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We value your feedback as our referring partner in providing quality, comprehensive care for your patients and clients. We are pleased to offer our services with the convenience of two full-service hospital locations – Angell in Boston and MSPCA-Angell West in Waltham – as well as limited service clinics in Westford, MA (Angell at Nashoba), Danvers, MA (Angell at Essex), and the MSPCA-Angell clinics at Boston, Nevins Farm (Metheun, MA), and on Cape Cod (Centerville, MA).

This Referral Guide contains important information to ensure that you and your clients have a positive experience while using the services at any of our locations. We strive to offer the best in specialized veterinary care while providing the one-on-one compassion and customer service that your clients and patients deserve. Angell’s staff is committed to working with you to ensure the best overall health of your patient.

Angell remains focused on investing in three crucial areas: advanced medical equipment and technology, space renovation, and the endowment of mission-based financial aid programs to help less fortunate pet owners receive life-saving care for their animals.

Please note that Angell is open on major holidays, including Veterans Day, Columbus Day, Presidents Day, and Martin Luther King Jr. Day.

Thank you for your continued referrals to Angell Animal Medical Center. I hope you will use Angell as a resource, and I encourage you to call or email our specialists with questions when faced with a complex case, regardless of whether it is a referral.

If you have any questions, please feel free to contact me directly by phone at 617-541-5042 or via email at agreenleaf@angell.org.

Sincerely,

Ann Marie Greenleaf, DVM, DACVECC
Chief of Staff
Angell Animal Medical Center
# REFERRAL CONTACT INFORMATION

Phone numbers apply for both Boston and Waltham

<table>
<thead>
<tr>
<th>24/7 EMERGENCY &amp; CRITICAL CARE</th>
<th>BOSTON: 617-522-5011</th>
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## BOSTON AND WALTHAM

### AVIAN & EXOTIC MEDICINE
Phone: 617-989-1561  Fax: 617-989-1613
avianexotic@angell.org
angell.org/avianandexotic

### BEHAVIOR
Phone: 617-989-1520  Fax: 617-989-1627
behavior@angell.org
angell.org/behavior

### CARDIOLOGY
Phone: 617-541-5038  Fax: 617-989-1653
cardiology@angell.org
angell.org/cardiology

### DERMATOLOGY
Phone: 617-524-5733  Fax: 617-989-1613
dermatology@angell.org
angell.org/dermatology

### DIAGNOSTIC IMAGING
Phone: 617-541-5139  Fax: 617-989-1617
diagnosticimaging@angell.org
angell.org/diagnosticimaging

## BOSTON ONLY

### ANESTHESIOLOGY
Phone: 617-541-5048  Fax: 617-989-1660
anesthesia@angell.org
angell.org/anesthesia

### DENTISTRY
Phone: 617-522-7282  Fax: 617-522-4885
dentistry@angell.org
angell.org/dentistry

### NEUROLOGY
Phone: 617-541-5140  Fax: 617-989-1666
neurology@angell.org
angell.org/neurology

### INTERNAL MEDICINE & OUTPATIENT ULTRASOUND
Phone: 617-541-5186  Fax: 617-989-1657
internalmedicine@angell.org
angell.org/internalmedicine

