Combination Chemotherapy in Feline Lymphoma: Treatment Outcome, Tolerability, and Duration in 23 Cats

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Background: Different chemotherapy regimes have been described for feline lymphoma with varying outcomes.

Hypothesis: In cats with lymphoma, a long-term, multiagent chemotherapy protocol will be effective and carry acceptable toxicity.

Animals: Twenty-three cats with histologically or cytologically confirmed diagnosis of lymphoma.

Methods: Prospective, single-arm clinical trial in which cats were treated with a chemotherapy protocol consisting of a cyclic combination of L-asparaginase, vincristine, cyclophosphamide, doxorubicin, methotrexate, and prednisolone with a planned total treatment time of 122 weeks.

Results: Complete remission (CR) rate was 74% (n = 17). Fourteen percent of cats attained partial remission (PR). Median duration of first CR was 264 days (range, 45–2,485 days). Six-month, 1-, and 2–5-year remission rates were 75, 50, and 34%, respectively. Duration of PR ranged between 23 and 63 days. Median survival in cats with CR was 296 days (range, 50–2,520 days). Six-month, 1-, 2-, and 3–5-year survival rates in cats with CR were 82, 47, 34, and 27%, respectively. Survival of cats achieving PR ranged between 38 and 120 days. Of the analyzed variables, only anatomical location had a significant influence on remission duration (P = .022). Actual median treatment time in cats with CR was 128 days (18 weeks). Hematologic and gastrointestinal toxicosis was infrequent and mostly low grade.

Conclusions and Clinical Importance: In this population of cats with lymphoma, chemotherapy was effective. With frequent and mostly low-grade toxicosis, tolerability of the protocol may be considered good.

Keywords: Feline immunodeficiency virus/feline leukemia virus; Lymphosarcoma; Remission; Survival; Toxicosis.

Lymphoma is one of the most frequent neoplasms in the cat, accounting for most of the hematopoietic tumors with an annual incidence of 160–200 per 100,000 individuals in this species.1–3 Despite a decreasing frequency of feline leukemia virus (FeLV) infection in recent years, the incidence of feline lymphoma has increased, emphasizing the relevance of this disease in veterinary oncology.4

Different chemotherapy protocols with varying treatment results have been reported in the literature. Complete remission (CR) rates of up to 80% for all types and up to 92% when stratified by anatomical site as well as CR durations ranging from a few weeks to more than 650 days have been described.5–15 However, compared with the amount of information available in the literature on chemotherapy for canine lymphoma, the number of reports on treatment of feline lymphoma is limited. Furthermore, in contrast to the dog, in which discontinuous chemotherapy regimens have been effective,16–20 only maintenance combination protocols have been reported for treatment of feline lymphoma. Owing to the efficacy of these shorter term chemotherapy protocols in canine lymphoma, this treatment approach also has been recommended for feline lymphoma, although currently there are no published data to support this recommendation.21

The aim of the present study was to evaluate the efficacy and toxicity of a continuous, multiagent chemotherapy protocol in cats with lymphoma.

Material and Methods

Patients

Cats with a histologically or cytologically confirmed diagnosis of lymphoma were eligible for this study. Other eligibility criteria were no concurrent serious medical illness and signed owner consent.

Clinical Staging

Initial pretreatment evaluation consisted of physical examination, complete blood count (CBC), serum biochemistry, urinalysis, FeLV and feline immunodeficiency virus (FIV) testing, thoracic and abdominal radiography, abdominal ultrasound examination, and ECG. For documentation of measurable disease, tumors were measured either directly with calipers or by radiographic or ultrasonographic imaging. Echocardiography and bone marrow aspiration cytology were performed if clinically indicated. Clinical staging was performed according to the modified clinical staging system for feline lymphoma.22 Anatomical forms of lymphoma (mediastinal, gastrointestinal, multicentric, and extranodal) were classified according to previous description.21

Chemotherapy Regimen and Patient Monitoring

The patients were treated with a long-term combination chemotherapy protocol consisting of L-asparaginase, vincristine, cyclophosphamide, doxorubicin, methotrexate, and prednisolone2 (Table 1). Dexamethasone2 (0.5 mg/kg IV) was administered before administration of L-asparaginase and doxorubicin. The planned total treatment time was 122 weeks.

