Published in final edited form as:

J Med Primatol. 2019 June ; 48(3): 197–204. doi:10.1111/jmp.12412.

Salivary Gland Neoplasms in Non-human Primates: A Case Series and Brief Literature Review

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Abstract

Background: Salivary gland neoplasms are rare in non-human primates.

Methods: Thirty-five years of pathology records were reviewed at the Southwest (SNPRC) and Yerkes (YNPRC) National Primate Research Centers. An in-depth literature search for salivary gland neoplasms in non-human primates was performed.

Results: Seventeen salivary gland neoplasms (9 from SNPRC and YNPRC, 8 from published literature) were identified. There were 7 malignant, 9 benign, and 1 of undetermined behavior identified in eight rhesus macaques, six baboons, a chimpanzee, a bonnet macaque, and a moustached tamarin. Parotid gland was the most frequent origin ($n = 7$), followed by mandibular ($n = 4$), or minor salivary glands ($n = 2$). Two animals with salivary gland adenoma had a history of prior radiation exposure.

Conclusions: Parotid glands are the most common origin for salivary gland neoplasms. Salivary gland neoplasms should be considered in the differential diagnoses of head and neck masses in non-human primates.

Keywords

Tumor; Salivary; Oral neoplasms; Radiation

Introduction

Salivary gland neoplasms are one of the rarest neoplasms in humans, accounting for less than 1% of total cancers in the United States with a reported incidence rate of 1.7 per 100,000 and a male-female ratio of 1.8, and are most often diagnosed in older individuals.[1] Worldwide incidence ranges from 0.5–2 per 100,000 individuals, with the highest incidence recorded in Croatia.[2] Salivary gland neoplasms most frequently originate from one of the

three sets of paired major salivary glands: parotid (68 – 84%), submandibular (10–25%), or sublingual, and less frequently from one of the several hundred minor salivary glands located in the palate, tonsils, pharynx, or larynx.[3–5] Salivary gland neoplasms are classified as epithelial or mesenchymal origin, with the majority being epithelial in both humans and domestic animals. [6, 7]. Only three primary neoplasms of mesenchymal origin have been reported in the salivary glands of domestic animals: a melanoma, an infiltrative angiolipoma, and an osteosarcoma.[6, 8–10] In humans, 75 % of salivary gland neoplasms are benign, with pleomorphic adenoma as the most common histological type.[5]

The etiology of salivary gland neoplasms is unclear and has not been thoroughly studied. [11] The best established risk factor in humans is prior radiation exposure, and the risk is positively associated with radiation dose.[12] Head and neck exposures to medical radiation, ultraviolet light treatments, and full-mouth dental X-rays have all been reported to increase the risk for salivary gland neoplasms. [3, 11, 13] Studies on atomic bomb survivors also support exposure to ionizing radiation as a well-established risk factor. [11, 14] Parotid gland tumors have been induced in laboratory mice by nitroso compounds and this has been suggested as a cause of the higher incidence of parotid gland neoplasms among workers in the rubber industry. [15] Prior cancer of lung, breast, prostate and lip have also been reported as risk factors.[3] Hodgkin's lymphoma patients were found to have a 4-fold increased risk of salivary gland neoplasms in a Swedish report. [16, 17]

Salivary gland neoplasms are rare in animals. [6] There are two case reports of salivary gland neoplasms in non-human primates (NHP): a 15 year old male baboon with an undifferentiated carcinoma of a minor palatine salivary gland, and an adult male bonnet macaque with a carcinosarcoma originating from a minor salivary gland. [18, 19] In addition, six NHP salivary gland neoplasms are briefly mentioned in pathology surveys. [20–25]

We present a case series of nine salivary gland neoplasms that were identified over a 35 year period at the Southwest National Primate Research Center (SNPRC) and Yerkes National Primate Research Center (YNPRC). In addition, we summarize eight reported cases of NHP salivary gland tumors in the veterinary literature since 1965. To the best of our knowledge, these cases represent all salivary gland tumors that have been published in NHPs to date.