### PHYSICAL REHABILITATION*
Phone: 781-902-8400  Fax: 781-622-1410
physicalrehab@angell.org
angell.org/rehab

### SURGERY
Phone: 617-541-5048  Fax: 617-989-1660
surgery@angell.org
angell.org/surgery

### URGENT CARE*
Phone: 781-902-8400
urgentcare@angell.org
angell.org/urgentcare

### ONCOLOGY
Phone: 617-541-5136  Fax: 617-989-1668
oncology@angell.org
angell.org/oncology

### OPHTHALMOLOGY
Phone: 617-541-5095  Fax: 617-989-1647
ophthalmology@angell.org
angell.org/eyes

### PATHOLOGY (CLINICAL & ANATOMIC)**
Phone: 617-541-5014  Fax: 617-522-7356
pathology@angell.org
angell.org/lab

* Available only in Waltham

** Service is located in Boston, but serves both Boston & Waltham
# CONTACT SHEET

**Chief of Staff:** Ann Marie Greenleaf, DVM, DACVECC  |  agreenleaf@angell.org

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## REFERRAL ASSISTANCE

<table>
<thead>
<tr>
<th>Location</th>
<th>Phone</th>
<th>Fax</th>
</tr>
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<tr>
<td>Boston</td>
<td>617-522-5011</td>
<td>617-989-1635</td>
</tr>
<tr>
<td>Waltham</td>
<td>781-902-8400</td>
<td>781-622-1410</td>
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## 24/7 EMERGENCY & CRITICAL CARE, BOSTON

[angell.org/emergency](http://angell.org/emergency)

**Phone:** 617-522-5011  |  Fax: 617-989-1633

--

Alison Allukian, DVM  
aallukian@angell.org

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jbartling@angell.org

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jbecker@angell.org

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Service Co-Director  
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kтурley@angell.org

Julia VanDerslice, DVM  
jvanderslice@angell.org

Megan Whelan, DVM, DACVECC, CVA  
Chief Medical Officer  
mwhelan@angell.org

## 24/7 EMERGENCY & CRITICAL CARE, WALTHAM - TEMPORARILY CLOSED. SEE URGENT CARE INFO BELOW.

**URGENT CARE BY APPOINTMENT ONLY, WALTHAM**

**Phone:** 781-902-8400

- Alina Ermilio, DVM  
aermilio@angell.org
- Jordana Fetto, DVM  
jfetto@angell.org
- Kimberly Freid, DVM  
kfreid@angell.org
- Mina Gergis, DVM  
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- Amanda Lohin, DVM  
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cpeek@angell.org
- Jessica Seid, DVM  
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- Catherine Sumner, DVM, DACVECC  
csumner@angell.org

## ANESTHESIOLOGY

[angell.org/anesthesia](http://angell.org/anesthesia)

**Phone:** 617-541-5048  |  Fax: 617-989-1660

- Sandra Allweiler, DVM, DACVAA  
sallweiler@angell.org
- Kate Cummings, DVM, DACVAA  
kcummingss@angell.org

## AVIAN & EXOTIC MEDICINE

**BOSTON & WALTHAM**

[angell.org/avianandexotic](http://angell.org/avianandexotic)

**Phone:** 617-989-1561  |  Fax: 617-989-1688

- Klaus Loft, DVM  
kloft@angell.org
- Meagan Painter, DVM, DACVD  
mpainter@angell.org

## BEHAVIOR

**BOSTON & WALTHAM**

[angell.org/behavior](http://angell.org/behavior)

**Phone:** 617-989-1520  |  Fax: 617-989-1627

Terri Bright, Ph.D., BCBA-D, CAAB  
tbright@angell.org

## CARDIOLOGY

**BOSTON & WALTHAM**

[angell.org/cardiology](http://angell.org/cardiology)

**Phone:** 617-541-5038  |  Fax: 617-989-1653

Katie Hogan, DVM, DACVIM  
(kardiologie@angell.org)

## DENTISTRY

[angell.org/dentistry](http://angell.org/dentistry)

**Phone:** 617-522-7282  |  Fax: 617-522-4885

Alice Ekerdt Goodman, DVM, DAVDC  
aeckerdt@angell.org

## DERMATOLOGY

**BOSTON & WALTHAM**

[angell.org/dermatology](http://angell.org/dermatology)

**Phone:** 617-989-1516  |  Fax: 617-989-1668

Brendan Noonan, DVM, DABVP  
bnoonan@angell.org

Elisabeth Simone-Freilicher  
DVM, DABVP (Avian Practice)  
esimonefreilicher@angell.org

