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CASE I – 8688 (AFIP 2985463).

Signalment: 2-year-old, female, crossbreed goat (*Capra hircus*).

History: The animal underwent surgery as part of a research study to evaluate components of a synthetic cervical disc implant. She had been anesthetized with diazepam and ketamine IV and maintained on isoflurane delivered via positive pressure ventilation. The surgical procedure went smoothly, and the animal was stable throughout surgery; total anesthetic time was approximately 3.5 hours. Shortly after discontinuation of gas anesthesia, the goat quickly awoke and was extubated. She soon became apneic, and within minutes entered cardiac arrest.

Gross Pathology: The animal was submitted fresh and was in good body condition. The mouth contained a small amount of rumen contents, which extended to the mid-trachea. The larynx was slightly edematous. Atelectasis was present in both lungs; the left side was 80% atelectatic, and the right side was 30% affected. The bronchi and large airways contained a large amount of blood, seen post-fixation. The mediastinum contained an enlarged, firm lymph node filled with caseous material.

Laboratory Results: Culture from the mediastinal lymph node grew *Corynebacterium pseudotuberculosis*.

Histopathologic Description: The enlarged mediastinal lymph node is centrally effaced by necrotic cellular debris with foci of mineralization. The necrotic debris is surrounded by laminated layers of epithelioid macrophages (some multinucleate), neutrophils, fibrosis, and a peripheral rim of lymphocytes and plasma cells.

There is multifocal to diffuse atelectasis and congestion in the lungs. The bronchial-associated lymphatic tissue is centrally abscessed as was seen grossly in the mediastinal lymph node. In addition, there is multifocal hyperplasia of the terminal bronchial epithelial cells. The bronchioles and bronchi are multifocally to diffusely filled with blood and necrotic cellular debris.

Contributor's Morphologic Diagnosis:

1. Mediastinal lymph node: Granulomatous lymphadenitis with abscessation, severe, chronic, focally extensive.
2. Lung: Bronchial and bronchiolar hemorrhage, severe, acute, diffuse.
3. Lung: Bronchial-associated lymphoid tissue hyperplasia, with multifocal abscessation, moderate, chronic, multifocal.

Contributor's Comment: *Corynebacterium pseudotuberculosis* is a non-motile Gram-positive aerobic (and facultatively anaerobic) coccobacillus bacteria.[6] It has been documented to cause disease in several species, including horses, cattle, swine, mice, deer, camels, zebras, alpacas, hedgehogs and humans.[1,4,6] In sheep and goats, caseous lymphadenitis (CLA) is the most common disease syndrome caused by *C. pseudotuberculosis*.

The organism most commonly gains entry to the body via wounds in the skin or mucous membranes, though inhalation and ingestion can also be forms of exposure.[6] After tissue infiltration, the organism then disseminates via the lymphatic system to local lymph nodes and internal organs, where local colonization and abscessation can occur.[6] Due to presence of an external lipid coat and secretion of the potent exotoxin phospholipase D, the bacteria are able to survive phagocytosis and spread through the body.[6]

Internal and external forms of caseous lymphadenitis can occur in small ruminants, sometimes concurrently. The external form of CLA is characterized by abscessation of superficial lymph nodes and/or subcutaneous tissues. Animals with this form generally present with visible swellings that may rupture and drain. The internal form of CLA causes abscessation of internal organs and internal lymph nodes. Most commonly affected organs include the liver, kidneys, lungs, spleen and uterus. Additionally, the mediastinal, bronchial and/or lumbar lymph nodes are often involved. Clinical findings can include: unthriftiness ("thin-ewe" syndrome), poor fertility, decreased milk production, poor growth, decreased weaning weights of lambs, and a decrease in wool quality and production.[5,6] In rare cases, the hematogenous spread to atypical organs can cause osteomyelitis,[2,3] mastitis, or CNS disease.[5]

