MICHIGAN STATE UNIVERSITY

DIAGNOSTIC CENTER FOR POPULATION AND ANIMAL HEALTH

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REPORT OF LABORATORY EXAMINATION

Client:	Owner:
White Shepherd Genetics Project (295483) Project PO Box 2068 Howell, MI 48844-2068 USA	Koons, Michelle

Rec'd Date:	12/20/2006 08:28:00 AM	Animal:	LUGER	MRN:	
Admitted By:	Not, Provided	Species:	Canine	Breed:	German Shepherd
Ordered By:	N/A	Age:	13 years	Gender:	Male
Encounter:	00282000	Tag/Reg ID:			
CR#:	AP 635408282	Other ID:			

Necropsy Preliminary Report

Accession Number:	Received Date/Time:	Verified Date/Time:	Pathologist:
NC-06-0002682	12/20/2006 08:30:00 AM	12/21/2006 04:18:55 PM	Patterson, Jon S.

History

According to the history provided, this dog had an acute hemoabdomen. A large splenic mass and numerous masses within the liver were noted by both ultrasound and during abdominal surgery, and humane euthanasia was elected due to these findings.

Gross Description

This 32.55-kg, male neutered white German shepherd was in adequate nutrition and hydration status and was well preserved. There were multiple regions of the skin which had been clipped of hair, including a 8 x 5.5-cm region on the right distal forelimb over the cephalic vein, an irregular 5 x 5-cm region on the right distal hind limb over the lateral saphenous vein, and a large region over the entire ventral abdomen and ventral caudal thorax extending from the cranial edge of the scrotum to approximately 12 cm cranial to the xyphoid process. Within the clipped region over the right forelimb, there was a 0.7 x 0.4 x 0.4-cm, protruding skin tag. An additional skin lesion was present over the right lateral elbow joint and consisted of an approximately 5 x 2-cm region of alopecia, with thickened, discolored skin and multifocal crusts. A 13-cm long full thickness incision was present within the clipped region of the ventral abdomen. The incision extended from just cranial to the prepuce to the caudal edge of the xyphoid process. This incision was closed with a subcuticular suture pattern. A large, roughly spherical, 5 x 4.5 x 3-cm, dark red to black, mottled and friable mass protruded from the ventral end of the spleen. A focal 2.5 x 2 x 1-cm area of dark red to black discoloration was present on the opposite end of spleen which had a small, 0.8-cm in diameter, fluctuant protrusion. Numerous siderotic plaques were present on the capsular surface of the spleen. These golden plaques ranged from 0.1 to 1.5 cm in diameter and extended approximately 0.1 to 0.2 cm from the capsular surface. Numerous (greater than 50) dark red to black lesions were present within the liver, visible from the surface and extending into parenchyma. All liver lobes were affected. The lesions ranged from 0.1 to 4 cm in diameter. Many of the smaller masses were depressed, and many of the larger lesions were thin walled, fluctuant and filled with dark red, bloody fluid. The gall bladder was markedly distended, but the bile duct was patent. The lungs were diffusely mottled dark red and pink and there was intraluminal foam within the caudal half of the trachea. The left cranial lung lobe was absent, and there was focally extensive adhesion of the visceral pleura of adjacent lung tissue to the parietal pleura. There was focally extensive pallor of the epaxial skeletal muscles over the caudal

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lumbar vertebrae, bilaterally. Bony bridging (spondylosis) was present on the ventral aspect of the L2-L3 intervertebral space, causing fusion of the second and third lumbar vertebral bodies (L2-L3). There was both loss of the intervertebral disc and spondylosis between L7 and the first sacral vertebrae (S1). The spinal canal was narrowed at the L7-S1 joint. There were mild degenerative and proliferative changes of the femoral head and acetabulum of the right hip. There was irregular cartilage erosion of both joint surfaces and lipping of the joint cartilage of the femoral head. The changes within the left hip joint were more severe than those on the right, with moderate flattening of the femoral head in addition to cartilage erosion of both joint surfaces. The left and right thyroid gland lobes were grossly normal in appearance and size. A linear fissure was present along the dorsal midline of the tongue within which multiple hair tufts were present.