## PATIENTS & VETERINARIANS

**Phone:** 617-522-7282  |  Fax: 617-522-4885

- Patrick Sullivan, DVM, DABVP  
  (Avian Practice)  
  Boston & Waltham  
p.sullivan@angell.org
- Sandra Allweiler, DVM, DACVAA  
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- Virginia Sinnott-Stutzman  
  DVM, DACVECC  
vcsinnottstutzman@angell.org
- Brendan Noonan, DVM, DABVP  
bnoonan@angell.org
- Elisabeth Simone-Freilicher  
  DVM, DABVP (Avian Practice)  
esimonefreilicher@angell.org

---

**Waltham**

**Phone:** 781-902-8400  |  Fax: 781-622-1410

- Mina Gergis, DVM  
mgergis@angell.org
- Ashley Lockwood, DVM, DACVECC  
acockwood@angell.org
- Amanda Lohin, DVM  
alohin@angell.org
- Courtney Peck, DVM, DACVECC  
cpeek@angell.org
- Jessica Seid, DVM  
jseid@angell.org
- Catherine Sumner, DVM, DACVECC  
csumner@angell.org

## ANESTHESIOLOGY

[angell.org/anesthesia](http://angell.org/anesthesia)

**Phone:** 617-541-5048  |  Fax: 617-989-1660

- Sandra Allweiler, DVM, DACVAA  
sallweiler@angell.org
- Kate Cummings, DVM, DACVAA  
kcummingss@angell.org

## AVIAN & EXOTIC MEDICINE

**BOSTON & WALTHAM**

[angell.org/avianandexotic](http://angell.org/avianandexotic)

**Phone:** 617-989-1561  |  Fax: 617-989-1688

- Klaus Loft, DVM  
kloft@angell.org
- Meagan Painter, DVM, DACVD  
mpainter@angell.org

## BEHAVIOR

**BOSTON & WALTHAM**

[angell.org/behavior](http://angell.org/behavior)

**Phone:** 617-989-1520  |  Fax: 617-989-1627

- Terri Bright, Ph.D., BCBA-D, CAAB  
tbright@angell.org

## CARDIOLOGY

**BOSTON & WALTHAM**

[angell.org/cardiology](http://angell.org/cardiology)

**Phone:** 617-541-5038  |  Fax: 617-989-1653

- Katie Hogan, DVM, DACVIM  
  (Cardiology)  
  Boston & Waltham  
hokhan@angell.org
- Michelle Oranges, DVM  
moranges@angell.org
- Elizabeth Wiley, DVM  
ewiley@angell.org

## DENTISTRY

[angell.org/dentistry](http://angell.org/dentistry)

**Phone:** 617-572-7282  |  Fax: 617-522-4885

- Alice Ekerdt Goodman, DVM, DAVDC  
aeckerdt@angell.org
- Jessica Riehl, DVM, DAVDC  
jrieihl@angell.org
- Joyce Tai, DVM, MS  
ji@angell.org

## DERMATOLOGY

**BOSTON & WALTHAM**

[angell.org/dermatology](http://angell.org/dermatology)

**Phone:** 617-524-5733  |  Fax: 617-989-1613

- Klaus Loft, DVM  
kloft@angell.org
- Meagan Painter, DVM, DACVD  
mpainter@angell.org

## REFERENCES

- Virginia Sinnott-Stutzman  
  DVM, DACVECC  
vcsinnottstutzman@angell.org
- Brendan Noonan, DVM, DABVP  
bnoonan@angell.org
- Elisabeth Simone-Freilicher  
  DVM, DABVP (Avian Practice)  
esimonefreilicher@angell.org

---

**Chief of Staff:** Ann Marie Greenleaf, DVM, DACVECC  |  agreenleaf@angell.org

**Waltham**

**Phone:** 781-902-8400  |  Fax: 781-622-1410

- Mina Gergis, DVM  
mgergis@angell.org
- Ashley Lockwood, DVM, DACVECC  
acockwood@angell.org
- Amanda Lohin, DVM  
alohin@angell.org
- Courtney Peck, DVM, DACVECC  
cpeek@angell.org
- Jessica Seid, DVM  
jseid@angell.org
- Catherine Sumner, DVM, DACVECC  
csumner@angell.org