A CBC was performed before each treatment. An ECG was performed before each doxorubicin treatment. If indicated by...
abnormalities in cardiac auscultation or ECG, an echocardiographic examination also was performed. Serum biochemistry was performed when cats exhibited signs of toxicosis or other signs of concern to the attending clinician. Tumor size was evaluated at each visit by direct measurement or radiographic or ultrasonographic imaging. Cats with gastrointestinal lymphoma were also monitored ultrasonographically. In the event of relapse (during treatment or after treatment discontinuation), cats belonging to owners who wanted to continue or reinitiate therapy were treated with a 2nd cycle by the initial protocol.

**Response Assessment**

The following criteria were used to evaluate response to treatment: CR, 100% reduction in size of all measurable disease; partial remission (PR), >50% but <100% reduction in size of all measurable disease; stable disease (SD), <50% reduction in size of all measurable disease, no change in size, or <25% increase in size of all measurable disease; progressive disease (PD), >25% increase in size of all measurable disease or the appearance of new lesions. SD and PD were also classified as no response (NR). All responses were required to last for at least 21 days. Remissions of shorter duration were classified as SD.

**Assessment of Toxicity**

Results of CBC as well as gastrointestinal toxicity were recorded 1 week after each treatment. Neutropenia was graded retrospectively according to the VCOG-CTCAEv1.0.23 Gastrointestinal toxicity was rated grade 0 (none), grade 1 (inappetence, vomiting, and diarrhea; transient [self-limiting within 1 day] or responsive to dietary management), grade 2 (inappetence, vomiting, and diarrhea necessitating medical treatment), grade 3 (inappetence, vomiting, and diarrhea necessitating medical treatment and postponing of chemotherapy), and grade 4 (inappetence, vomiting, and diarrhea necessitating medical treatment, hospitalization, and postponement of chemotherapy) according to the attending clinician as reported in a previous study.20 At the time of study design and patient accrual, grading of gastrointestinal toxicity according to VCOG-CTCAEv1.0 was not available yet; therefore, the grading system described above was used to minimize variability because of subjectivity of the different attending clinicians. A retrospective grading according to VCOG-CTCAEv1.0 was not performed to avoid inaccuracy. Other signs of toxicosis were also documented for each cat.

**Statistical Analysis**

Complete and partial response rates were defined as the number of cats achieving CR or PR compared with the total number of cats treated. Kaplan-Meier product limit analysis was used for remission and survival analysis. A complete event was defined as lymphoma relapse or death, respectively. Cats were censored if they were alive at the time of data accrual closure (survival analysis), or were still in remission (remission analysis) at time of death or data accrual closure.

Univariate Cox forward regression analysis (followed by multivariate Cox forward regression analysis if multiple influential factors were identified) was used to evaluate the following variables for independent influence on remission and survival times: sex, body weight, age, clinical stage, substage, anatomical classification (mediastinal, gastrointestinal, extranodal), previous treatment with corticosteroids, FIV status, presence of dyspnea, weight loss, inappetence, or vomiting at diagnosis, duration of clinical signs before diagnosis, hematocrit (HCT) at diagnosis, presence of anemia (HCT below 27%) at diagnosis, and time from diagnosis to induction treatment. The influence of the above patient factors on whether or not each cat reached CR was analyzed by univariate logistic regression analysis and multivariate analysis if appropriate.

A P value <.05 was considered significant. All statistical analyses were performed by SPSS 14 statistics software.1

**Results**

**Patient Population**

Twenty-three cats were enrolled between March 1996 and December 2004. Breeds included Chartreux (2), Persian (1); the remaining 20 cats were European Shorthair. Median age was 9.5 years (range, 2–15 years). Cats with mediastinal lymphoma (n = 4) had a median age of 3 years (range, 2–5 years), whereas the remaining cats with lymphoma had a median age of 11 years (range, 4–15 years). Median body weight was 5.5 kg (range, 3–8.5 kg). Nineteen cats were castrated males and 4 were spayed females. Eighteen cats (78%) were presented with no prior treatment and 5 cats (22%) had previously been treated with corticosteroids. Seven cats presented with dyspnea, 7 with weight loss, 10 with inappetence, and 9 cats experienced vomiting. Median duration of clinical
signs before diagnosis was 14 days (range, 2–120 days, Table 2).

