



Feline Health Topics

for veterinarians

Summer 1995

Volume 10, Number 3

The Utility of Intraoperative Cytology

Kenita S. Rogers, D.V.M., M.S.

Cytology is a practical clinical technique which may serve as a valuable intraoperative diagnostic tool for the surgical oncologist. Although it does not replace histologic evaluation, cytology can provide immediate answers to several questions commonly asked by the surgeon in the intraoperative setting including:

- ❖ *Is this mass neoplastic or inflammatory/infectious in origin?*
- ❖ *Is there evidence of metastatic disease such that cure cannot be accomplished by local resection alone?*
- ❖ *Does this surgical biopsy contain representative neoplastic cells?*
- ❖ *Is surgical resection complete with the margins free of tumor?*

If answers to these questions are available during the surgical procedure, decisions about the direction of treatment can be made with a better understanding of the likelihood of cure, local recur-

rence, or systemic spread. Frozen section histopathology has been shown to provide valuable information in the intraoperative setting, but has extremely limited availability in veterinary medicine.

The primary advantage of cytology is the immediacy of its application; this makes it particularly valuable in the intraoperative setting when the extent of surgery or the need for adjunctive treatment may be altered by the information provided. However, the effectiveness and accuracy of this diagnostic technique depends both on the quality of the sample obtained and on the skill and experience of the cytologist. The ability of the cytologist is critical; while cytology is a very accurate tool in experienced hands, the cytologist must know when the specimen does not provide sufficient information to add to the decision-making process. The disadvantages of cytology in the intraoperative setting include the need to carefully select a representative area for cellular collection (also true of histopathology), the difficulty of distinguishing well-differentiated malignancies from benign processes, the difficulty in making a specific diagnosis (e.g., malignant spindle cell tumor vs. fibrosarcoma), and the possibility that focal metastatic lesions in lymph nodes and parenchymal organs may be overlooked due to the small sample size.

Differentiating Inflammation and Neoplasia
Although distinguishing inflammation and neoplasia would seem to be a relatively simple task, there are two particular circumstances that can cause confu-

Inside this issue ...

Intraoperative Cytology	page 1
Research Briefs	page 4
Subject Index	page 6

sion to the inexperienced cytologist. First, inflammation is often present as a consequence of neoplasia. Tumors can develop necrotic centers as they outgrow their blood supply; this is especially common in malignant fibrous histiocytomas and bronchogenic carcinomas, but may be seen with any large, rapidly growing tumor. Many oral and cutaneous tumors have superficial inflammation associated with ulceration on their surface. If the cytologic specimen is collected from these areas rather than sites more representative of the neoplastic process, inflammation rather than neoplasia will be diagnosed. A second source of confusion accompanies the varied morphologic forms displayed by certain inflammatory cells, particularly reactive macrophages and fibroblasts, which can have bizarre alterations in appearance and mimic neoplasia.

Cytology of Neoplasia

Three basic categories of neoplasia that can be cytologically distinguished are epithelial, mesenchymal, and round cell tumors. Epithelial tumors exfoliate in clusters with cell-to-cell adherence. These tumors generally exfoliate well and their distinct cytoplas-

mic borders are round to polyhedral. Mesenchymal tumors tend to exfoliate poorly and individually rather than in clusters. Mesenchymal tumors can assume a variety of shapes because their cytoplasm is not confined within definite borders. Round or discrete cell tumors exfoliate individually and tend to yield large numbers of cells on aspiration or imprinting; their cytoplasmic borders are round and distinct.

Cytologic characteristics of malignancy represent cellular changes typical of anaplasia or dedifferentiation. These may include the following:

1. Variation in the size and shape of nuclei.
2. Multinucleation and indentation of nuclei. Multinucleation may also occur in certain normal cells (macrophages, mesothelial cells, inflammatory giant cells, osteoclasts, hepatocytes, transitional epithelium, and germinal tissues).
3. Enlargement of the nucleus. Cells with nuclei larger than 10μ in diameter are suspected to be malignant.
4. Increase in the number and size of nucleoli. A nucleolus greater than 5μ in diameter strongly suggests malignancy.
5. Abnormal or frequent mitoses.
6. Increase in the nuclear:cytoplasmic ratio. This is usually due to enlargement of the nucleus.
7. Increased basophilia of the cytoplasm. This characteristic implies increased RNA content of the cell and suggests rapid cell growth.