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**Contact:** angell.org/contact

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**Clinic:** angell.org/clinics

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**Care Guide:** angell.org/careguide

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**Pet Finder:** angell.org/petfinder

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**Find a Vet:** angell.org/findavet

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**Donate:** angell.org/donate

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**Volunteer:** angell.org/volunteer

---

**Jobs:** angell.org/jobs

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**About Us:** angell.org/aboutus
## APPOINTMENT TIMES

**AVIAN & EXOTIC MEDICINE**
617-989-1561 angell.org/avianandexotic

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>Mon</td>
<td>10am–3pm</td>
<td>(Waltham 9am–3:20pm)</td>
</tr>
<tr>
<td>Tues</td>
<td>10am–3pm</td>
<td>(Waltham 10am–12pm)</td>
</tr>
<tr>
<td>Wed</td>
<td>10am–2pm</td>
<td>(Waltham 9am–10:15pm)</td>
</tr>
<tr>
<td>Thurs</td>
<td>1pm–2pm</td>
<td>(Waltham 9am–10:15pm)</td>
</tr>
<tr>
<td>Fri</td>
<td>1pm–2pm</td>
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<tr>
<td>Sat</td>
<td>1pm–2pm</td>
<td></td>
</tr>
<tr>
<td>Sun</td>
<td>10am–3pm</td>
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**BEHAVIOR (ONE-HOUR APPOINTMENTS)**
617-989-1520 angell.org/behavior

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>Mon</td>
<td>11am</td>
<td></td>
</tr>
<tr>
<td>Tues</td>
<td>10am, 12pm</td>
<td>(Waltham 10am, 12pm)</td>
</tr>
<tr>
<td>Wed</td>
<td>11am, 1pm, 2:30pm, 4pm</td>
<td>(Waltham 10am, 12pm)</td>
</tr>
<tr>
<td>Thurs</td>
<td>9:30am, 11:30am, 2:30pm, 4pm, 5:30pm</td>
<td></td>
</tr>
<tr>
<td>Fri</td>
<td>11am</td>
<td></td>
</tr>
</tbody>
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**CARDIOLOGY**
617-541-5038 angell.org/cardiology

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Mon</td>
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<td>Tues</td>
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<tr>
<td>Fri</td>
<td>9am–12pm</td>
<td></td>
</tr>
<tr>
<td>Sat</td>
<td>9am–3pm</td>
<td></td>
</tr>
</tbody>
</table>

**DERMATOLOGY**
617-524-5733 angell.org/dermatology

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon</td>
<td>7:30am–4:30pm</td>
<td>(Waltham, every other Mon, 7:30am–10:15am; 1pm–1:45pm)</td>
</tr>
<tr>
<td>Tues</td>
<td>8am–4:30pm</td>
<td>(Waltham, 7:30am–10:15am; 1pm–1:45pm)</td>
</tr>
<tr>
<td>Wed</td>
<td>7:30am–4pm</td>
<td>(Waltham, 7:30am–10:15am; 1pm–1:45pm)</td>
</tr>
<tr>
<td>Thurs</td>
<td>7:30am–4pm</td>
<td>(Waltham, 7:30am–10:15am; 1pm–1:45pm)</td>
</tr>
<tr>
<td>Fri</td>
<td>7:30am–4pm</td>
<td></td>
</tr>
</tbody>
</table>

**DENTISTRY**
617-522-7282 angell.org/dentistry

Surgery can be scheduled Monday–Friday. Consultations are available Tuesdays and Thursdays, 8am–4pm

**DERMATOLOGY AT WALTHAM**

**OPHTHALMOLOGY**
617-541-5095 angell.org/eyes

Appointments available Monday–Friday from 8am–5pm with extended service hours on select Mondays and Thursdays

**OUTPATIENT ULTRASOUND**
617-541-5139 angell.org/ultrasound

Outpatient ultrasound available every day Monday–Friday as well as every other Saturday and Sunday.