**Anatomic Locational and Clinical Staging**

Mediastinal lymphoma was present in 4 cats. Five cats had gastrointestinal lymphoma and 1 cat had multicentric disease. The remaining 13 cats had extranodal manifestations, including renal (n = 5), nasal (n = 2), laryngeal or pharyngeal (n = 2), muscular or subcutaneous (n = 2), and retrobulbar (n = 1) lymphoma, and central nervous system (n = 1).

Of the 23 cats, 6 (26%) were classified as stage 1, 6 (26%) as stage 2, 8 (35%) as stage 3, 2 (9%) as stage 4, and 1 (4%) as stage 5. At presentation 3 (13%) cats had no signs of disease (substage a) and 20 (87%) had constitutional signs (substage b). Bone marrow aspiration cytology was performed in 3 cats, 1 of which was positive for lymphoma.

**Laboratory Variables**

Four of the 23 cats had anemia, with HCTs ranging between 20 and 23%. Median HCT in all cats was 36% (range, 20–49%). Two cats were hypercalcemic (serum-ionized calcium concentrations 1.43 and 1.45 mmol/L; normal range, 1.15–1.37 mmol/L).

**FIV and FeLV Status**

None of the 23 cats was FeLV positive. Seven cats (30%) were FIV positive. Of these FIV-positive cats, 6 had extranodal lymphoma (renal, 2; muscle or subcutaneous tissue, 2; laryngeal, 1; retrobulbar, 1) and 1 had mediastinal disease.

**Treatment Response**

Median time from diagnosis to induction chemotherapy was 3 days (range, 0–21 days). Median time from
induction chemotherapy to documentation of remission was 8 days (range, 1–35 days). Response distribution in the 23 patients was as follows (Table 3): CR: 17 (74%), PR: 4 (17%), NR (SD, PD): 2 (9%). None of the variables analyzed had a significant association with the likelihood of a cat achieving CR (Table 2).

First Remission Duration

Median follow-up period from date of diagnosis was 242 days (range, 38–2,520 days, 95% confidence interval, 145–339 days).

Seventeen cats achieved a CR. Median CR duration was 264 days (range, 45–2,485 days, Fig. 1). In the 17 cats that achieved CR, Cox regression analysis indicated that of the analyzed variables, only anatomical location of disease had a significant influence on duration of CR ($P=0.022$, Table 2), and cats with gastrointestinal lymphoma achieved a median remission duration of 52 days, whereas cats with mediastinal and extranodal disease achieved median remission durations of 522 and 264 days, respectively.

In 4 cats, PR between 23 and 63 days (median, 23 days) was attained.

Survival

Overall survival in the 23 cats was 242 days (range, 38–2,520 days). In the 17 cats that achieved CR, median survival duration was 296 days (range, 50–2,520 days, Fig. 2).

### Table 3. Anatomical form, remission status, and remission and survival duration in 23 cats with lymphoma treated with long-term combination chemotherapy.

<table>
<thead>
<tr>
<th>Anatomical Form</th>
<th>Clinical Stage</th>
<th>Remission Status</th>
<th>Remission Duration (days)</th>
<th>Survival Duration (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mediastinal</td>
<td>n = 4</td>
<td>1: n = 3</td>
<td>CR: n = 4</td>
<td>141–2485</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2: n = 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>n = 5</td>
<td>2: n = 1</td>
<td>CR: n = 2</td>
<td>52–66 (CR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3: n = 3</td>
<td>PR: n = 2</td>
<td>23, 63 (PR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4: n = 1</td>
<td>NR: n = 1</td>
<td></td>
</tr>
<tr>
<td>Multicentric</td>
<td>n = 1</td>
<td>4</td>
<td>PR</td>
<td>23</td>
</tr>
<tr>
<td>Extranodal (renal)</td>
<td>n = 5</td>
<td>3: n = 5</td>
<td>CR: n = 4</td>
<td>45–2038 (CR)</td>
</tr>
<tr>
<td>Extranodal (nasal)</td>
<td>n = 2</td>
<td>1: n = 1</td>
<td>CR: n = 2</td>
<td>187, 908</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2: n = 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extranodal (muscle,</td>
<td>n = 2</td>
<td>1: n = 1</td>
<td>CR: n = 2</td>
<td>257, 2406</td>
</tr>
<tr>
<td>subcutaneous tissue)</td>
<td></td>
<td>2: n = 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extranodal (CNS)</td>
<td>n = 1</td>
<td>5</td>
<td>NR</td>
<td>0</td>
</tr>
<tr>
<td>Extranodal (retrobulbar)</td>
<td>n = 1</td>
<td>1</td>
<td>CR</td>
<td>556</td>
</tr>
<tr>
<td>Extranodal (larynx, pharynx)</td>
<td>n = 2</td>
<td>2: n = 2</td>
<td>CR: n = 2</td>
<td>225, 264</td>
</tr>
</tbody>
</table>