Materials and Methods

Animals

The baboons and moustached tamarin were maintained at the Southwest National Primate Research Center, Texas Biomedical Research Institute (San Antonio, TX). The rhesus macaques and chimpanzee were maintained at the Yerkes National Primate Research Center, Emory University (Atlanta, GA, USA). The baboons were socially housed in two 6-acre outdoor corrals, outdoor metal and concrete gang cages, and indoor-outdoor cages and were fed a diet of commercial monkey chow (Teklad, PMI Nutrition International, LLC, Brentwood, MO 63144) supplemented with grains, fruits, and vegetables and provided water *ad libitum*. The moustached tamarin was housed in indoor, conventional wire caging, fed a commercial diet (Mazuri Callitrichid diet, Richmond, Indiana) supplemented with grains,

vegetables, and fruits and provided water *ad libitum*. The rhesus macaques were housed in socially compatible same sex pairs and fed monkey diet (Purina Labdiet 5037, St. Louis, Missouri) supplemented daily with fresh fruit or vegetables and water *ad libitum*. The chimpanzee was socially housed in outdoor-indoor enclosures and fed a low-fat, commercial primate diet (Monkey Diet Jumbo 5037, Purina Mills, St Louis, MO), with daily fruit and vegetable supplementation and water *ad libitum*. Additional enrichment including the delivery of appropriate safe toys was provided to all species.

All animals were cared for in compliance with the Guide for the Care and Use of Laboratory Animals and Animal Welfare Act and Regulations. All animal care and procedures were approved by the Texas Biomedical Research Institute or Yerkes National Primate Research Center Institutional Animal Care and Use Committees.

Pathology

A complete necropsy was performed on each animal, and appropriate tissue samples were taken for histologic evaluation. All tissues were fixed in 10% neutral buffered formalin, processed conventionally, embedded in paraffin, cut at 4–6 μ m thickness, stained with hematoxylin and eosin, and evaluated by light microscopy by at least one board-certified veterinary pathologist. If deemed necessary, cases were referred to the Joint Pathology Center, Silver Springs, MD or other specialists for consultation.

Records Review

Pathology records for salivary gland neoplasms were searched for all necropsies over a 35 year period at Southwest National Primate Research Center and the Yerkes National Primate Research Center. The digital medical records, gross necropsy reports, histopathology reports, and histologic slides were obtained and reviewed for the selected cases.

Literature Review

An in-depth literature search for all published cases of salivary gland neoplasms in NHP was performed. Databases searched included PubMed, JSTOR, Web of Science, and CAB Abstracts. Keywords used were “salivary gland”, “neoplasm”, “nonhuman primate”, “monkey”, and various species of NHPs. Eight additional cases of salivary gland neoplasms were identified in the literature review, and the following information was recorded when available: species, sex, age, diagnosis, and clinical presentation.

Results

A total of seventeen cases of salivary gland neoplasms were identified (Table 1). Nine were from the SNPRC and YNPRC colonies (which included two baboons [20, 21] and a chimpanzee [26] that were previously listed in pathology surveys). Eight additional cases were identified in the published literature including two case reports about salivary gland neoplasms in a baboon [18] and a bonnet macaque [19]); and six cases were listed in surveys (four rhesus macaques [23, 24], and two 2 baboons [22, 25]).

Descriptions of the nine cases from SNPRC and YNPRC follow. Five (Cases 3, 4, 5, 7, and 8) were incidental findings at necropsy. The other four animals (Cases 1, 2, 6, and 9) presented with a palpable firm facial mass located in the region of a salivary gland. Two of the rhesus macaques (Cases 6 and 9) had a history of radiation exposure.

Case reports

Case 1: A 40 year old male chimpanzee (*Pan troglodytes*) presented with right side facial swelling and a firm nodule around the right ear and temporal mandibular joint (Figure 1A). Cultures of exudate from the palate revealed *Staphylococcus aureus*, *Streptococcus sanguis*, and *Streptococcus mitis*; biopsy identified pleomorphic adenocarcinoma of the parotid salivary gland. The animal was humanely euthanized. Necropsy examination revealed extensive local invasion of the tumor with extension into the oral cavity, soft palate and nasal sinuses. Furthermore, extensions of the mass in the neck compressed major cervical vessels, resulting in the facial edema and subsequent swelling noted clinically. Histological examination confirmed a salivary gland adenocarcinoma with metastasis to the lymph nodes in the thoracic inlet.

Case 2: A 20 year old female baboon (*Papio spp.*) presented with a $9.0 \times 7.0 \times 5.5$ cm, well-circumscribed, firm mass on the left cheek that extended from the ear to the chin. The mass was diagnosed as parotid salivary gland adenocarcinoma from the biopsy submission. A three month treatment involving toremifene (Kyowa Kirin, Inc, NJ) was unsuccessful. The animal was humanely euthanized. Grossly, the neoplasm was firm to gelatinous with a soft yellow core. The tumor was attached to the bone, but did not appear to invade. There were scattered approximately 10 mm diameter foci of metastasis throughout the lung lobes. Histologic evaluation confirmed local invasion of the surrounding soft tissues and metastasis to the lungs. The center of the neoplasm was largely necrotic.

