

# Suspected Case of Exocrine Pancreatic Insufficiency in a Bengal Tiger (*Panthera tigris tigris*)

Haerin Rhim\* and Jae-Ik Han\*\*\*<sup>1</sup>

\*Laboratory of Wildlife Medicine/Diseases, College of Veterinary Medicine, Chonbuk National University, Iksan 54596, Korea

\*\*Biosafety Research Institute, College of Veterinary Medicine, Chonbuk National University, Iksan 54596, Korea

(Received: July 27, 2018 / Accepted: October 02, 2018)

**Abstract :** A 1-year-old, female Bengal tiger (*Panthera tigris tigris*) presented signs of weight loss and dark brown-colored diarrhea. On fecal examination, numerous intact and broken red blood cells were found, but both parasites and inflammatory signs were absent. No significant findings were seen in serum biochemistry profiles, including electrolytes, with negative feline pancreatic lipase immunoreactivity (fPLI). Diagnostic kits using feces or peripheral blood were negative for feline parvovirus, feline coronavirus, feline immunodeficiency virus, and feline leukemia virus. Based on the result of feline trypsin-like immunoreactivity (fTLI) concentration (4.6 µg/L), the tiger was provisionally diagnosed to have exocrine pancreatic insufficiency (EPI). After this diagnosis, pancreatic enzymes were prescribed. The feces of the tiger returned to normal form and her weight was increasing. EPI is uncommon and not described extensively in Felidae, including domestic cats. Feline EPI is associated with a variety of non-specific signs and it should be considered in the differential diagnosis of cases presenting with weight loss, diarrhea, and other gastrointestinal signs. In this case, the patient was strongly suspected to have EPI based on the very low fTLI concentration, though the concentration of fTLI in tigers has not yet been determined. This is the first report to present a suspected EPI case in Bengal tigers.

**Key words :** tiger, weight loss, diarrhea, TLI, EPI

## Introduction

Feline EPI is a condition that presents deficiency of pancreatic digestive enzymes secreted into the small intestine, resulting in malassimilation of nutrients. The large molecules retained in the intestines lead to osmotic, lipemic diarrhea and weight loss (1,2). Compensatory polyphagia may occur and general body condition could worsen (4,5). In cats, there are no specific clinical signs of EPI and no typical appearance in common laboratory examination and imaging. Hence to avoid misdiagnosis, if a patient shows weight loss, diarrhea or other gastrointestinal signs, EPI should be considered in the differential diagnosis. The most common known cause is acinar atrophy in dogs and chronic pancreatitis in cats (1,4,6). EPI was believed to be rare in cats in the past, but diagnosis of feline EPI is now increasing with advancing diagnostic methods. However, it is still uncommon in cats than in dogs. The age distribution is even and breed predilection has not yet been reported (1,7). Currently, serum fTLI is the most reliable diagnostic indicator (1-3). An EPI in a tiger has not been reported, and we describe a case of suspected EPI in a Bengal tiger.

## Case

A 1-year-old female Bengal tiger (*Panthera tigris tigris*)

with normal behavior and good appetite, presented to Veterinary Medical Center, Chonbuk National University with chronic brown-black colored diarrhea and weight loss (Fig 1). There was no inflammation or internal parasites observed on the fecal wet mount and smear, but numerous intact or broken red blood cells were found. Physical examination and blood collection were performed under general anesthesia. We used Ketamine (3 mg/kg, Yuhan, Seoul, Korea) and Xylazine (1 mg/kg, Rompun, Bayer, Leverkusen, Germany) combination using a blow gun, and the blood was collected from the cephalic vein. Serum biochemistry and electrolyte profiles were examined using automatic analyzer (Catalyst, IDEXX, Westbrook, ME, USA). There were no specific findings based on the International species information system (ISIS) reference interval for Bengal tigers (Table 1). Feline diagnostic kits were used to rule out infectious diseases. Feces sample was used to detect feline parvovirus and blood sample was used for feline coronavirus, feline immunodeficiency virus, and feline leukemia virus; all results were negative. The feline pancreatic immunoreactivity (fTLI) test also yielded a negative result. For the fTLI test, frozen serum was referred to Texas A&M GI laboratory in USA. It showed 4.6 µg/L (reference interval for domestic cats: 12-82 µg/L) which is a very low level for cats. Considering the clinical signs with very low fTLI level, EPI was highly suspected even though there was no information about the normal reference interval of tiger's TLI test. Due to lack of serum samples, we could not measure the serum cobalamin level. The tiger was treated with porcine pancreatic enzyme (1/2 teaspoon per meal, Pan-