For the cytologist to be convinced of malignancy, there should be at least three and preferably four characteristics of malignancy. Many cytologic preparations contain numerous characteristics, making a diagnosis of malignancy straightforward. However, it must be remembered that cells from a reactive or dysplastic process can appear abnormal particularly when secondary to inflammatory or infectious processes. In the presence of inflammation or infection,

Feline Health Topics

A publication for veterinary professionals

The ultimate purpose of the Cornell Feline Health Center is to improve the health of cats everywhere, by developing methods to prevent or cure feline diseases, and by providing continuing education to veterinarians and cat owners. All contributions are tax-deductible.

Director: Fred W. Scott, D.V.M., Ph.D

Assistant Director: James R. Richards, D.V.M.

Editor: June E. Tuttle

Secretaries: Gwen Frost

Marsha J. Leonard

Sheryl A. Thomas

©1995 by Cornell University on behalf of the Cornell Feline Health Center, College of Veterinary Medicine, Ithaca, NY 14853. Phone: (607) 253-3414 Fax: (607) 253-3419 All rights reserved. Permission to reprint selected portions must be obtained in writing. Cornell University is an equal opportunity, affirmative action educator and employer.

Printed on recycled paper.



a follow-up cytologic preparation should be performed after the disease process has been cleared. Continued cellular abnormalities warrant a surgical biopsy.

Another difficult area for definitive cytologic diagnosis is well-differentiated malignancy. There may be less than three characteristics of malignancy, making a definitive cytologic diagnosis impossible; however, these cells may show tissue invasion and architectural changes on histopathologic examination that are not apparent with cytology. An important cytologic principle is that a tissue with many malignant characteristics can be diagnosed as malignant, but a tissue with few cytologic changes cannot be assumed to be benign. "Benign" is a histologic, not a cytologic diagnosis.

Evaluating for Metastatic Disease

One of the most important roles of intraoperative cytology is detection of metastasis, as this may alter the aggressiveness of the surgical procedure. In some instances, intraoperative diagnosis of malignancy or metastasis may influence the decision for immediate euthanasia. Tumors that are likely to spread first to lymph nodes include carcinomas, mast cell tumor, malignant melanoma, and transmissible venereal tumor. Lymphoma is a neoplasm that arises in many nodes simultaneously. Metastases from tumors that spread hematogenously, including many sarcomas, will usually be found in the first large capillary bed in the circulatory drainage pattern. If the tumor is drained by the portal vein, liver and spleen are likely sites of metastasis. If the tumor is drained by the vena cava, the lungs are likely to be the first site of spread.

Diagnosis of lymph node metastasis is based upon identification of neoplastic cells that should not be found within the lymphoid cell population. Because of the small and random sample size obtained with cytology, a positive finding of metastasis is useful, but a negative result does not completely rule out tumor spread. Scan the slide first on low power and evaluate several slides if possible. Metastatic cells, particularly those from carcinomas, usually are

easily identified within the node if present in sufficient numbers due to their large size compared to the normal small lymphocyte. They are generally pleomorphic in appearance, and may show bizarre cytologic characteristics. Their mere presence in the node is the ultimate cytologic characteristic of malignancy.

Representative Surgical Biopsies and Evaluating Surgical Margins

An important use of cytology is to ensure that a representative surgical biopsy was obtained. The biopsy can be aspirated, imprinted, or scraped in order to make a cytologic preparation. If it is not apparent that the biopsy has come from a representative area, additional samples should be collected. It is important to prepare the cytologic specimen prior to placing the biopsy in formalin because contact with fixative destroys the quality of the preparation.

