

Multicentric cutaneous histiocytic proliferation resembling Langerhans cell histiocytosis in a howler monkey (*Alouatta palliata*)

A. Reyes-Matute*, Y.A. Basilio-Cornejo†, G.Y. Castillo-Mendoza‡ and A.C. Negrete-Philippe†

*Departamento de Patología, Facultad de Medicina Veterinaria y Zootecnia, Universidad Nacional Autónoma de México, Mexico city, MX, †Grupo Xcaret, Grupo Xcaret, Quintana Roo, MX and ‡Facultad de Agronomía y Medicina Veterinaria, Universidad Autónoma de San Luis Potosí, San Luis Potosí, MX

Introduction: Howler monkey (*Alouatta palliata*), is a neotropical primate considered a vulnerable species according to the IUCN, because of its decreasing population due to habitat loss combined with hunting, both for the pet trade and for bushmeat. This species occupies several distinct vegetation types, including mature evergreen forests, deciduous and riparian forests, mangroves, and anthropogenically disturbed forests.¹ Beyond infectious diseases, with major knowledge in parasitic diseases, little has been reported about diseases affecting the different species of howler monkeys. Some of the reported conditions, beside infectious diseases, in the genre *Alouatta* are: renal disease, benign pheochromocytoma, lymphoma (experimentally induced), and seminoma.^{2,4}

Langerhans cell histiocytosis (LCH) has been mostly described in humans and, although uncommon, it is well recognized in dogs. LCH is considered an idiopathic condition characterized by proliferation of abnormal Langerhans cells (antigen-presenting immune cells). It is still not well established whether it represents a reactive process due to the fact that some cases have spontaneous remissions, or a neoplastic process due to organ infiltration and response to chemotherapy. Besides, there is evidence linking LCH with BRAF mutation.^{3,5}

This case report describes the clinical and pathological aspects of a multifocal cutaneous histiocytic proliferation resembling Langerhans cell histiocytosis in a captive howler monkey.



FIGURE 1. Range distribution of *Alouatta palliata* and IUCN status. Map available at: IUCN (International Union for Conservation of Nature) 2021. *Alouatta palliata*. The IUCN Red List of Threatened Species. Version 2022-2 <https://www.iucnredlist.org/species/39960/190425583> Image licensed under the Creative Commons Attribution 4.0 International license modified from: https://commons.wikimedia.org/wiki/File:Panamanian_Male_Adult_Howler_Monkey.jpg



FIGURE 2. Initial skin lesions, the bigger one close to the elbow, and several smaller ones in the chest