Appointments are available during daytime and evening hours.

**PHYSICAL REHABILITATION**

**SURGERY**
617-541-5048 angell.org/surgery

**ANGELL AT ESSEX**
978-304-4648 angell.org/essex

Mon–Fri 7:45am–4pm

**ANGELL AT NASHOBA**
978-577-5992 angell.org/nashoba

Mon–Fri 7:45am–4pm

**ADDITIONAL CONTACT INFORMATION**

**Anesthesiology**
617-541-5048

**Emergency**

Referrals – 617-522-5011
Boston – 617-522-7282
Waltham – 781-902-8400

**Pathology (Anatomic & Clinical)**
617-541-5014

**Pharmacy**
617-524-5700
REFERRAL FORM

TODAY’S DATE: ________________  □ BOSTON  □ WALTHAM

REFERRING VETERINARIAN INFORMATION
Veterinarian’s Name: ____________________________  Clinic: ____________________________
Address: __________________________________________
Phone: ____________________________  Fax: ____________________________
Angell Service to which you are referring: ____________________________

Would you like us to call your client to schedule an appointment?  □ Yes  □ No
Should we advise your client to seek the first available appointment, or are you referring to a specific doctor?
□ First available   □ Ask client for their preference   □ Specific Dr. ____________________________

CLIENT INFORMATION
Client’s Name: ____________________________  Phone(s): ____________________________
Address: __________________________________________

PATIENT INFORMATION
Pet’s Name: ____________________________  Breed: ____________________________  Sex: __________
Date of Birth: ____________________________  Weight: ____________________________

MEDICAL HISTORY
For what problem is the patient specifically being referred to Angell? ____________________________

Client Concerns/Chief Complaint: ____________________________
Pertinent Medical History: ____________________________
Recent Vaccine History: ____________________________
Current Treatment/Medications: ____________________________
Additional Comments/Concerns: ____________________________

Online referral submission available at angell.org/referrals
TODAY’S DATE: _______________

REFERRING VETERINARIAN INFORMATION

Veterinarian’s Name: ___________________________ Clinic: ___________________________
Address: ___________________________________________________________________________
Phone: ___________________________ Fax: ___________________________
Email (if you would like this to be a method for contacting you): ___________________________

CLIENT INFORMATION

Client’s Name: ___________________________ Phone(s): ___________________________
Address: ___________________________________________________________________________

PATIENT INFORMATION

Pet’s Name: ___________________________ Breed: ___________________________ Sex: __________
Date of Birth: ___________________________ Weight: ___________________________
Reason for Referral: __________________________________________________________________
Summary of Dermatologic History: __________________________________________________________________

________________________________________
________________________________________
________________________________________
________________________________________

Current Medications: __________________________________________________________________
Other Medical or Surgical Problems: __________________________________________________________________

In case a diet change is required, which dermatologic prescription diets does your clinic carry? __________

________________________________________

Please fax the medical history and lab work for your patient at least 24 hours prior to your patient’s appointment with the Angell Dermatology Service. A visit summary will be faxed to your clinic within 24-48 hours of your patient’s appointment.

If this is a referral of chronic pruritus for Intradermal Allergy Testing, please discontinue antihistamines for two weeks and oral glucocorticoids for four weeks prior to the appointment. A full listing of recommended drug withdrawal times prior to intradermal allergy testing can be found at angell.org/dermatology.