Case 3: A $1 \times 0.5 \times 0.5$ cm, firm, tan mass was identified at necropsy in the right submandibular salivary gland of a 22.25 year old female baboon (*Papio spp.*). There was no relevant clinical history. Histologic evaluation revealed a salivary gland adenocarcinoma.

Case 4: A 2 cm diameter, firm mass was identified at necropsy in the left submandibular salivary gland of a 26.75 year old female baboon (*Papio spp.*). The animal had no relevant clinical history. Histologic evaluation revealed a salivary gland adenoma.

Case 5: A 5 year old female moustached tamarin (*Saguinus mystax*) presented for rear limb paralysis, icterus and abnormal breathing. The animal was euthanized for humane reasons. At necropsy an enlarged, rounded heart and nearly total occlusion of the aorta by thrombosis was noted. A salivary gland adenoma was identified upon histologic evaluation of the submandibular salivary gland.

Case 6: A 26.75 year old female rhesus macaque (*Macaca mulatta*) presented with a 2.5×3.0 cm mass at the base of the right ear. Previous history included diabetes and unspecified exposure to radiation 30 years prior. Histologic evaluation of a biopsy specimen revealed a salivary gland adenoma; the origin was not stated.

Case 7: A 19 year old female rhesus macaque (*Macaca mulatta*) presented thin, dehydrated, and weak with a palpable mass in the lower abdomen. Exploratory laparotomy revealed a stricture at the ileocecolic junction and a cecum full of rocks. A 0.6 cm diameter gray-white nodule was identified at necropsy in the parenchyma of an unspecified salivary gland. A salivary gland adenoma was identified after histological evaluation.

Case 8: A 30 year old male rhesus macaque (*Macaca mulatta*) presented with lethargy, kyphosis, and severe dermatitis over the abdomen, upper legs, and scrotum. Previous history included osteoarthritis. The animal was euthanized for humane reasons. A $1.5 \times 1.5 \times 2.0$ cm firm mass was noted at necropsy in the left parotid salivary gland. Histologic evaluation revealed a salivary gland adenocarcinoma.

Case 9: A 35 year old male rhesus macaque (*Macaca mulatta*) presented with progressive weight loss. The animal was euthanized due to chronic osteoarthritis and severe vision impairment. Previous history included exposure to 205.78 rads of fractionated cobalt radiation over a period of between 17 to 23 years prior to necropsy. A small, firm, palpable mass was previously noted in the area of left submaxillary lymph node; aspiration of the mass identified mononuclear cells and erythrocytes. Two firm nodules, $2.0 \times 2.0 \times 1.5$ cm and $2.0 \times 1.5 \times 1.0$ cm, were identified at necropsy on the ventroposterior aspect of the left side of the tongue. Histologic evaluation revealed a salivary gland adenoma.

Histologic features

Salivary gland adenocarcinomas were characterized by effacement of normal salivary gland tissue with central coagulative necrosis, areas of dystrophic mineralization and a prominent desmoplastic response. The tumors were generally multi-lobulated and unencapsulated with masses composed of densely cellular, disorganized epithelial aggregates with tubular and cystic formations, thin cords and individual cells supported by a moderate to scant fibrovascular stroma (Figures 1B, C, D, E, and F). Morphologic features of the neoplastic population were variable throughout the masses. Solid aggregates were comprised of polygonal epithelial cells with variably distinct cell borders, scant to abundant uniform to vacuolated eosinophilic cytoplasm (Figure 1C), a low to high nuclear to cytoplasmic ratio, round to oval nuclei with vesiculate to stippled chromatin and indistinct nucleoli. Mitoses were common, ranging from 2–10 per 10 high power fields of view (HPF), (Figure 1C inset). There was mild to moderate anisocytosis and anisokaryosis. Tubular formations were lined by simple cuboidal epithelium, often exhibiting similar morphologic features as the solid aggregates. Some tubules exhibited squamous differentiation and contained keratin. Cysts were often lined by stratified squamous epithelium and the lumina contained eosinophilic fluid. Along the margins of the neoplastic masses, salivary gland lobules were compressed and atrophied. Mild to moderate numbers of lymphocytes and plasma cells were within the interstitial areas. There was pulmonary intravascular metastasis in one case; metastatic lesions had similar histologic features as noted in the primary mass (Figure 1D).