A similar procedure can be helpful in evaluating margins of a surgically resected tissue. Cytologic examination of such tissue is inferior to histologic evaluation in determining whether neoplastic cells are present, but is preferable to judgments made by gross inspection alone. There are a limited number of circumstances where this technique will be valuable. Oral neoplasia has a tendency to spread down the "path of least resistance." For mandibulectomy and maxillectomy procedures, the bone marrow cavity may be involved in advance of radiographically visible bone lysis. Borders of resected bone should be scraped and examined prior to definitive closure. Tumors such as mast cell tumors can be very deceptive in their gross appearance, with borders extending much further than is apparent from palpation. After removal, the edges of the tissue should be imprinted or scraped to determine if neoplastic cells can be identified. If tumor cells are present, wider surgical resection should be attempted. ■

Reprinted with permission from "Veterinary Cancer Society Newsletter", fall 1994. The Veterinary Cancer Society was formed in 1974.

Research Briefs

Virucidal Efficacy of the Newer Quaternary Ammonium Compounds

(Authors: M.A. Kennedy, V.S. Mellon, G. Caldwell, L.N.D. Potgieter)—The virucidal activity of several disinfectants containing newer generation quaternary ammonium compounds (QACs) as their active ingredients was evaluated. Disinfectants were used at the manufacturers' recommended dilutions with isolates of feline herpesvirus, feline calicivirus, and canine parvovirus, and a contact time of 10 minutes at room temperature. Detoxification of virus/disinfectant solutions was done by dialysis prior to virus assay in cell cultures.

Two of four disinfectants completely inactivated feline herpesvirus, and two significantly reduced the titer of this virus. None of the disinfectants that were tested completely inactivated feline calicivirus. Canine parvovirus was not inactivated significantly by any of the QAC disinfectants. Sodium hypochlorite completely inactivated all viruses.—(Resource: *J Am Anim Hosp Assoc* 31:254-260, 1995)

Priapism in Seven Cats

(Authors: D.A. Gunn-Moore, P.J. Brown, P.E. Holt, T.J. Gruffydd-Jones)—Priapism (persistent and painful erection) is an uncommon disorder in cats and dogs. This report describes the clinical and pathological features of seven cases of priapism in cats. Six of the cases were Siamese cats, and in four of them the priapism developed after attempted mating with an estrus female, despite three of them having been neutered. Five cats were treated by perineal urethrotomy, which was successful in four. In five of the six amputated specimens, thrombois of the corpus cavernosum was evident.—(Resource: *J Small Anim Pract* 36:262-266, 1995)

Cat Shedding of Fel d I Is Not Reduced by Washings, Allerpet-C Spray, or Acepromazine

(Authors: C.V. Klucka, D.R. Ownby, J. Green, E. Zoratti)—Researchers compared the effects of cat washing, Allerpet-C spray, and acepromazine with that of no treatment on the shedding of the primary cat allergen, *Felis domesticus* I (Fel d I) by cats. In a blinded, comparative, controlled study, amounts of Fel d I were measured during an 8-week treatment period with a sample of 24 female cats randomly assigned to four groups; one group received weekly distilled water washings, one received weekly Allerpet-C spray applications, one received daily oral acepromazine, and one group had no treatment (control). Thirty-minute, twice-weekly air samples were collected from each cat with a laminated plastic-acrylic chamber and air sampler.

One-sample, two-sided t tests comparing baseline to final-week measurements revealed no significant change in Fel d I within each group. Furthermore, analysis of covariance revealed no significant change in Fel d I levels between groups ($p=0.72$). Since our data do not show significant reductions in Fel d I shedding as a result of any of these treatments, we cannot recommend them to patients who are allergic to cats.—(Resource: *J Allergy Clin Immunol* 95:1164-1171, 1995)

The Combination of an Antihistamine and an Omega-3/Omega-6 Fatty Acid-containing Product for the Management of Pruritic Cats

(Authors: D.W. Scott, W.H. Miller)—Chlorpheniramine maleate (2mg/cat every 12 hours orally) and a fatty acid supplement (0.5 ml/cat every 24 hours

orally) were administered in combination to 11 pruritic cats. Although none of the cats had responded to the two products when they were administered as single therapeutic agents, six of the cats (54%) had an excellent response to the combination. Adverse effects were not seen. Under the conditions of this study, the combination of antihistamine (chlorpheniramine) and the omega-3/omega-6 fatty acid-containing supplement exhibited a superior antipruritic effect to either product alone.—(*Resource: New Zealand Vet J 43:29-31, 1995*)

