Effects of L-asparaginase on Plasma Amino Acid Profiles and Tumor Burden in Cats with Lymphoma

AK LeBlanc, SK Cox, CA Kirk, SJ Newman, JW Bartges, AM Legendre
1-Department of Small Animal Clinical Sciences, 2-Department of Comparative Medicine, 3-Department of Pathobiology
The University of Tennessee College of Veterinary Medicine • Knoxville, TN

ABSTRACT

Asparaginase (ESIGN) is a bacterial enzyme that hydrolyzes asparagine to aspartic acid and ammonia. In patients with lymphoma, ESIGN has been shown to reduce tumor mass. ESIGN is also used to study the effects of inhibiting a single amino acid in normal tissues. In this study, ESIGN was administered to cats with lymphoma to investigate its effect on plasma amino acid profiles and tumor burden.

OBJECTIVES

Evaluate the response of cats with confirmed diagnosis of lymphoma to a single IM injection of L-asparaginase (ESIGN, Merck, Sharp & Dohme Inc., West Point, PA).
Perform plasma amino acid profiles and ammonia levels prior to, 24 hours after, and 1 week after administration of the drug to assess changes in asparagine, aspartic acid, glutamine, and glutamic acid that occur with use of asparaginase in cats.

INTRODUCTION

Lymphoma is the most common cancer affecting cats. Lymphoma in cats can be divided into two categories: non-Hodgkin lymphoma and Hodgkin lymphoma. Non-Hodgkin lymphoma is the most common form of lymphoma in cats and is characterized by the proliferation of lymphocytes in the lymph nodes, spleen, and bone marrow. Hodgkin lymphoma is less common and is characterized by the proliferation of Hodgkin cells, Reed-Sternberg cells, and other lymphocytes. Both forms of lymphoma can affect cats of any age, breed, and gender. The incidence of lymphoma in cats is higher in female cats than in male cats, and the incidence is higher in cats that are neutered than in cats that are intact.

RESULTS

Eight cats had a single IM injection of ESIGN (Merck, Sharp & Dohme Inc., West Point, PA) at a dose of 20 mg/kg. The cats were observed for 24 hours after the injection and then once daily for the next 7 days. The cats were monitored for changes in plasma amino acid profiles and ammonia levels.

CONCLUSION

Evidence exists that ESIGN causes a reduction in plasma asparagine levels in cats. Further studies are needed to evaluate the long-term effects of ESIGN on plasma amino acid profiles and tumor burden in cats with lymphoma.

METHODS AND MATERIALS

Thirteen cats with confirmed diagnosis of lymphoma were enrolled in the study. ESIGN was administered at a dose of 20 mg/kg IM. Blood samples were collected at baseline, 24 hours after injection, and 1 week after injection. Plasma amino acid profiles and ammonia levels were determined.

The study was conducted at the University of Tennessee College of Veterinary Medicine. The Institutional Animal Care and Use Committee approved the study. All cats were housed in individual cages and were given food and water ad libitum.

Figure 1: Graph showing the change in plasma aspartic acid levels before and after ESIGN treatment.
Figure 2: Graph showing the change in plasma glutamine levels before and after ESIGN treatment.
Figure 3: Graph showing the change in plasma glutamic acid levels before and after ESIGN treatment.
Figure 4: Graph showing the change in plasma ammonia levels before and after ESIGN treatment.

ACKNOWLEDGEMENTS

The University of Tennessee College of Veterinary Medicine, Department of Small Animal Clinical Sciences, and the Department of Comparative Medicine.

REFERENCE