Though *C. pseudotuberculosis* causes similar disease in both sheep and goats, there are a few differences in general disease patterns seen between the two species. For example, the external form of disease is more common in goats, while sheep are more likely to develop internal CLA. The distribution pattern of external abscesses also varies; lymph nodes of the head and neck are more commonly affected in goats, while sheep tend to present with external abscessation of the subiliac and superficial cervical lymph nodes.[6] The character of the abscesses also differs. In sheep, the abscesses often contain a pale green material that may be centrally mineralized. On cross-section, the abscess has a layered morphology that is often referred to as an "onion-ring" appearance.[5,6] The center of the mass is composed of proliferating bacteria and dying phagocytes. Surrounding the central abscess are layers of fibrosis and inspissated caseous material.[5] In goats, this laminated appearance generally does not occur. Rather, goat abscesses are typically uniform in character, with a cream to pale-green pasty exudate.

Clinical signs are highly suggestive of the external form of caseous lymphadenitis, but bacteriologic culture should be obtained to make a definitive diagnosis. *C. pseudotuberculosis* is a catalase-positive, urease-negative, phospholipase-D—positive, pyrazinamide-negative organism.[6] Diagnosis of the internal form of CLA, however, is not as straightforward. Serologic tests are available, such as the synergistic hemolysin inhibition test (SHI) performed at the California Animal Health and Food Safety Laboratory System at the University of California—Davis. The value of serological screening is a controversial topic, as false positives and false negatives occur. If serological screening is performed, comparison of paired titers taken 2-4 weeks apart is recommended. Several animals from the flock associated with this goat tested positive with the SHI test, two of which have presented with external CLA.

This case is unusual in that the goat was affected by the internal form of caseous lymphadenitis, and rupture of the abscess resulted in acute death. After an uneventful surgical and anesthetic event, it is likely that the abrupt anesthetic awakening caused a sudden increase in thoracic pressure, which ruptured pulmonary abscesses. There was secondary severe pulmonary hemorrhage, causing rapid death. Though small ruminants are commonly used models in biomedical research, there is a general lack of available specific-pathogen free (SPF) herds. Researchers and veterinary staff need to be cognizant of this fact when designing experiments and providing care for these species, particularly when the animals will be exposed to stressful events, such as surgery and anesthesia.

AFIP Diagnosis: Lung: Pneumonia, granulomatous, multifocal to coalescing, moderate, with hemorrhage and lymphoplasmacytic peribronchiolar inflammation, goat, caprine.

Conference Comment: The contributor provides an excellent overview of *Corynebacterium pseudotuberculosis* to include the notable differences in the general disease pattern seen between sheep and goats. Additionally, *C. pseudotuberculosis* causes ulcerative lymphangitis and pectoral abscesses in horses.[7]

C. pseudotuberculosis typically forms large colonies in hematoxylin and eosin (H & E) stained sections. Residents at AFIP utilize the mnemonic "YACS" to develop a differential diagnosis when large colonies of bacteria are present in H & E stained sections.
YACS stands for:

Y *Yersinia sp*.
A *Actinomyces sp., Actinobacillus sp.*
C *Corynebacterium sp.*
S *Staphylococcus sp., Streptococcus sp.*

Some residents include *Arcanobacter* sp. and *Clostridium* sp. on this list since these bacteria are large in size; however, they do not typically form large colonies.

Conference attendees discussed potential etiologies that incite granuloma formation to include fungi, foreign bodies, and higher bacteria. The higher bacteria belong to the order Actinomycetales and include the following genera: *Corynebacterium*, *Actinomyces*, *Nocardia*, *Rhodococcus*, *Dermatophilus*, *Streptomyces*, and *Mycobacterium*.[7]

Surprisingly, special stains run at the AFIP did not reveal any gram positive or gram negative bacteria. Although this does not definitively rule in or rule out *C. pseudotuberculosis* as the cause of the multifocal pulmonary granulomas, other potential etiologies were discussed since only the mediastinal lymph node, and not the lung itself, was cultured. Attendees discussed mycobacteria as a potential etiology; however, Ziehl-Neelsen staining did not reveal any acid-fast bacteria. Additionally, in some sections, the granulomatous response was centered on brightly eosinophilic material leading to a discussion of a potential infestation by *Muellerius capillaris*.