Salivary gland adenomas were well-delineated nodular masses within the salivary gland rimmed by a thin, intact, fibrous capsule resulting in slight compression and atrophy of the adjacent salivary gland lobules (Figures 2A and B). The salivary gland adenomas were

composed of solid epithelial aggregates with frequent tubular formations and minimal supporting connective tissue stroma (Figures 2C and D). The solid aggregates were comprised of polygonal epithelial cells with indistinct cell borders, scant to moderate eosinophilic cytoplasm, a high nuclear to cytoplasmic ratio, and round to oval nuclei with finely stippled chromatin and variably distinct nucleoli. Mitotic activity was rare and ranged from 0–1 per 10 HPF. There was minimal anisocytosis and anisokaryosis. Tubular formations were lined by simple cuboidal epithelium with similar morphologic features as the solid aggregates. The fibrous capsule contained low numbers of lymphocytes and plasma cells.

Literature review

There were two case reports of salivary gland neoplasms [18, 19], and six additional animals were listed in NHP pathology surveys [22–25]. These identified three adenomas, an adenocarcinoma, an undifferentiated carcinoma, a carcinosarcoma, a mixed tumor, and a mucoepidermoid cystadenoma, in four rhesus macaques, three baboons, and one bonnet macaque. Three of the animals were male and one was female; the sex was not reported in four cases. The ages ranged from 3 months to 25 years in baboons and 9.9–27.4 years in rhesus macaques; the bonnet macaque was estimated to be between 7–10 years old.

Both case reports [18, 19] described clinical signs. The baboon [18] presented with dysphagia, weight loss, severe gingivitis, and 3 abscessed teeth. A 0.5 cm ulcer was identified on the hard palate. Over the next two months, the ulcer increased in size to 1.9 cm. A biopsy collected from the margin of the ulcer revealed neoplastic cells, and the animal was euthanized. Histopathologic evaluation revealed an undifferentiated salivary gland carcinoma with metastasis to a regional lymph node. The bonnet macaque [19] presented with left eye tearing and swelling and discharge from the left nostril. Proptosis and lateral strabismus of the eye developed one month later. The animal was euthanized. Necropsy revealed a 3.0×7.0 cm dark red gelatinous mass within the left nasal cavity, an enlarged left retropharyngeal lymph node and multiple pale round solid 0.25–1.0 cm masses in the lungs. Histopathologic evaluation revealed a carcinosarcoma of minor salivary gland origin with metastasis to regional lymph nodes and lungs. The six survey listings did not specify how the salivary gland tumors were diagnosed or describe the morphology.

Summary

Combining the cases reported here and those already in the literature, 17 salivary gland neoplasms were identified in eight rhesus macaques, six baboons, a bonnet macaque, a chimpanzee, and a tamarin. Salivary gland neoplasms were identified in seven females and six males; sex was not reported in four animals. Six animals presented with clinical symptoms related to salivary gland neoplasia, five neoplasms were incidental findings at necropsy, and clinical history was unavailable for six animals. The most common glands affected were the parotid ($n = 7$), mandibular ($n = 4$) or minor ($n = 2$) salivary glands; the origin was not specified in four cases. Nine neoplasms were benign (8 adenomas and 1 mucoepidermoid cystadenoma). Seven were malignant (five adenocarcinomas, one pleomorphic, and one carcinosarcoma of minor salivary gland). Four had metastatic lesions in the lymph nodes and lung; another was locally invasive. A mixed tumor in one survey was

of unspecified malignancy. Malignant neoplasms appeared more often in males, and in the parotid or minor salivary glands; age did not appear to be correlated with malignancy. Both rhesus macaques with a history of radiation exposure presented with adenomas; the origin was not specified for either animal.