If this is a referral of chronic ear disease to the Angell Ear Clinic, topical or systemic glucocorticoid administration prior to the appointment may help minimize otic swelling during otoscopic exam. We ask that no ear medications or cleaners be used during the 24 hours prior to an Ear Clinic appointment.
Please fax this referral form, laboratory results, biopsy or cytology results, and any other pertinent information to the oncology service at 617-989-1668 at least 24 hours prior to your patient’s appointment with the Angell Oncology Service. Current radiographs may be sent with the client or mailed to us prior to the appointment. They will be returned promptly.
PHYSICAL REHABILITATION SERVICE

TODAY’S DATE: ________________

REFERRING VETERINARIAN INFORMATION
Veterinarian’s Name: ___________________ Clinic: _______________________________
Address: ______________________________________________________________________
Phone: ___________________ Fax: ___________________
Email (if you would like this to be a method for contacting you): _______________________

CLIENT INFORMATION
Client’s Name: ___________________ Phone(s): ________________________________
Address: ______________________________________________________________________

PATIENT INFORMATION
Pet’s Name: ___________________ Breed: ___________________ Sex: __________
Date of Birth: ___________________ Weight: ___________________
Vaccine History: _____________________________________________________________

MEDICAL HISTORY
Pertinent Past Medical History: ________________________________________________
Diagnosis: ___________________________________________________________________
Medical/Rehabilitation Precautions: _____________________________________________
Medications: __________________________________________________________________
Diagnostic Studies/Results: ____________________________________________________
Type/Date of Surgery: __________________________________________________________

A comprehensive evaluation and appropriate treatment plan will be initiated unless more specific treatment goals are checked below.

☐ Reduce pain   ☐ Increase flexibility
☐ Improve range of motion   ☐ Facilitate neurological return
☐ Decrease swelling/inflammation   ☐ Improve conditioning and endurance
☐ Increase strength   ☐ Decrease weight
☐ Enhance function and performance   ☐ Other (please specify): ____________________________

Please fax the medical history and lab work for your patient at least 24 hours prior to your patient’s appointment with the Angell Physical Rehabilitation. A visit summary will be faxed to your clinic within 24-48 hours of your patient’s appointment.
OUTPATIENT ULTRASOUND

Waltham Phone: 781-902-8400 | Waltham Fax: 781-622-1410 | diagnosticimaging@angell.org | angell.org/ultrasound

We are pleased to share that Angell offers outpatient abdominal ultrasound exams in Waltham for stable patients. Following this information sheet outlining the service, you will find a referral form to complete before your client schedules an appointment. If you need additional forms, please visit angell.org/ultrasound or contact us at 781-902-8400, and we can send them via email or fax.

This service is available to all of our referring hospitals Monday to Sunday at Angell-West. Many of you already use the services of traveling ultrasonographers; however, they may work on a periodic schedule that does not always serve the immediate needs of your client or patient. We hope to fill that niche for you.

We would like to emphasize that this service is not designed for sick patients who need hospital admission. Those patients should be referred directly to one of our direct patient care services. However, should we discover an urgent situation at the ultrasound study (e.g., intestinal obstruction, free air, gallbladder mucocele, or suspected hemorrhagic effusion), we will consult with you and your client and expedite emergency admission if that is requested by the client.

Fine-needle aspirates are available via Internal Medicine appointments and not during outpatient abdominal ultrasounds. There will be additional charges associated with any aspiration procedure. If your examination of the pet makes you anticipate that sampling may be desired, it would be optimal if you prepared your client for that possibility in advance. Patients that require sedation should be referred to the Emergency Service or Internal Medicine Service.

We look forward to providing outpatient abdominal ultrasound service to you and your clients. Please call us with any questions or concerns. To schedule an appointment, please provide your client’s contact information on the completed form, and we will contact your client to arrange an appointment time. After submitting the form, you or your client can reach us at 781-902-8400 between 8:00am–6:00pm Monday through Friday to finalize appointment arrangements.