M. capillaris, also known as the nodular lungworm, is the most common lung parasite of sheep in Europe and Northern Africa and also occurs in goats. Sheep develop multifocal, subpleural nodules that tend to be most numerous in the dorsal caudal lung lobes. Microscopically, adults, eggs, and larvae reside in the subpleural alveoli and are surrounded by a focal, eosinophilic, and granulomatous reaction. In

contrast, goats develop diffuse interstitial rather than focal lesions. Microscopically, the reaction to the lung worms varies from almost no lesions to a severe interstitial pneumonia with heavy mononuclear cell infiltrates in alveolar walls resembling caprine arthritis-encephalitis virus (CAE) or mycoplasmal infections.[8]

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CASE II - K (AFIP 2816006).

Signalment: Adult female *Lepus timidus,* hare (varying hare).

History: The hare was found dead.

Gross Pathology: Normal body condition; liver light brown; spleen slightly enlarged.

Laboratory Results: No specific bacteria were isolated from liver, spleen, lung or intestine. Liver was positive for European brown hare syndrome (EBHS) virus with RT-PCR.

Contributor's Morphologic Diagnosis: Liver: Severe periportal necrotizing hepatitis. Etiology: calicivirus (EBHS-virus).

Contributor's Comment: European brown hare syndrome is a disease caused by a calicivirus that is closely related to the rabbit hemorrhagic disease (RHD) virus. The disease affects many hare species e.g. *Lepus europaeus* (the European brown hare) and *Lepus timidus* (varying hare). Gross lesions can be minimal, but typically pulmonary edema, a slightly enlarged spleen and a yellowish or mottled friable liver are present. Hemorrhages sometimes occur on the serosal surfaces of the lungs and intestine.

Histologically the disease is characterized by necrotizing hepatitis. The degree of hepatic necrosis varies from periportal coagulation necrosis to massive acute liver necrosis with hemorrhage. In less acute cases, there is usually mild to moderate fatty degeneration of hepatocytes and mild mononuclear inflammatory cell infiltrate in the portal areas. There is usually some mineralization of the necrotic periportal hepatocytes.

Affected hares are usually adults. Both sexes are affected. The disease appears to be highly infectious and fatal; however, it does not seem to affect significantly the size of the hare population.

AFIP Diagnosis: Liver: Hepatocellular degeneration and necrosis, periportal, diffuse, marked, with hemorrhage, hare, lagomorph.

Conference Comment: The contributor mentions that European brown hare syndrome is closely related to the rabbit hemorrhagic disease (RHD) virus. Both are caliciviruses and cause periportal to massive hepatocellular necrosis.[2] Only lagomorphs of the species *Oryctolagus cuniculus* are affected by rabbit hemorrhagic disease virus. North American lagomorphs, such as the cottontail rabbit (*Sylvilagus floridanus*), the snowshoe hare (*Lepus americanus*), and the black-tail jackrabbit (*L californicus*) are not susceptible to disease.[5] Similarly, only hares are affected by the European brown hare syndrome virus. Attempts to infect rabbits and hares with the heterologous virus have failed to produce clinical disease.[4] Terminal DIC is seen less frequently in hares with EBHS than in rabbits

with RHD. Hares with chronic disease often develop jaundice and chronic hepatitis. Hares that recover may have liver fibrosis and remain in poor body condition. The characteristic histological liver lesion is single-cell necrosis in periportal areas. Acidophilic bodies are often present, formed as a result of single cell acidophilic degeneration and coagulative necrosis. Hepatocytes expel fragments of condensed cytoplasm into the sinusoids where they are phagocytized by Kupffer cells. Acidophilic bodies are characteristically present in a number of viral hepatic infections such as yellow fever (Flavivirus), where they are referred to as Councilman bodies.[2] Mitochondrial mineralization is frequently observed in hepatocytes undergoing necrosis.[6] The basophilic granules can be viewed by vonKossa staining. The heptatic calcium content of hares with EBHS is increased up to 20 times the normal value.[2]

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CASE III –056-39214 (AFIP 3028040).