<sup>1</sup>Corresponding author.  
E-mail : jihan@jbnuc.ac.kr



**Fig 1.** A photograph of the tiger showing thin body (A) and brown-black colored watery diarrhea (B).

**Table 1.** Results of serum biochemistry and electrolyte profiles

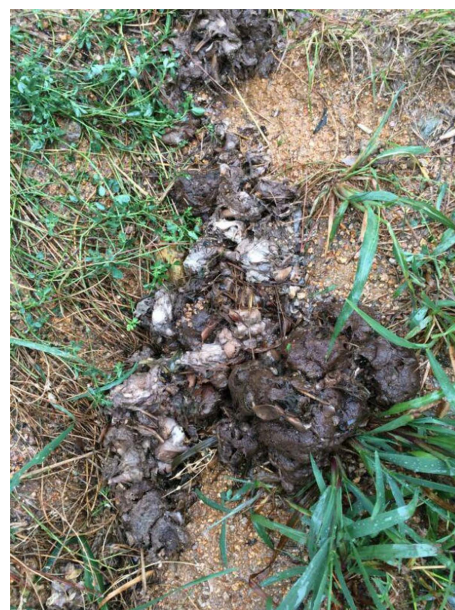
Test	Unit	Result	Reference*
Na	mEq/L	160	128-170
K	mEq/L	4.2	3.5-6.5
Ca	mg/dL	8.8	8-12
P	mg/dL	4.1	3-11
TP	g/dL	7.9	4.5-8.3
ALB	g/dL	3.7	2.5-4.6
GLOB	g/dL	4.2	1.8-4.4
ALP	U/L	10	11-284
ALT	U/L	151	10-326
BUN	mg/dL	31	13-63
CREA	mg/dL	1.6	0.6-8.4
GGT	U/L	0	0-7
GLU	mg/dL	76	0-303
TRIG	mg/dL	29	8-177
TBIL	mg/dL	1.7	0-8
AMYL	U/L	2,220	160-7,847

\* International Species Information System

creatin, Sigma-Aldrich, Korea) along with bromelain (90 mg per meal, Rozyme, Korea Pharma, Seoul, Korea) in every meal (4 times a day). After 3 weeks of treatment, the feces still showed undigested materials but with a distinct shape (Fig 2), and the tiger showed a continuous gain in weight.

## Discussion

EPI has not been commonly reported in domestic cats or other Felidae species (2,3). The most common cause is the destruction of the pancreas resulting from chronic pancreatitis, followed by atrophy and aplasia or hypoplasia of the acinar cells (1). The most common clinical signs in cats with EPI are weight loss, followed by diarrhea and soft feces, overeating, vomiting, lethargy, anorexia, poor haircoat, polyuria and polydipsia (1,2). Hyperthyroidism, dental and periodontal diseases, chronic renal disease, heart failure, tumors, and chronic gastrointestinal diseases should be ruled out before the definitive diagnosis in cats presenting with overeating and weight loss (1).



**Fig 2.** Appearance of feces after 3 weeks of treatment with porcine pancreatic enzyme and bromelain.

Secondary cobalamin deficiency is common in cats with EPI; it is caused by the lack of production and secretion of internal factors (2,10-13). Internal factors such as cobalamin binding protein, only produced in the pancreas, are critical for the absorption of cobalamin in small intestine. Additionally, if the pancreatic enzyme does not cut the cobalamin binding off, cobalamin will not bind to internal factors resulting in cobalamin deficiency. There is another report that bacterial overgrowth in the small intestine may induce secondary cobalamin deficiency (2,4). Loss of exocrine pancreatic function leads to undigested nutrients in the small intestine which is an ideal environment for bacteria. In addition, malabsorption and indigestion reduces the gut motility and results in bacterial overgrowth (1,2,17). However, its diagnosis is controversial. Some cats with low cobalamin, showed an increase in folic acid. If only pancreatic enzymes are administered without cobalamin, clinical signs may continue to be present and this could be misread as a failure of the treatment (1). All cats with EPI have to be checked regularly for cobalamin levels and then given appropriate supplements (1,2).

TLI test, measuring the trypsinogen among small amount

of enzyme particles released into the bloodstream, is commonly used for diagnosis of EPI in dogs and cats. However, the same method cannot be followed in both dogs and cats due to its high species specificity (1). The reference interval of fTLI value in domestic cats is 12-82 µg/L, where, 8.1-11.9 µg/L is considered as the grey zone (suspected) and under 8 µg/L is definite diagnosis of feline EPI (3,10,16).

In this case, the Bengal tiger was suspected to have EPI considering the physical examination, clinical signs, and laboratory test results. There is no known reference interval of TLI concentration for tigers, but very low level of TLI was observed that indicated the possibility of EPI. But unlike common cause of EPI in cats, this tiger did not have pancreatitis or other chronic diseases. The tiger was empirically treated with pancreatic enzymes along with digestive enzymes, and the tiger responded well to the treatment, suggesting a true deficiency of pancreatic enzymes.

### Acknowledgement

This subject was supported by the Korea Ministry of Environment (MOE) as "Public Technology Program based on Environmental Policy (No. 2016000210002)".

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