ANGELL IMAGE TRANSFER EXPRESS

Angell Image Transfer Express is available for both Boston and Waltham locations. Referring veterinarians can email diagnostic images for any Angell service to images@angell.org which auto-uploads images into Angell’s image central repository. This repository makes images quickly and easily retrievable by all Angell clinicians, avoids confusion over where to send images, and prevents the need to resend images when multiple specialists collaborate on a case. Please use images@angell.org to send diagnostic images of referred cases (this is not for online imaging consultations/fee-based radiograph interpretation).

SUBMISSION GUIDELINES FOR IMAGES@ANGELL.ORG

Please email images to images@angell.org and include in the email subject line (in this order):

- the PATIENT’S FIRST NAME (in all caps)
- the owner's first and last name
- a 1-3 word description of the case
- the Angell doctor's last name

EXAMPLE: “FIDO, Bob Smith, lung tumor, Talbott”
Angell offers outpatient abdominal ultrasound exams in Waltham with our internists as a service to our referring veterinarians.

GUIDELINES FOR REFERRAL

- Non-critical patients only; those in need of urgent medical, surgical, or emergency care should be referred to one of those services directly
- This service does not offer fine-needle aspirates or sedation. If either sedation or aspirates are indicated for this exam, the client should make an appointment through our Internal Medicine service at 617-541-5186 (Boston) or 781-902-8400 (Waltham).
- Please complete and fax the following form (see next page) to 617-989-1617 or submit it online at angell.org/referrals. Once we receive the form, we will contact the client to schedule an appointment. If the client prefers to call us at their convenience, please indicate this on the form. If you prefer, you may make the appointment for your client by calling 781-902-8400.

PROCEDURE DETAILS

Please discuss the following points with your client before their arrival.

- The patient should be fasted to allow for optimal evaluation of the cranial abdomen
- The patient’s abdomen will be shaved and a complete ultrasound performed
- Should the ultrasound exam results warrant urgent intervention, you should prepare the client for possible admission to the hospital via the Emergency Service at your discretion and in consultation with the client.
- Angell’s internist will communicate findings to your office via fax. You can share the report with the client at that time.
- Clients are encouraged to direct follow-up questions to you, their primary care doctor of record. The internist does not typically speak to the client after the study.
- The client will be escorted to the front desk for payment. The fee is $438. There is a registration fee of $11. Payment via credit card or cash is expected at the time of service.

- Fine-needle aspirates (FNAs) may be indicated during the exam. Please discuss this with the client in advance. FNAs are only available via Internal Medicine appointments.

TO MAKE AN APPOINTMENT

Please provide your client’s contact information on the completed form, and we will contact your client to arrange an appointment time. If you prefer, you may make the appointment for your client by calling 781-902-8400. Clients may call or email us at diagnosticimaging@angell.org.
RDVM ULTRASOUND REFERRAL

TODAY’S DATE: ________________ □ WALTHAM

REFERRING VETERINARIAN INFORMATION
Veterinarian's Name: ____________________________ Clinic: ____________________________
Address: ________________________________________________________________________
Preferred method of contact: (Report will be faxed unless otherwise indicated.) □ Phone □ Fax □ Email

CLIENT INFORMATION
Client’s Name: ____________________________ Phone(s): ____________________________
Email: __________________________________________________________________________
Address: ________________________________________________________________________

PATIENT INFORMATION
Pet’s Name: ____________________________ Breed: __________________ Sex: ____________
Date of Birth: ____________________________ Weight: __________________________

MEDICAL HISTORY
Date of most recent rabies vaccination (Patient must be up-to-date on rabies vaccine): ____________
□ 1 Year □ 3 Year
Complaint/reason for this ultrasound (Please include any pertinent prior history, lab results, other diagnostic tests, etc):
_____________________________________________________________________________
_____________________________________________________________________________
What are your differential diagnoses? ________________________________________________
Abnormal diagnostic results at your clinic: ____________________________________________
_____________________________________________________________________________
Please list significant past medical history: ____________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

Please make sure client is aware that patient's abdomen will be shaved. Please inform client to fast pet the day of the
exam (they may still offer water).