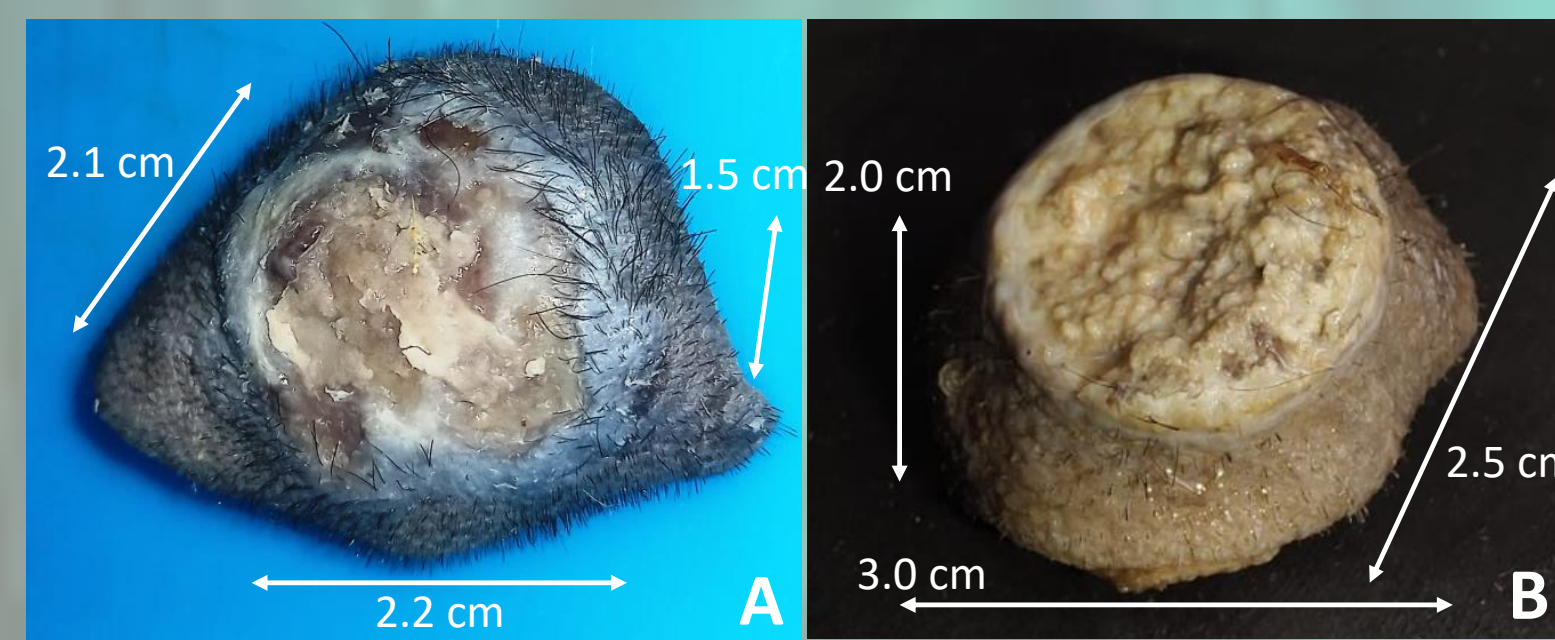


FIGURE 3. Resected, formalin fixed nodules showing similar features, with a dome shaped appearance and ulceration. A.- initial elbow mass; B.- submandibular mass.

Materials and Methods: An eleven-year-old, male, howler monkey (*Alouatta palliata*) was presented with mild lethargy, weight loss, and numerous skin lesions. The biggest one was located close to the elbow, others were reported to have grown and regressed. Seven months later, new skin masses had developed in the chest and submandibular region. Neither worsening of clinical signs nor lymphadenomegaly were reported, and a prednisone treatment was initiated. The largest initial masses (elbow and submandibular region) and some later masses were completely excised and subjected to histological and immunohistochemical examination.

Results: Microscopically, the masses consisted of large neoplastic round cells arranged in sheets. The cells had distinct margins and moderate to large amounts of eosinophilic cytoplasm. Nuclei were large and oval to reniform, with stippled chromatin and 1-3 small nucleoli. There was moderate to marked anisocytosis and anisokaryosis. There were 15 mitotic figures in 10 high power fields (2.37 mm²). Occasional bi and multinucleations were identified. The cells exhibited widespread and intense vimentin and Iba-1 expression, while CD3 staining was negative. The new skin masses exhibited identical histological features, but with a higher mitotic count (67 mitotic figures in 10 high power fields (2.37 mm²)).