Gross Diagnosis(es)

1. Spleen, Liver: Multifocal/metastatic neoplasia, most likely hemangiosarcoma
2. Vertebrae, L7-S1: Focal loss/degeneration of intervertebral disc
3. Vertebrae, L2-L3, L7-S1: Multifocal bridging spondylosis
5. Femoral Head, right: Mild cartilage erosion with mild, focally extensive lipping
6. Acetabulum, right: Mild cartilage erosion
7. Femoral head, left: Mild to moderate cartilage erosion with moderate joint surface remodeling (flattening)
8. Acetabulum, left: Mild to moderate cartilage erosion
9. Spleen: Multifocal siderotic plaques
10. Tongue: Multifocal ectopic hair follicle development

COMMENTS:
The metastatic neoplasia, which is most likely hemangiosarcoma, was the most significant lesion seen within this dog. There were numerous other lesions, including loss of the intervertebral disc at L7-S1 with subsequent spondylosis, as well as narrowing of the spinal canal at this site. This dog also had bilateral hip dysplasia, which was more severe on the left side than the right. Siderotic plaques on the spleen are a common old age change in dogs. The hair growing from the tongue is considered an incidental finding, and this condition has been previously reported in dogs. Histopathologic analysis is pending on numerous tissues, including sections of the large splenic mass and a representative hepatic mass to confirm the presumptive diagnosis of hemangiosarcoma. In addition, analysis of the spinal cord will be completed to assess for any changes from the narrowed spinal canal lumen at L7-S1.

Jessica S. Hoane, DVM

Jon S. Patterson, DVM, PhD, DACVP

(Electronically signed by) JSP

Verified: 12.21.2006 16:18

JSP /JSH

Necropsy Final Report

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Microscopic Description

Sections of spleen, liver, heart, lung, kidney, adrenal gland, prostate gland, cervical lymph node, cerebrum, brain stem, cerebellum, thalamus, lumbar spinal cord, lumbar epaxial skeletal muscle, skin from the right elbow and the skin mass from the right distal forelimb were examined microscopically. The large mass within the spleen was composed of an infiltrative proliferation of neoplastic mesenchymal cells forming numerous variably-sized and irregularly-shaped, incomplete blood-filled channels that were lined by endothelial cells with short cytoplasmic extensions and plump nuclei. The neoplastic cells had little to moderate amounts of eosinophilic cytoplasm, and they contained pleomorphic euchromatic nuclei with finely to coarsely clumped chromatin. Most cells displayed 1-3 prominent nucleoli, and mitotic figures were rare. There was focal expansion of the splenic capsule primarily by mineralized connective tissue, consistent with a siderotic plaque. Within the liver, there was a comparable vasoformative neoplastic cell infiltrate as was described for the spleen. Adjacent unaffected hepatic parenchyma was characterized by primarily centrilobular vacuolation. Affected hepatocytes had a finely reticulated pattern to the cytoplasm, resulting in a lacy appearance to the cell consistent with glycogen accumulation. These cells also often had a small to moderate accumulation of intracytoplasmic golden brown granular pigment, possibly representing lipofuscin or hemosiderin. There were small cluster of lipid-laden cells containing brown pigment scattered randomly throughout the hepatic parenchyma. Sections of heart had mild multifocal stromal infiltration of mature adipose tissue. Moderate numbers of cardiac arteries had subintimal to medial expansion by a finely fibrillar to amorphous amphophilic material which was occasionally mineralized. The lumens of affected vessels were either significantly narrowed or completely occluded. The lungs were characterized by patchy accumulation of intra-alveolar edema fluid residue as well as mild distension of the pulmonary veins and arteries with blood. Within the adrenal gland, there were multiple nodule-like expansions of adrenal cortical tissue extending into the adrenal medulla, as well as multiple small foci of adrenal cortical tissue within the adrenal capsule. The prostate gland had prominent fibromuscular stroma with numerous, small ducts, most of which had no lumens, and very little remaining glandular tissue. Both the right and left cervical lymph nodes had multifocal to focally extensive accumulations of macrophages within the medullary sinuses, many of which contained either intact erythrocytes or hemosiderin. Numerous plasma cells were also present within the medullary sinuses of both lymph nodes. Numerous cross sections of the lumbar spinal cord were examined, one section taken from each level (e.g., L1-L2, L2-L3, etc.). There were no significant changes seen within the spinal cord, however, as the sections went from cranial to caudal, there was increased myelin and axonal degeneration within the nerve roots characterized by fragmentation and dilation of the myelin sheath with loss of the axon, and rare scattered intramyelinic macrophages (digestion chambers). In addition, there was mild multifocal mononuclear inflammatory infiltrates around the nerve roots. At the level of L7-S1, where stenosis of the vertebral canal was evident grossly, the intradural nerves were normal in appearance, however, the extradural peripheral nerve roots had moderate degenerate changes. There was also central atrophy or loss of nerve fibers with expansion of the loose connective tissue epineurium. Both cross and longitudinal sections of the epaxial muscles from the lumbar area had multifocal stromal infiltrates of adipose tissue. The fatty infiltrates both moderately to severely expanded the epimysium and also were present within the muscle fascicles, likely replacing degenerate or atrophied myofibers. In the more severely affected muscle fascicles, the myofibers were smaller in size than those in fascicles with less fatty infiltrates. In addition to having smaller myofibers, the severely affected areas also had decreased numbers of myofibers per fascicle and more consistent loss of cross-striation of the myofibers. Occasional nerve bundles within the skeletal muscle exhibited mild degenerate changes similar to those described for the nerve roots of the lumbar spinal cord. Moderate numbers of arterioles--and in one section, the majority of the arterioles within the skeletal muscle--had similar changes as were seen within the cardiac arterioles, with subintimal thickening and mineralization. The skin sample from the right elbow was characterized by moderate superficial and deep perivascular to blending and periadnexal infiltrates of primarily lymphocytes and plasma cells. There were also multiple foci of primarily histiocytic inflammation, occasional forming granulomas particularly in regions with ruptured hair follicles. The overlying epidermis exhibited mild to moderate papillary hyperplasia with a mild compact parakeratotic and orthokeratotic hyperkeratosis. The skin lesion from the right distal forelimb was characterized by a focal accumulation of dense irregular collagenous stroma within the superficial dermis, consistent with a skin tag or acrochordon.