Signalment: 1-year-old female intact, mixed-breed Caprine (*Capra hircus*).

History: Animal presented for a history of coughing, diarrhea and foot and skin lesions. Lesions had been present for five months. There is a farm history of both Contagious Ecthyma and Caseous Lymphadenitis.

Gross Pathology: The coronary bands of all four limbs, the base of the ears bilaterally and commisure of the lip contain, multiple, raised, proliferative crusty lesions measuring up to 3 cm in diameter, that are associated with superficial areas of hemorrhage on cut surface. The hard palate and tongue contain similar lesions measuring up to 1 cm.

There is regionally extensive fibrinous peritonitis of the cranial abdominal cavity. The rumen and omasal mucosa contain multiple raised, plaque-like lesions measuring up to 2cm in diameter with occasional central areas of hemorrhage on cut surface.

There is generalized lymphadenopathy.

The lungs have pronounced cranioventral bronchopneumonia with diffuse edema and congestion. There is effusive fibrinous pleuritis.

Remaining organ systems appear grossly normal.

Histopathologic Description: Rumen: The rumen mucosa contains multifocal mildly proliferative lesions with severe ballooning degeneration and epithelial necrosis. Scattered through the mucosal epithelium are degenerative neutrophils and cellular debris. There are occasional superficial mucosal colonies of mixed, predominately rod-shaped, bacteria. At the periphery of the lesion epithelial cells contain eosinophlic 5-10 um intracytoplasmic inclusion bodies. There is submucosal fibrovascular proliferation and infiltrate of lymphocytes and plasma cells. Underlying muscle is mildly edematous.

Some sections contain underlying omentum with lymph node. There is minimal infiltration of the omentum with lymphocytes and plasma cells. The lymph node is reactive with sinus histiocytosis.

Contributor's Morphologic Diagnosis: Rumen: Rumenitis, proliferative with ballooning degeneration, moderate, and intracytoplasmic inclusion bodies.

Contributor's Comment: Gross and histological lesions are consistent with the parapoxviral disease, Contagious Ecthyma caused by the Orf virus. Orf virus is a double-stranded DNA parapox virus causing an acute skin disease of sheep and goats, which may be debilitating.[1] Of importance is the zoonotic character of the Orf virus and other viruses in the genus *Parapoxvirus*.[2] The disease generally has

high morbidity with low mortality. Mortality has decreased substantially since the eradication of screwworm flies from the USA.[3] Severe persistent Orf in young Boer goats has been previously reported suggesting that individuals in this breed may have, as yet, unidentified susceptibility factors to the disease.[3] This particular case had similar pneumonia and lymphoid changes similar to that reported in the previous study. Lesions usually spontaneously heal in three to four weeks.[3] In this case the lesions persisted for five months. Recently, a PCR assay-utilizing gene 045 was developed to rapidly diagnose cases of Orf.[4]

The family *Poxviridae* is divided into two subfamilies: the poxviruses of vertebrates, *Chordopoxvirinae*, and the poxviruses of insects, *Entomopoxvirane*. *Chordopoxvirinae* comprises eight genera and more poxviruses are being discovered in multiple different species that will be in need of classification.[2] The genome consists of a single linear double-stranded DNA molecule ranging from 130 to 375 kbp depending on genus. Viruses in the *Parapoxvirus* genera include Orf virus, Pseudocowpox virus, Bovine papular stomatitis virus, Ausdyk virus (Camels), and Seal parapoxvirus. The Parapox virion is cocoon shaped and approximately 260 X 160 nm in size compared to other poxvirus virions that are brick shaped and 250 X 200 nm in size. The surface structure of genus *Parapoxvirus* has surface tubules that resemble a ball of yarn.[2]