Discussion

We present nine cases of salivary gland neoplasms identified at the SNPRC and YNPRC over a 35 year period (including 3 cases which were previously listed in surveys) [20, 21, 26], and summarize additional eight cases from published literature [18, 19, 22–25]. To give a context to these numbers, since 1988 we have had approximately 25,000 baboon necropsies and 450 tamarin necropsies at SNPRC, of which we found only three baboons and one tamarin diagnosed with salivary gland neoplasia in our records. These results support the paradigm that salivary gland neoplasms are rare in non-human primates (as in humans). NHP species affected included the rhesus macaque, baboon, bonnet macaque, chimpanzee, and moustached tamarin. Except the one case in a moustached tamarin, all cases were in old world primates. The rhesus macaque and baboon were the most common species reported. This preponderance of rhesus macaques and baboons (old world primates), is likely a reflection of the large numbers in captivity and use in research rather than an increased incidence of salivary gland neoplasia in these species [27]. The most common glands affected were the parotid and mandibular, which is similar to the reported distribution of salivary gland neoplasia in humans of 80–83% parotid [17, 28] and 12% mandibular [28].

Salivary gland neoplasia is rare in humans (<1% incidence) [1], dogs (0.15–0.18%), cats (0.6%), horses (0.2%), sheep, and cattle [6]. The actual incidence in livestock and humans may be understated, as most cases of salivary gland neoplasia in humans occur in older patients, often after 60 years of age [1, 17, 29], and most livestock and research NHP species do not reach advanced age. NHPs housed at zoological parks often reach advanced age; however, our literature search did not reveal any reports of salivary gland neoplasms in zoo-housed NHP. Additional reasons for this lower reported incidence could include overlooked masses, underreporting of benign tumors, or a lack of documentation of salivary gland neoplasms in NHPs. The presumed earlier detection in humans resulting from self-presentation due to early symptoms might also explain some of this difference.

Although the average life span varies greatly between NHP species, our results showed similar findings with the majority of salivary gland tumors being diagnosed in later stages of life. Cancer of the salivary gland in humans is more common in males [1, 3]. The male-to-female ratio of tumor occurrence in NHP appears more equal at 6:7; however, since information about sex was not available in 24% (4 of 17) of cases, the true male-to-female ratio for NHP salivary gland neoplasms remains unknown. Of the animals of known sex, malignant salivary gland tumors appeared more common in male (4 of 6) than in female NHP (2 of 7). In humans, the pleomorphic adenoma occurs most commonly making up 65% of diagnosed salivary gland tumors [30]. Adenomas were also the most frequent neoplasms in the NHP, comprising 47% (8 of 17) of salivary neoplasms.

Of the 11 animals with known clinical history, six displayed clinical symptoms while the other five neoplasms were found during necropsy. This indicates that salivary gland neoplasms are just as likely to present clinically as to be discovered post mortem. Malignant neoplasms did not appear any more likely to be identified clinically than benign neoplasms. The likelihood of malignancy in humans varies with the origin of the salivary neoplasm: parotid glands (20–25% malignant), submandibular glands (40% malignant), and sublingual gland neoplasms (90% malignant) [31, 32]. The likelihood of metastasis varies by the histologic grade and type of the neoplasm [17] with the most common metastatic sites being the regional lymph nodes and lungs. Malignant neoplasms comprised 41% (7 of 17) of the cases in NHPs. Metastasis appeared common in NHPs, where >50% (4 of 7) of malignant neoplasms metastasized to either the lymph nodes, lungs, or both.

The etiology of salivary gland tumors is uncertain in humans; however, several studies have indicated radiation exposure as a risk factor [11, 13, 14, 33]. DNA damage from radiation causes chromosomal breaks and aberrations, which may predispose to tumor development [33]. In NHPs, there is little research regarding radiation exposure and salivary gland tumors. Some have reported failed attempts to induce malignant salivary gland tumors, suggesting that NHP's have a high resistance for certain blastomogenic agents that are carcinogenic in other animals [34]. However, two of the eight rhesus macaques with salivary gland neoplasia in this report had clinical histories that included exposure to radiation; they were diagnosed with salivary gland adenomas at 35 and 29 years of age. This suggests that radiation exposure could be a risk factor for salivary gland tumors in NHP, but further studies are needed.

Salivary gland neoplasia is a rare occurrence that is uncommonly documented in both domestic animal and nonhuman primate species. We present nine cases of NHP salivary gland neoplasms from two primate research facilities. In addition we present eight identified cases from the literature. Further research and studies are needed for identifying risk factors, developing treatment options, and providing a more thorough understanding of salivary gland neoplasms in NHPs as well as in other veterinary species.

Acknowledgements:

The authors would like to thank Sarah Pennington, Jesse Martinez, Antonio Perez, and Renee Escalona for their anatomic pathology support and the clinical support staff of the Texas Biomedical Research Institute. This investigation used resources that were supported by the Yerkes base grant P51OD11132, and Southwest National Primate Research Center grant P51 OD011133 from the Office of Research Infrastructure Programs, National Institutes of Health and was conducted in facilities constructed with support from the Office of Research Infrastructure Programs (ORIP) of the National Institutes of Health through Grant Number C06 RR014578 and C06 RR015456.