CR, complete remission; PR, partial remission; NR, no response; CNS, central nervous system.

![Fig 1. Kaplan-Meier curve depicting complete remission (CR) time of cats with lymphoma treated with a combination chemotherapy protocol (n = 17; median remission, 264 days [range, 45–2,485 days]; 6-month, 1- and 2-5-, and 6-year remission rates: 75, 50, 34, and 23%, respectively). Vertical bars represent cats censored at analysis.](image1)

![Fig 2. Kaplan-Meier curve depicting survival time of cats with lymphoma reaching complete remission (CR) treated with a combination chemotherapy protocol (n = 17; median survival, 296 days [range, 50–2,520 days]; 6-month, 1-, 2-, 3-5-, and 6-year survival rates: 82, 47, 34, 27, and 18%, respectively). Vertical bars represent cats censored at analysis.](image2)
In the multivariate Cox regression analysis, none of the analyzed patient variables had a significant influence on survival duration in the 17 cats that achieved CR (Table 2).

Survival times of those cats that reached PR only (n = 4) ranged from 38 to 120 days (median, 47 days).

**Treatment Duration**

Despite a planned long-term chemotherapy treatment, median treatment time in all 23 cats was 71 days (range, 21–1,570 days). In the CR patients (n = 17) median treatment time was 128 days (range, 21–1,570 days). Of cats that achieved CR, initial treatment was discontinued because of lymphoma relapse in 8 cats. In the remaining 9 cats, chemotherapy was discontinued according to owners’ wish during CR. In these 9 cats, median treatment duration was 156 days (range, 21–1,570 days) with 5 (56%) and 6 (67%) cats receiving fewer than 6 and 8 months of treatment, respectively. Median CR duration after treatment discontinuation was 503 days (range, 76–1,597 days) in these 9 cats.

**Toxicosis**

In general, toxicity was mostly low grade and infrequent, resulting in satisfactory tolerability of the chemotherapy regimen (Table 4).

The number of neutropenic episodes for each cat during treatment ranged from 0 to 6 (median, 1). Nine cats (39%) had no neutropenic episodes. Thirty-two neutropenic episodes were documented. Neutropenia was grade 1 in 59% (n = 19), grade 2 in 16% (n = 5), grade 3 in 25% (n = 8), and grade 4 in none of the cats. Six (20%) neutropenic episodes occurred after induction treatment with vincristine and L-asparaginase. The distribution of the remaining episodes of gastrointestinal toxicosis were after treatment with vincristine: 15 (38%), doxorubicin: 8 (21%), cyclophosphamide: 6 (15%), and methotrexate: 3 (8%). Of the 39 gastrointestinal episodes, 36 (92%) were grade 1; 1 (3%) was grade 2 (after vincristine administration); and 2 (5%) were grade 3 (after vincristine and after doxorubicin administration). No grade 4 gastrointestinal toxicosis occurred.

**Discussion**

The clinical features of these 23 cats with lymphoma were comparable to those described in other reports. The bimodal age distribution of cats with mediastinal lymphoma has been reported previously. None of the cats with mediastinal lymphoma was FeLV positive and the reason for development of mediastinal lymphoma in these young cats remains unclear, similar to what was described in a previous study. That no cat was FeLV positive supports the changing epidemiology of this viral disease. One third of the cats in the present study were FIV positive, a higher frequency than observed in previous studies. An association between FIV and development of lymphoma has been shown, with FIV-positive cats exhibiting an approximately 5-fold increased risk. Interestingly, the majority of FIV-positive cats in the present study had extranodal forms of lymphoma, supporting previous findings in naturally and experimentally infected cats that developed lymphoma in unusual extranodal locations.