Orf virus gains access to the host through broken skin and replicates in regenerating epidermal cells. Primary lesions are proliferative and over 4-6 weeks progress from erythematous macule, papule, vesicle and scab. Reinfection lesions have similar clinical stages, but are generally not proliferative.[1] The character of the lesion in the rumen as only mildly proliferative may indicate it as a reinfection lesion. Viral antigen is present approximately between 3 and 25 days post-infection. Viral antigen localizes in areas of epidermal hyperproliferation, with intensity in degenerating cells, which indicates an *in vivo* cytopathic affect.[1] There is an early neutrophil influx within 48 hours with accumulation of $\gamma\delta$ T-cell receptor T-cells, CD4+ T-cells, CD8+ T-cells, B-cells and MHC Class II+ dendritic cells 9-15 days post infection. Preinfection levels return around day 30.[1] The dense accumulation of MHC Class II+ dendritic cells is an unusual feature of lesions. Skin repair, antigen-presentation or virus containment are theories for their presence. Their phenotype is CD1- CD11b- CD11c-, so do not appear related phenotypically to epidermal Langerhans cells that express CD1 or tissue macrophages that express CD11b and/or CD11c.[1]

AFIP Diagnosis: Rumen (per contributor): Rumenitis, proliferative and necrotizing, multifocal, moderate, with epithelial ballooning degeneration and rare intracytoplasmic inclusion bodies, goat, caprine.

Conference Comment: The contributor provides an excellent summary of ovine and caprine parapoxvirus which causes contagious ecthyma/contagious pustular dermatitis in sheep and goats, and orf in humans. Conference participants discussed the unusual location of the proliferative lesion in this case. Lesions typically begin at the commissures of the mouth, then spread to the lips, muzzle, face, eyelids, and feet. Lesions on the limbs typically involve the coronet, interdigital cleft, and bulb of the heels and are less common than lesions on the lips. In severe cases, lesions can occur on the gingiva, dental palate, palate, and tongue. Lesions may also develop on the mammary glands and other areas of sparsely wooled or haired skin. Very rarely, lesions extend into the esophagus, rumen, and omasum. Lesions can also occur in the lower gastrointestinal tract causing an ulcerative gastroenteritis. Additionally, lesions have been reported in the heart and lungs.[5,7]

Lesion development involves progression through the typical poxviral phases, but is much more proliferative:[5]

Macule → papule → vesicle → pustule → crust → scar

The vesicular stage is very brief and the pustules are flat rather than umbilicated. Additionally, the ulcer and crust stage persists and is prominent clinically. A layer of thick brown crust, which may be elevated up to 4mm above the skin surface, is the most significant feature of the gross lesion in contagious ecthyma.[5]

Typical light microscopic findings include marked epidermal hyperplasia with prominent rete ridges; intraepidermal abscesses; swollen and vacuolated keratinocytes in the stratum spinosum (ballooning degeneration); and a thick crust composed of orthokeratotic and parakeratotic hyperkeratosis, proteinaceous fluid, degenerate neutrophils, and bacteria. Newly proliferating keratinocytes in the outer stratum spinosum are the target cell population for parapoxvirus infections. Basophilic cytoplasm in swollen keratinocytes corresponds to polyribosome proliferation and viral replication. Inclusion bodies are briefly detectable. Basophilic intracytoplasmic inclusion bodies can be seen as early as 31 hours post infection. By 72 hours post infection, keratinocytes may have eosinophilic intracytoplasmic inclusions, pyknotic nuclei, and marked hydropic change. Pseudocarcinomatous hyperplasia is common. Dermal changes include superficial edema, vascular proliferation and dilation, and a perivascular mononuclear infiltrate.[5,6]

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CASE IV - E27/06 (AFIP 3026008).

Signalment: Juvenile, male, domestic short hair, *Felis silvestris f. catus*, cat.

History: A domestic shorthair cat was found dead on the Rügen island of the Baltic Sea in close proximity to places were HPAIV H5N1 infected wild birds, mainly mute and whooper swans and several species of geese and ducks, were detected shortly before.