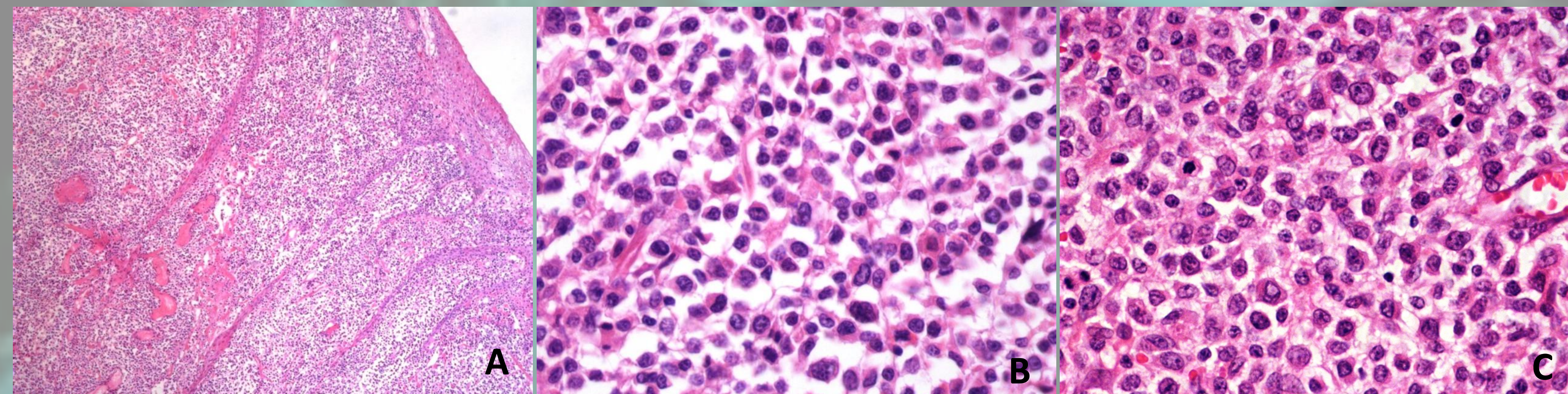


FIGURE 4. Initial elbow mass (A & B). The nodule is composed of a dense proliferation of round and polygonal cells arranged in cords of cells oriented perpendicularly to the skin surface. The epidermis shows rete peg-like extensions that penetrate the neoplasm. Submandibular mass (C). The neoplastic cells display similar features. H&E.

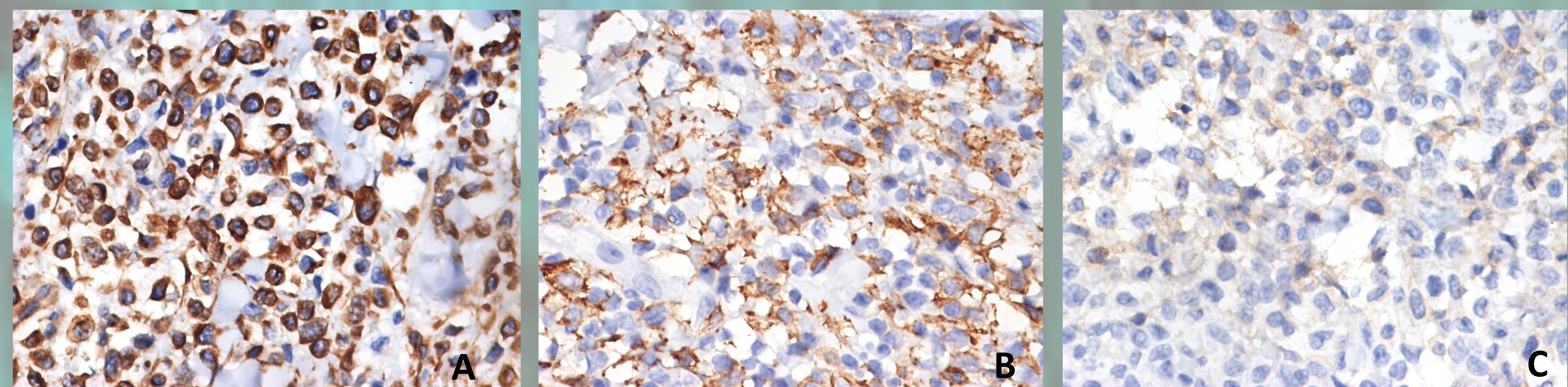


FIGURE 5. Neoplastic cells had widespread and intense vimentin (A), and Iba-1 expression (B), while CD3 staining was negative (C).

Discussion & Conclusions: In humans, it is not yet well established, whether this condition represents a neoplasm or an inflammatory response, and scarce information is available about its origin and clinical features in animals. In this case, cellular morphology, together with some microscopic features (e.g. top-heavy configuration), and Iba-1 positive staining granted a diagnosis of an histiocytic proliferation very similar to canine histiocytoma, while the multicentric and growth behavior remind to what is known of LCH in other species. The recommendation made for this case was to keep a close follow up, specially regarding any changes in lymph node size, as it is well known that dissemination to lymph nodes worsens the prognosis.^{3,5} Although an initial weight loss was reported, it was immediately solved by a diet change. No similar cases have previously been reported in new world primates.

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