinia ruckeri</i> or <i>Aeromonas salmonicida</i>).
11	ISH	Interstitial (hematopoietic) cell hyperplasia (kidney); ISH is evidence of increased demand for erythrocytes or white blood cells somewhere in the body. In Chinook salmon, this lesion is often associated with the clinical diagnosis of "Marine anemia".
12	LFN	Liver focal/multifocal necrosis; hepatocellular necrosis can be caused by inadequate vascular perfusion (e.g., as occurs with harmful algal blooms or hypoxia) or direct cytotoxicity from viral or bacterial infections (e.g., viral hemorrhagic septicemia virus or <i>Piscirickettsia salmonis</i>).
13	LIP	Lipidosis (hepatocellular); LIP often occurs when fish are not feeding; it also occurs in cases of inadequate nutrition.
14	MCH	Mucous cell hyperplasia (gill);excess mucus on the surface of the gill is a reponse to irritatants in the water (e.g., toxins or parasites).
15	MIN	Mineralization (kidney); MIN is common in cultured fish species; when severe, the condition is termed nephrocalcinosis. The lesion is not considered fatal, although feed conversion may be adversely affected. The pathogenesis is not fully understood, but renal mineralization has been experimentally reproduced through high carbon dioxide levels, magnesium deficiency, selenium toxicity, and a diet low in minerals (source, "Systemic Pathology of Fish", Second edition, 2006, edited by H. Ferguson). Clinically, renal mineralization is most commonly associated with high carbon dioxide levels.
16	MKM	Myocardial karyomegaly/megalocytosis; MKM probably is an indication of multiple copies of DNA within the affected nuclei; this could represent a developmental anomaly or a response to toxicant exposure. Karyomegaly in other cell types has been associated with exposure to algal toxins (e.g., hepatocytes exposed to microcystin LR in netpen liver disease).
17	PER	Peritonitis (spleen); PER is consistent with a reaction to foreign material; it is common in fish that have been vaccinated; the primary differential, especially when peritonitis is fibrinous, is a bacterial infection (e.g.Yersinia ruckeri or Aeromonas salmonicida).
18	RTN	Renal tubular necrosis (epithelial); RTN is commonly associated with viral hemorrhagic septicemia virus (VHSV); differentials include exposure to toxins (e.g., bacterial toxins, heavy metals, or aminoglycoside antibiotics such as gentamicin).
19	HHd	hepatocellular hydropic degeneration; HHD is evidence of cellular damage in the liver. Possible differentials include exposure to toxins (endogenous or exogenous) or viral infection (VHSV).
20	TDI	Tubular dilation (of lumen, kidney); TDI is evidence that flow of urine is abnormal. The most probable cause is some type of flow blockage. Increased sectional area of the tubular lumen can also result from attenuation of epithelial cells (e.g., after necrosis of tubular epithelial cells).
21	TEP	Tubular epithelial protein droplets (intracytoplasmic, renal tubules); TEP are normal in some species, or they may be an indication of glomerular disease. Ferguson ("Systemic Pathology of Fish," second edition, 2006) reports an association of renal protein droplets and high ammonia levels in salmonids.