Other Research Articles of Interest:

Capron TM: Traumatic temporomandibular-joint luxation in a cat and treatment by condylar tethering. *Vet Comp Orthopaed Traumatol 8:66-70, 1995.*

Corcoran KA, Peiffer RL, Koch SA: Histopathologic features of feline ocular lymphosarcoma-49 cases. *Vet Comp Ophthal 5:35-41, 1995.*

Day HJ, Lucke VM: Melanocytic neoplasia in the cat. *J Small Anim Pract 36:207-213, 1995.*

Esplin DG, Campbell R: Widespread metastasis of a fibrosarcoma associated with a vaccination site in a cat. *Feline Pract 23:13-16, 1995.*

Foley RH: Feline demodicosis. *Compend Cont Educ Pract Vet 17:481, 1995.*

Ford SL: NIDDM in the cat: Treatment with the oral hypoglycemic medication, Glipizide. *Vet Clin N Amer Small Anim 25:599-615, 1995.*

Greene RT: Coccidioidomycosis in 48 cats: A retrospective study. *J Vet Intern Med. 9:86, 226, 1995.*

Hatchell DL, Toth CA, Barden CA, Saloupis P: Diabetic retinopathy in a cat. *Exp Eye Res 60:591-593, 1995.*

Ivanova M, Petrov M, Klissourska D, Mollova M: Contraceptive potential of porcine zone-pellucida in cats. *Theriogenology 43:969-981, 1995.*

Kuehn NF: Diagnostic methods for upper airway disease. *Semin Vet Med Surg Small Anim 10:70-76, 1995.*

Lutz TA, Rand JS: Pathogenesis of feline diabetes mellitus. *Vet Clin N Amer Small Anim 25:527-552, 1995.*

Plotnick AN, Greco DS: Home management of cats and dogs with diabetes-mellitus: Common questions asked by veterinarians and clients. *Vet Clin N Amer Small Anim 25:753-759, 1995.*

Schwartz S: An unusual case of acute aggression in a cat associated with serum organophosphate (Diazinon). *Feline Pract 23:13-19, 1995.*

Shell LG: Diabetic polyneuropathy. *Feline Pract 23:27, 1995.*

Shelton GH, Linenberger ML, Persik MT, Abkowitz JL: Prospective hematologic and clinicopathological study of asymptomatic cats with naturally acquired feline immunodeficiency virus-infection. *J Vet Intern Med 9:133-140, 1995.*

Theon AP, Madewell BR, Shearn VI, Moulton JE: Prognostic factors associated with radiotherapy of squamous-cell carcinoma of the nasal plane in cats. *J Amer Vet Med Assn 206:991-996, 1995.*

Whittem T: Pyrethrin and pyrethroid insecticide intoxication in cats. *Compend Cont Educ Pract Vet 17:489, 1995. ■*

Photocopies of the above articles are available by making your request via mail to the Flower-Sprecher Library, College of Veterinary Medicine, Ithaca, NY 14853; or by telephone at 607-253-3510; or by fax at 607-253-3080. There is a charge for this service. The total charged is based on the number of pages copied, New York state sales tax of 8% if applicable, and delivery method (e.g., U.S. mail, Federal Express, or fax).

Subject Index

Anesthetics/Drugs:

- A Guide to Feline Anesthesia, Spring '84
- Cats and Pharmaceuticals, Summer '84
- Synopsis of Cardiac Drugs, Vol 1(2)
- Using Organophosphates to Control Fleas, Vol 1(3)
- Side Effects of Megestrol Acetate Therapy, Vol 2(2)
- Telazol: A New Injectable Anesthetic, Vol 2(3)
- The Effects of Xylazine on Cardiac Function, Vol 2(4)
- Isoflurane: A New Inhalant Anesthetic, Vol 2(4)
- Analgesics: The Relief from Pain, Vol 5 (2)
- Drugs Useful in Feline Practice, Vol 7 (2 & 3)
- Anesthesia for the Old Cat, Vol 8 (2)
- Use of Ultralente Insulins in Cats, Vol 8 (3)
- Cisapride: New Drug to Treat Megacolon, Vol 9(2)
- Novo Nordisk Discontinues Ultralente, Vol. 9(4)