Gross Pathology: At necropsy the cat showed extensive postmortal loss of the skin, subcutaneous tissue and parts of the skeletal muscles in the cervical and shoulder region due to scavenging. The mucosa of the nasal cavity, pharynx and trachea was diffusely hyperemic. There was a hemohydrothorax of about 20 ml. The lung was severely edematous and showed numerous, sharply demarcated, yellow, nodules. Multifocally in the liver there were few, up to 2 mm in diameter large, sharply demarcated light brown to yellow areas (necrosis). Retropharyngeal and pulmonary lymph nodes were moderately swollen with few ecchymoses.

Petechiation or diffuse hemorrhages were found retroperitoneally and intramuscularly in the diaphragm, within the perirenal tissue and the pancreas.

Laboratory Results: M-PCR and H5N1-specific RRT-PCRs of tracheal swabs and liver tissue revealed infection of the cat with H5N1. Molecular pathotyping confirmed the presence of HPAIV H5N1 of the Asian lineage in and revealed the closest relationship to a H5N1 HA partial sequence obtained from a dead whooper swan from the island of Rügen. The cat was negative by PCR for the detection of FIV gag-specific and FeLV U3 LTR-specific proviral DNA. In a commercial test (FeLV/FIV Snap®; IDDEX, USA) performed with lung exudate and cardial blood, FeLV-specific antigen or FIV-specific antibodies were also not detected. Bacteriology revealed a minimal growth of Streptococcus spp. No relevant bacteria were detected in the liver. Spleen, lung, heart and brain were bacteriologically negative or contained only small to moderate numbers of *E. coli*.

Clinical chemistry of the aqueous humor showed a marked increase of enzyme activitiy of AST, ALT and LDH (Table 1).

Table 1. Postmortem analysis of aqueous humor (anterior chamber, eye).

Parameter	AST (nkat/l)	ALT (nkat/l)	LDH (nkat/l)	ALP (nkat/l)	GGT (nkat/l)
refer. intervals	< 650	< 970	< 120	< 2500	< 100
E27/06	55440	5120	1148	1250	3

AST: aspartate aminotransferase, ALT: alanine aminotransferase, LDH: lactate dehydrogenase, ALP: alkaline phospatase, GGT: gamma glutamyl transferase

Histopathologic Description: Within the liver there were numerous, randomly arranged, sharply demarcated areas of coagulative necrosis with loss of hepatic architecture and cellular detail and replacement by karyorrhectic and cellular debris admixed with abundant fibrin and numerous erythrocytes. Occasionally these foci were surrounded by a small number of lymphocytes. Corresponding to the histological findings strong intracytoplasmic and intranuclear immunohistochemical signals for influenza virus A nucleoprotein antigen were found in degenerating hepatocytes adjacent to hepatocellular necrosis.

Contributor's Morphologic Diagnosis: Liver, necrosis and degeneration, moderate, random, domestic short hair cat (*Felis silvestris f. catus*), cat.

Contributor's Comment: Since its first emergence in 1997 in Hong Kong, highly pathogenic avian influenza virus (HPAIV) of the H5N1 subtype has spread continuously in Southeast Asia. In February 2006, outbreaks of HPAIV H5N1 of Asian lineage had been reported in 17 countries for the first time, including Germany. The H5N1 HPAIV has been shown to have the ability to infect a broad