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Figure 1.

Salivary gland adenocarcinomas in different non-human primate species. A) Case 1 - Adenocarcinoma, chimpanzee. Gross image of salivary gland neoplasm (parotid) taken at the time of necropsy. B) Case 1 - Adenocarcinoma, chimpanzee. Note neoplastic cells forming occasional glandular patterns. H&E. C) Case 2 - Adenocarcinoma, baboon. Biopsy. Note neoplastic cells arranged in solid lobules separated by fibrovascular stroma. Inset shows a mitotic figure. H&E. D) Case 2 - Adenocarcinoma, baboon. Necropsy. Pulmonary metastasis of the salivary gland neoplasm. Inset shows higher magnification of the highlighted area. H&E. E) Case 3 - Adenocarcinoma, baboon. Neoplastic cells arranged in

tubules showing capsular infiltration. H&E. F) Case 3 – Adenocarcinoma, baboon. Higher magnification showing individual neoplastic cells within the capsule. H&E.

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Figure 2.

Salivary gland adenomas in different non-human primate species. A) Case 4 – Adenoma, baboon. Well-demarcated, encapsulated neoplasm slightly compressing the adjacent gland. H&E. B) Case 4 – Adenoma, baboon. Higher magnification of the previous image showing glandular structures. H&E. C) Case 5 – Adenoma, moustached tamarin. Well-demarcated neoplasm with a thin fibrous capsule. H&E. D) Case 5 – Adenoma, moustached tamarin. Higher magnification of the previous image showing glandular structures. H&E. E) Case 6 – Adenoma, macaque. Well-demarcated, encapsulated neoplasm. H&E. F) Case 6 – Adenoma, macaque. Higher magnification of the previous image showing neoplastic cells arranged in ducts and tubules with prominent stroma. H&E. G) Case 7 – Adenoma, macaque. Well-

demarcated, nodular neoplasm with a thick capsule. H&E. H) Case 7 – Adenoma, macaque. Higher magnification of the previous image showing neoplastic cells arranged in tubules lined by a single layer of cuboidal to columnar epithelial cells with atypical nuclear features. H&E.

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Table 1.

Salivary gland neoplasms in NHPs.

case number	Species	Sex	Age	Diagnosis	Origin	Metastasis	Local Invasion	Reference
1	Chimpanzee	Male	40 years	Pleomorphic Adenocarcinoma	Parotid SG	Thoracic LN		26
2	Baboon	Female	20+ years	Adenocarcinoma	Parotid SG (Left)	Lung	Yes	20, 21
3	Baboon	Female	22 years, 3 months	Adenocarcinoma	Submandibular SG (right)			
4	Baboon	Female	26 years, 9 months	Adenoma	Submandibular SG (Left)			20, 21
Case Report	Baboon	Male	15 years	Undifferentiated Carcinoma	Minor Palatine SG	Retropharyngeal LN		18
Survey	Baboon	Female	3 months	Benign Mucoepidermoid Cystadenoma	Parotid SG			25
Survey	Baboon	Male	25+ years	Mixed Tumor	Submandibular SG			22
Case Report	Bonnet Macaque	Male	7-10 years	Carcinosarcoma	Minor SG	Retropharyngeal LN; Lung	Yes	19
5	Moustache Tamarin	Female	5 years	Adenoma	Submandibular SG			
6	Rhesus Macaque	Female	26 years, 9 months	Adenoma				
7	Rhesus Macaque	Female	19 years	Adenoma				
8	Rhesus Macaque	Male	30 years	Adenocarcinoma	Parotid SG			
9	Rhesus Macaque	Male	35 years	Adenoma				
Survey	Rhesus Macaque	Not Recorded	19.5 years	Adenoma	Parotid SG			23,24
Survey	Rhesus Macaque	Not Recorded	26.9 years	Adenoma	Parotid SG			23, 24
Survey	Rhesus Macaque	Not Recorded	9.9 years	Adenoma	SG NOS			23
Survey	Rhesus Macaque	Not Recorded	27.4 years	Adenocarcinoma	Parotid SG		Yes	23, 24

(SG = Salivary Gland, NOS = Not Otherwise Specified, LN = Lymph Node)