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Morphologic Diagnosis(es)

1. Spleen, liver: Hemangiosarcoma
2. Liver: Moderate steroid hepatopathy with mild multifocal lipid granulomas
3. Heart: Mild multifocal stromal fatty infiltrates
4. Cardiac Arteries: Moderate to severe arteriosclerosis
5. Lung: Mild pulmonary congestion with mild multifocal to coalescing pulmonary edema
6. Adrenal Gland: Mild multifocal cortical hyperplasia
7. Prostate Gland: Diffuse prostatic atrophy
8. Cervical lymph nodes: Severe multifocal to focally extensive medullary erythrophagocytosis, hemosiderosis and plasmacytosis
9. Lumbar spinal cord, nerve roots: Mild to moderate multifocal myelin and axonal degeneration with mild, multifocal perineuritis
10. Lumbar skeletal muscle: Moderate to severe multifocal denervation atrophy with stromal fatty infiltrates
11. Lumbar skeletal muscle: Moderate to severe arteriosclerosis
12. Skin, right elbow: Chronic lymphoplasmacytic and focally granulomatous dermatitis with epidermal hyperplasia and hyperkeratosis, findings consistent with pressure point
13. Skin, right distal forelimb: Acrochordon

Final Diagnosis(es)

Metastatic Hemangiosarcoma; lumbosacral stenosis; mild hip dysplasia

COMMENT:

The metastatic hemangiosarcoma was the most significant finding in this dog. There were numerous other changes seen within a variety of tissues which are consistent with aging in canines. These changes include the stromal fatty infiltrate in the heart, splenic siderotic plaques, and adrenal cortical hyperplasia. The significance of the changes within the arterial walls of the heart and skeletal muscle is poorly understood. Hypothyroidism is a common cause of atherosclerosis in dogs, however, the lesions would be expected to be more widespread and not just limited to skeletal and cardiac muscle, and the histologic findings were not consistent with the atherosclerosis typically seen with hypothyroidism. Unfortunately, though the thyroid gland was identified grossly (and were of normal size), sections of the gland were not available for histopathologic evaluation. The pulmonary congestion and edema is consistent with barbiturate euthanasia. The prostatic atrophy is expected for a neutered male dog. The cause and significance of the findings within the cervical lymph nodes is unclear, though it suggests bilateral drainage of a site of hemorrhage. There were degenerate changes within the nerve roots of the caudal lumbar spinal cord, and the skeletal muscle atrophy and fatty infiltration of the skeletal muscle adjacent to the affected region is consistent with decreased innervation of these muscles. These changes may be seen when lumbosacral stenosis is severe enough to put pressure on spinal nerve roots or affect the spinal cord.

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