Bacterial Diseases:

- Campylobacter jejuni and Cryptosporidia: Two New Causes of Feline Diarrhea, Winter '83
- Cats and Tuberculosis, Summer '83
- Cat Scratch Disease, Fall '83
- Salmonella Implicated as Cause of Songbird Fever, Vol 3(3)
- Helicobacter and Chronic Gastric Disease, Vol. 9(4)

Behavior:

- Feline Behavioral Problems, May '81

Cardiology:

- New Cardiovascular Studies, June '82
- Feline Heartworm Disease, Summer '85
- Synopsis of Cardiac Drugs, Vol 1(2)
- Systemic Hypertension in the Cat, Vol. 10, No. 1

Client Relations:

- The Veterinarian's Role in Bereavement, Oct '82
- Memorial Program, Vol 6(3)
- Improving Relationships with Cat Breeders, Vol 7 (4)

Dentistry:

- Feline Oral & Dental Diseases, Vol 6(4)

Dermatology:

- Eosinophilic Granuloma, Vol 1(3)
- A Differential for Oral Ulcers in Cats, Vol 2(2)

Diagnostic Tests and Aids:

- ELISA for Detection of Feline Coronaviral Antibodies, Nov '81
- New Computer Program Aids in Diagnosis, Fall '83
- Diagnostic Ultrasonography, Winter '84
- Feline Diagnostic Services at Cornell, Summer '84
- Understanding Coronaviral Serology Titers, Fall '84
- New Computer Program for Veterinarians, Winter '85
- Toxoplasmosis: Interpretation of Serologic Results, Summer '85
- Heartworm Antigen Test, Vol 1(2)
- Biopsy Principles, Vol 3(1)
- Panther Study Provides New Insight into FeLV Tests, Vol 3(1)
- Synbiotics' FIP Test, Vol 6(2)
- New Diagnostic Test for Giardia, Vol 6(3)
- Surgical Techniques for Liver & Kidney Biopsies, Vol 6(3)
- FIV Tests and their Interpretation, Vol 8 (3)
- Radiology Case Review, Vol 8 (4); Vol 9 (1 & 3)

Endocrinology:

- Management of Diabetes Mellitus in the Cat, Nov '81
- Feline Hyperthyroidism, June '82
- Update on Hyperthyroidism, Vol 1(1)
- Treatment for Hyperthyroidism, Vol 1(2)

Gastroenterology:

- The Impact of Fecal Impactions, Vol 2(1)
- Inflammatory Bowel Disease, Vol. 9(2)

Genetics:

- Inherited Myopathy of Devon Rex Cats, Vol. 9(1)

Hematology:

- Anemia in Cats, Vol 5 (4) & Vol 6 (1)
- Basic Principles of Feline Blood Transfusions, Vol 1(4)

Hepatic Diseases:

- Feline Hepatic Lipidosis, Vol 4(3)

Hospital Management:

- Virucidal Disinfectants, Vol 1(3)
- Selecting the Right Suture Material, Vol 2(1)

Neurology:

Central Nervous System Disease in the Cat, Aug '81

Autonomic Polyganglionopathy, Spring '83
Peripheral Vestibular Diseases, Fall '84

Nutrition:

Guidelines to Selecting Patients for Nutritional Support, Vol 5 (3)

Oncology:

Phototherapy of Cancer, Winter '83
A Case for Chemotherapy, Spring '85
Mammary Tumors Are Third Most Common Cancer in Cats, Vol 1(4)
Effect of Radiation and Chemotherapy on Wound Healing, Vol 4(2)
Chemotherapy Safety: A Guide for Veterinarians, Vol 8 (4)

Ophthalmology:

Intraocular Inflammation in Cats, Winter '84
Complicated Ulcerative Keratitis, Vol 2(4)
Cases of Feline Central Retinal Degeneration Decline, Vol 7 (1)
Eye Alert: Iris Pigmentation, Vol. 9(3)

Parasitology:

Feline Haemobartonellosis, Summer '83
Feline Heartworm Disease, Summer '85
Feline Blood Parasites, Vol 2(3)

Pediatrics:

Clinical Evaluation of Young Kittens, Vol 8 (1)

Respiratory:

Eustachian Tube Polyps: A Cause of Chronic Respiratory Distress, Fall '83
Radiographic Evaluation of the Dyspneic Cat, Win'85
Feline Bronchial Diseases, Vol 5 (1)
Dyspnea in a Cat with Otitis, Vol 5 (3)
ICU Respiratory Therapy, Vol 6(2)
Radiology Case Review, Vol. 9(1)

Toxicology:

Ethylene Glycol Intoxication in the Cat, Oct '82
A Review of Anticoagulant Rodenticides, Vol 1(3)
Lead Poisoning in Cats, Vol 4(1,2)

Urology:

Micturition Disorders in Cats with Sacrocaudal Vertebral Injuries, Nov '81
Part I: Understanding FUS, Fall '85
Part II: Understanding FUS, Vol 1(1)
Chronic Renal Failure, Vol 3(2)
Ruptured Bladder and Peritoneal Dialysis in a Cat, Vol 3(4)

Vaccines:

Compendium of Feline Vaccines, Fall '83
Rabies Vaccination Recommended for Cats, Fall '83
Using the New FeLV Vaccine, Spring '85
Explanation of FeLV Vaccine Guidelines, Summer '85
Vaccines and Adjuvants, Vol 4(1)
Should Cats be Vaccinated for FeLV?, Vol 5 (3)
FIP Vaccination—Past and Present, Vol 6(2)
Evaluation of Primucell-FIP, Vol 7 (3)

Viral Diseases:

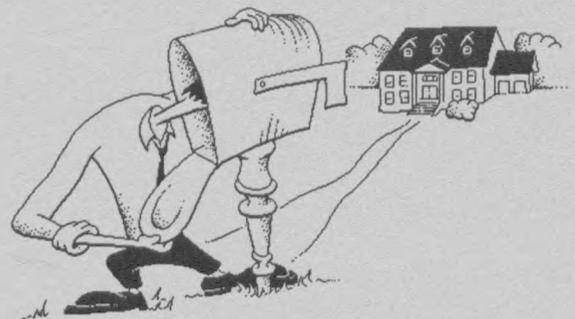
Immunopathogenesis of FIP, Feb '81
Herpesvirus Induced Atherosclerosis, Feb '81
New Insights in Gastrointestinal Viruses, Feb '81
Transmission of FeLV, May '81
Diagnosis of Virus Infections in Cats, Aug '81
Geographical Distribution of FIP, Aug '81
Feline Chronic Polyarthritis, Spring '83
Catpox Virus Infection, Summer '83
Recommendations for Prevention and Treatment of Kitten Mortality Complex, Spring '83
Understanding Coronaviral Serology Titers, Fall '84
Is Feline Leukemia Transmissible to Man?, Fall '85
Feline Immunodeficiency Virus, Vol 3(3)
The Immune Response to FIP in Cats, Vol 3(4)

Zoonoses:

Cat Scratch Disease, Fall '83
Toxoplasmosis: Interpretation of Serologic Results, Summer '85
Update on Feline Lyme Disease, Vol 5 (4)

Are You Moving?

If so, please send a "Change of Address" to our office so you can continue to receive *Feline Health Topics* with uninterrupted service.



National Veterinary Technician Week



The North American Veterinary Technician Association (NAVTA) is pleased to announce that the second annual National veterinary Technician Week will be October 15-21, 1995. The purpose of this event is to educate the public about the profession and to encourage people to pursue this as a career.

Public relations materials are available from NAVTA by writing to: NAVTA, P.O. Box 224, Battle Ground, IN 47920.



Cornell Feline Health Center
Cornell University
College of Veterinary Medicine
Ithaca, New York 14853