Lymphoma is one of the most common neoplasms in cats, and the most common anatomical form is alimentary lymphoma. Lymphoma can occur almost anywhere in the body; however, the cutaneous form is rare in cats [1, 2]. It has been well studied in dogs but not in cats [3]. Feline cutaneous lymphoma can be divided into epitheliotropic cutaneous lymphoma (ECL) and non-epitheliotropic cutaneous lymphoma (NECL). Most epitheliotropic tumors are of T-cell origin, and the tumor cells infiltrate the epidermis and adnexal epithelium in ECL [3]; however, tumor cells are of either T-cell or B-cell origin and do not usually involve the adnexal gland in NECL [4]. Previous studies have reported that the prognosis of NECL is grave, and its median survival time appears to be shorter than that of ECL [3, 5]. Herein, we report a case to describe clinical and pathological findings of T-cell NECL in a cat.

An 11-year-old, spayed female Persian cat was referred to the Gyeongsang Animal Medical Center, Gyeongsang National University for skin lesions. The owner noticed a small crusting lesion on the dorsal neck 2 months before admission, and patches, plaques, and firm nodules were observed thereafter. Moderate pruritus, lethargy, and micturition disorders were also recorded upon systemic review. Bacterial and fungal culture tests of the skin lesions revealed no growth of pathogens, and the lesion was not responsive to antimicrobials from the local veterinary clinic.

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Upon physical examination, ulcerated crust and erythema with numerous skin nodules were observed from the forelimbs to the craniodorsal trunk (Fig. 1). The nodular masses were firm and fixed under the skin, and the lesions expanded bi-
laterally to the shoulder area and forelimb. However, a 160 multi-slice computed tomography (CT, Aquilion Lightning 160; Canon Medical Systems, Japan) scan revealed heterogeneous contrast enhancement and extended dorsally from the 1st cervical vertebrae to the 12th thoracic vertebrae level (Fig. 2). A diffuse, irregularly margined, soft tissue attenuated lesion in the cutaneous layer, superficial fascia, and subcutaneous layer was also detected. No regional or distant lymph node enlargement was identified on either physical examination or CT scan. Skin cytology, biopsy, and comprehensive laboratory analysis were performed. The results revealed normocytic normochromic mild non-regenerative anemia (red blood cell counts of 5.26 x 10^6/μL [reference interval [RI], 6.54–12.2 × 10^6/μL]; a packed cell volume of 24% [RI, 30.3%-52.3%]; hemoglobin levels of 7.3 g/dL [RI, 9.8-16.2 g/dL]). Paraneoplastic hypercalcemia (ionized calcium level of 1.53 mmol/L [RI, 1.11–1.38 mmol/L]) and decreased blood urea nitrogen (11 mg/dL; RI, 16–36 mg/dL) and serum creatinine (0.7 mg/dL; RI, 0.8–2.4 mg/dL) concentrations as consequences of polyuria secondary to hypercalcemia were observed. Feline leukemia virus and feline immunodeficiency virus infections were excluded using the feline Triple SNAP test kit (IDEXX, USA). Skin cytology demonstrated a distinctive cytological pattern with a dominance of rounded cells with multilobulated nuclei and moderately basophil cytoplasm. The nucleus was three times larger than erythrocytes and was anisokaryotic, anisocytic, and biniucleated, which met the malignancy criteria. Skin biopsy was performed from three different sites of the left and right scapular lesions using 2 mm-punch biopsy. Histopathological examination of the biopsied sample revealed a non-encapsulated neoplasm comprising a tightly packed sheet of round cells in the dermis and underlying subcutis, with no evidence of epitheliotropism of the neoplastic cells. The neoplastic cells ranged from 9 to 13 μm in diameter and contained moderate amounts of amphophilic cytoplasm. The nuclei were rounded, had coarsely clumped chromatin, and contained one to several prominent nucleoli. Multiple areas of necrosis were observed throughout the neoplasm. The neoplastic cells stained strongly positive for CD3 but not for Pax5 (Fig. 3). Based on these findings, a diagnosis of NECL with diffuse large T-cell type was made. Chemotherapy and radiation therapy were suggested; however, the owner chose palliative treatment such as antibiotics, corticosteroids, and bisphosphonate, but it was not responsive. The disease progressed rapidly for 2 weeks after the initial

Fig. 1. Skin lesions in cats with non-epitheliotropic lymphoma. An ulcerated crust and erythema with numerous skin nodules are observed from (A) the cranial dorsal trunk to (B) the forelimb.
Fig. 2. Transverse (A-C) and sagittal (D) computed tomography images of the cutaneous lesion in a cat with non-epitheliotropic cutaneous lymphoma. Diffuse, irregular margined, and soft tissue attenuated lesion is observed in the cutaneous layer (arrow), superficial fascia, and subcutaneous layer (arrowhead). This lesion has heterogeneous contrast enhancement and extends dorsally from the 1st cervical vertebra to the 12th thoracic vertebra level.

Fig. 3. A histopathologic examination from the biopsied sample in a cat with non-epitheliotropic cutaneous lymphoma. (A) Infiltrative growth of large lymphocytic tumor cells is observed between the dermis and subcutaneous tissue, H&E. The neoplastic cells range from 9 to 13 µm in diameter. (B) The nuclei are rounded, have coarsely clumped chromatin, and contain one to several large nucleoli (H&E). (C) Neoplastic cells are stained strongly positive for CD3 antibody. Scale bars: (A) 1,280 µm, (B) 50 µm, (C) 200 µm.

diagnosis, and the owner elected humane euthanasia.

Cutaneous lymphoma is rarely reported and constitutes 0.2% to 3.0% of the feline lymphomas [6]. ECL is characterized by T cells with an affinity for the epidermis and adnexal epithelium, whereas NECL is of B- or T-cell origin and is characterized by neoplastic lymphocytes predominantly in the dermis and subcutis [1,5,7]. Although it is known that NECL is more common in feline cutaneous lymphoma [7], but most documents are ECL in cats [4,8]. The etiology of NECL remains unclear; however, chronic inflammation, prior surgery, trauma, metallic or-
The prognosis of feline NECL is worse than that of ECL. The median survival time reported in the literature is 10.25 months for feline ECL [3] and 190 days for feline NECL [1]. Therefore, histopathological subclassification is essential. Further research on the clinical application of various treatments and the analysis of prognosis should be conducted in the future.

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ORCID

YeSeul Jeon, https://orcid.org/0000-0003-3065-4729
Hyeona Bae, https://orcid.org/0000-0002-2888-5782
Sun Woo Shin, https://orcid.org/0000-0002-7978-3006
ARom Cho, https://orcid.org/0000-0001-9924-5056
Young Ju Kim, https://orcid.org/0000-0001-6638-6952
Tae Sung Hwang, https://orcid.org/0000-0001-6730-6061
Hee Chun Lee, https://orcid.org/0000-0001-5936-9118
Jae-Eun Hyun, https://orcid.org/0000-0002-1157-2237
Kyu-Woan Cho, https://orcid.org/0000-0003-1301-4033
Dong-In Jung, https://orcid.org/0000-0002-5116-6006
Dae-Yong Kim, https://orcid.org/0000-0002-3168-3938
DoHyeon Yu, https://orcid.org/0000-0001-7645-6926

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