In comparison with the literature, the cats of the present study had similar rates and durations of CR and survival. The observed CR rate of 74% is comparable to what has previously been reported using the cyclophosphamid, vincristine, and prednisolon (COP) protocol with reported CR rates ranging between 47 and 79% as well as studies using multiagent regimens with CR rates ranging between 17 and 80%. The observed duration of CR of 264 days also is comparable to what has been reported in other studies in which CR times of 112–281 days were observed. However, this outcome is exceeded by the treatment results

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**Table 4.** Toxicosis in 23 cats with lymphoma receiving long-term combination chemotherapy.

<table>
<thead>
<tr>
<th>Toxicosis</th>
<th>Total Number in 23 Cats</th>
<th>Median Number per Cat (range)</th>
<th>Grade</th>
<th>Number (n) of Episodes of Toxicosis after Treatment with</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Asp/Vinc</td>
</tr>
<tr>
<td>Neutropenia</td>
<td>32</td>
<td>1 (0–6)</td>
<td>1: n = 19</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2: n = 5</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3: n = 8</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4: n = 0</td>
<td>6</td>
</tr>
<tr>
<td>Gastrointestinal toxicosis</td>
<td>39</td>
<td>2 (0–6)</td>
<td>1: n = 36</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2: n = 1</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3: n = 2</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4: n = 0</td>
<td>7</td>
</tr>
</tbody>
</table>

Asp, L-asparaginase; Vinc, vincristine; Doxo, doxorubicin; Ctx, cyclophosphamide; Mtx, methotrexate.
Recently reported by Milner et al.\textsuperscript{15} where median duration of CR was 654 days.

The remission and survival rates over time in this study indicate that a subset of approximately one third of cats experienced long-term CR and survival of several years’ duration. This outcome supports findings in previous studies in which a comparable subset of cats also experienced similar long-term treatment success.\textsuperscript{10,12,14} Consequently, cats that maintain remission beyond a threshold of 1–2 years may experience even more long-term survival.\textsuperscript{10,12,14}

In this study, anatomical location was the only variable that significantly influenced duration of CR. Anatomical site has previously been shown to influence treatment outcome.\textsuperscript{5,14} The results of this study, however, must be interpreted with caution because the number of patients included was small. The poor outcome in cats with gastrointestinal lymphomas may not be representative and may have influenced the statistical difference in comparison with the mediastinal and extranodal forms. On the other hand, gastrointestinal lymphoma has previously been described to have unsatisfactory treatment results, which is supported by the present findings.\textsuperscript{14,13} Possible reasons for poor survival outcome of these lymphoma types may include their immunophenotype distribution or Pgp expression patterns. These variables, however, were not investigated in the present study.\textsuperscript{5,12}

Mediastinal and extranodal forms of lymphoma have also been reported to carry a poorer prognosis.\textsuperscript{5,14,21} In this study, cats with these types of lymphoma nevertheless experienced good treatment outcome with median CR duration of 522 and 264 days for mediastinal and extranodal lymphoma, respectively. These results corroborate previous findings, in which cats with these types of lymphoma also attained more durable remissions and survival.\textsuperscript{5,14} In this context, the FeLV status of cats with mediastinal lymphoma may be important because previous studies have also indicated that FeLV-negative cats with mediastinal lymphoma do exhibit durable remissions and survival.\textsuperscript{12,14}

In previous studies, response to treatment was a strong prognostic indicator of treatment outcome. Cats that achieved CR fared markedly better than those that attained only PR.\textsuperscript{10,14,15} Response to therapy, however, cannot be assessed before treatment is started, limiting its value as a true prognostic variable. Therefore, this feature was not included in the analysis of prognostic variables in the present study. In contrast to the situation in the dog, T-cell immunophenotype has not been identified as a clear negative prognostic factor in feline lymphoma, with 1 study even indicating a favorable influence of T-cell positivity on treatment outcome.\textsuperscript{12} Immunophenotyping unfortunately was not performed in this study, but should be considered in future clinical trials. Other patient variables such as clinical stage, duration of clinical signs before diagnosis, and breed have been shown to have prognostic value in previous studies.\textsuperscript{5,11,14} Similar effects could not be confirmed in this study. The low number of cats in the present study may have resulted in a lack of power to detect a significant difference.