number of avian species and mammals, especially cats and humans. Previously, felids were considered relatively resistant to infection with influenza viruses.[1] In contrast, few recently published reports describe the transmission of highly pathogenic H5N1 to wild and domestic cats. At first, the infection of two leopards and two white tigers with HPAIV H5N1 were reported in a zoo near Bangkok. These animals had been infected by ingestion of H5N1 HPAIV contaminated chicken meat and died with symptoms of a systemic infection especially involving the respiratory tract.[2] Susceptibility of domestic cats to HPAIV H5N1 and its horizontal transmission has been studied by experimental intratracheal inoculation of H5N1 virus (A/Vietnam/1194/04) and feeding of cats with infected chicks.[3] Main lesions in these cats consisted of diffuse alveolar damage as well as necrosis and inflammation in a variety of extra-respiratory tissues, while mortality in these experiments was low or not investigated.[4] In the case presented here, epidemiological data, results of virological investigations and, most strikingly, the intralesional detection of influenza virus NP antigen strongly indicate the lethal course of natural HPAIV H5N1 infection in the cat. According to the marked hepatocellular necrosis that was co-localized with AIV antigen, acute hepatic disease may play a major role in the pathogenesis of the disease. The moderate necrotizing bronchiolitis as result of infection with HPAIV H5N1 in association with marked pulmonary Aelurostrongylosis has certainly contributed to the severity of the clinical course. The cat was found in areas where wild birds were severely affected by an outbreak of HPAI H5N1 of Asian lineage and carcasses of wild swans and geese had been accessible to both avian and mammalian scavengers. It is therefore most likely that the cat contracted the infection from carcasses of infected wild birds. Similar exposure and infection of scavenging mammalian species is assumed in a confirmed H5N1 HPAIV infection of a stone marten found in the same area. Following the complete removal of bird carcasses from the shores, coinciding with the order to keep cats indoors and to take dogs on the leash, no further cases in mammals have been noticed. Although other species like red foxes and raccoon dogs have been included in the ongoing monitoring programs, so far, neither virological nor serological evidence for the involvement of these mammalian species has been obtained. With regard to feline retrovirus infections the animal belonged to the high risk group of straying outdoor cats. FIV and FeLV infections are associated with severe immunodeficiencies which might have favoured infection with HPAIV H5N1. Different lymphoid tissues were investigated for provirus and found negative. Under experimental conditions, cats have been shown to excrete HPAIV H5N1 influenza viruses oronasally and by the fecal route.[4] Here, immunohistochemistry revealed no influenza viral antigen in laryngeal, tonsillar and tracheal tissues or the mucosa of the gastrointestinal tract. Nevertheless, all three cats were diagnosed as HPAIV positive by nasopharyngeal and tracheal swabs and revealed a substantial viral load in these samples. Expectorated bronchial mucous and cellular debris seem to be responsible for the oronasal excretion as massive virus replication in the upper airways seems unlikely.

These observations agree with reports describing the presence of high affinity receptors (alpha 2-3 linked terminal sialic acid residues) for avian H5N1 HPAIV in cells lining the lower respiratory mucosa of cats (pneumocytes type II) and their absence in the mucosa of the upper respiratory tract.[5] Therefore, oropharyngeal swabbing may be the most promising sample for monitoring cats alive for HPAIV H5N1.

AFIP Diagnosis: Liver: Necrosis, random, multifocal, domestic shorthair cat, feline.

Conference Comment: The contributor provides a thorough overview of HPAIV H5N1 in felines.

HPAIV is a Type A Orthomyxovirus. Orthomyxoviruses are small-medium sized, enveloped, single stranded, negative sense RNA viruses. In contrast to low pathogenic strains of AI in which the hemagglutinin glycoprotein can only be cleaved by trypsin or trypsin-like enzymes restricting viral replication to the respiratory and intestinal tracts, HPAI viruses have a hemagglutinin glycoprotein that can be cleaved by a ubiquitous protease found in virtually all organs. Therefore, virulent viruses are capable of replication in all tissues and organs once within the systemic circulation and are not limited to the respiratory and intestinal tracts. Pathogenesis studies in chickens have shown that HPAI viruses replicate in endothelial cells throughout the body with spread to adjacent parenchymal cells in many organs and are capable of extrapulmonary spread. Depending on the virulence of the strain, infected chickens can die peracutely without clinical signs or may present with pulmonary, cardiac, or neurologic signs.[6]

Readers are encouraged to review WSC Conference 18 / Case IV from the 2005-2006 academic year for a case of HPAIV in a chicken.

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