The small number of cats evaluated was a major limiting factor in the present study. The cats in the present study may not be representative of the feline lymphoma population in general, limiting the applicability of the results of this study. Therefore, the results of this clinical study apply only to the studied population. The validity of a clinical trial is subject to limitations based on a number of factors such as selection bias and population differences.\textsuperscript{29,30} In veterinary trials, factors that contribute to reductions of validity include patient characteristics (age- or breed-related differences, FIV–/FeLV status), referral bias, or client factors such as financial considerations influencing the decision for or against treatment. These limitations therefore can be taken into account when interpreting patient characteristics such as FeLV/FIV status, sex distribution, and anatomical sites of disease as well as treatment results.

Toxicosis associated with this multiagent chemotherapy regimen was mild. Most cats experienced only low-grade hematologic and gastrointestinal toxicoses. Approximately half of the recorded episodes of neutropenia and gastrointestinal toxicosis were associated with the administration of vincristine, either in conjunction with L-asparaginase or alone. Hematologic and gastrointestinal toxicosis associated with vincristine has to our knowledge not been well described in the cat, although Moore et al.\textsuperscript{9} also reported on anorexia and vomiting occurring after vincristine administrations. On the other hand, vincristine was also the most frequently administered drug in this protocol. In general, information on the frequency and severity of complications associated with combination chemotherapy in cats with lymphoma is limited. However, especially gastrointestinal complications have been described to occur.\textsuperscript{9,8,13} A limitation of the present study was that gastrointestinal toxicosis was not graded according to the recently developed Veterinary Co-Operative Group Guidelines\textsuperscript{33} because this classification scheme had not been developed at the time the present study was designed. Therefore, comparison with other studies reporting gastrointestinal toxicosis cannot be made because scoring systems may differ among clinical trials.

Despite an intended total treatment time of 122 weeks, the actual treatment time in the presented population of cats was much shorter. This result was in part caused by treatment discontinuations as a consequence of patients not achieving CR. However, even in the CR cats, median treatment duration was only 128 days. In addition, in a subset of 9 cats with CR, treatment was discontinued at the owners’ own requests after a median treatment time of 156 days, with 56 and 67% of these cats being treated for < 6 and 8 months, respectively. These cats, however, did not relapse shortly after chemotherapy was stopped but experienced long-term CR for a median duration of more than 500 days after discontinuation of treatment. Therefore, results of this study indicate that, in cats experiencing CR after induction treatment, long-term chemotherapy may not be necessary to sustain this remission and discontinuation of treatment possibly could result in an outcome similar to that achieved with long-term chemotherapy regimens. Therefore, results of the
present study suggest that continuation of long-term chemotherapy may not be necessary to sustain remission in some cats. Whether or not short-term or continuous chemotherapy protocols are optimal for management of cats with lymphoma is beyond the scope of the present study. The lack of a control group was a limitation of the present study and prevents comparing the efficacy of short-term to long-term protocols. Therefore, future comparative trials are necessary to verify the observations made in the present study, to clarify the relative value of short-term regimens in cats with lymphoma as compared with established long-term regimens.

Footnotes

1. FeLV Antigen/FIV Antibody Test Kit, Idexx Laboratories, Westbrook, ME
2. Asparaginase (Asparaginase 5000, -10 000Medac), Medac, Hamburg, Germany
3. Vincristine sulfate (Vincristinsulfat Hexal), Hexal, Holzkirchen, Germany
4. Cyclophosphamide (Endoxan), Baxter Oncology, Frankfurt/Main, Germany
5. Doxorubicin-HCl (Adrimedac), Medac
6. Methotrexate (Methotrexate 50 injectable solution), Medac
7. Prednisolone (Prednisolon-ratiopharm), Ratiopharm, Ulm, Germany
8. Dexamethasone (Dexamethason), CP Pharma, Burgdorf, Germany
9. SPSS 14, SPSS Inc, Chicago, IL

References