Were radiographs taken?  □ Yes □ No If yes, please send radiographs with the client.

Appointment Date and Time: ____________________________ Confirmed by: __________________
ANGELL REFERRING VETERINARIAN PORTAL

Secure, mobile-friendly, 24/7 access to your referred patients’ medical records, images, lab results, discharge instructions, and more.

angell.org/vetportal

24/7 ACCESS TO YOUR REFERRED PATIENTS’ RECORDS

We are pleased to offer the Angell Referring Veterinarian Portal to our referring partners.

The Portal provides 24/7, secure, mobile-friendly access to your referred patients’ records through angell.org/vetportal. The system automatically updates throughout the day and provides 24/7 access to:

- Online Medical Records
- Check-in Status
- SOAPS
- Diagnostic Images
- Lab Results
- Referral Reports
- Discharge Instructions
- Prescriptions

Settings can be customized within the Portal to receive notices by email or fax, and you may list multiple emails to receive check-in, discharge, deceased, and update notices.

Visit angell.org/vetportal or call our Angell Referral Coordinator at 617-522-5011 to gain access to your account.
After-hours Call Service

We are pleased to offer our Angell Direct Connect after-hours call service to select referring partners. This free service expedites your clients’ ability to reach a live operator during an emergency and promptly provides you with call information to inform you of your patients’ needs. To sign up for this program, please call Mary Grace at 617-541-5181.

Mechanics of the Program

As a referring hospital, one of your first steps will be to change your after-hours greeting message on your phone to say, “If you have an emergency, press #, and you will be connected to Angell Animal Medical Center.” Information that Angell will collect and provide back to you includes:

- Date and time of phone call
- Client name and patient name
- Client phone number
- Reason for call
- Resolution (advised immediate visit, status unclear and left decision to owner, or advised follow-up with primary care veterinarian when open)

Benefits of the Program

This program enables better service for both you and your clients in the following ways:

- The client does not need to end the call after receiving the voice message at your practice; instead, they can just press a number and connect to Angell.
- A live person answers the phone to immediately assist your client.
- The reporting information we provide to you—the referring doctor—allows you to preemptively reach out to your client the following day.
- The information will provide you with statistics regarding after-hours call volume for your practice and demand for services.

Other Requirements

- You will need to request the call forwarding option via your phone carrier.
- Please provide us with your operating hours so that we know when to record calls in the call log.
- We will need your fax number to ensure prompt delivery of your daily call reports.

Emergencies at Angell Animal Medical Center

Angell has created the following guide to help you and your clients identify when an animal is experiencing an emergency after hours. We welcome your calls if you have any questions or concerns.

Cats & Dogs

- Trouble breathing or open-mouth breathing in cat
- Collapse or weakness
- Choking, gagging, coughing, or excessive salivation
- Severe vomiting/diarrhea or blood in vomit/diarrhea; black-colored feces or diarrhea
- Difficulty urinating, no urination, or blood in urine
- Seizure or other neurologic abnormalities
- Wobbly, unable to walk
- Head tilting to one side
- If pet is being treated for known seizures, direct client to ER if more than three seizures in 24 hours or seizure lasting longer than 10 minutes
- Known or suspected toxin exposure
- Trauma or suspected trauma
- Hit by car or other force
- Fall from height
- Eye problems/injury
- Squinting or red eyes
- Foreign body in or around eye
• Sudden onset of blindness
• Eye out of socket
• Any bleeding from or around eye
• Wounds (or acute skin problems including rashes), including bite wounds
• Bleeding from anywhere
• Acute-onset limping or concern for broken bone
• Not eating
• In labor and
  − Time between puppy/kitten births exceeds two hours
  − Time of active contractions with no puppy/kitten produced longer than 30-45 minutes
  − Pup or kitten stuck in canal
• Shaking, whining, not acting normal, or any time an owner is concerned enough to want their pet checked out through ER

AVIAN & EXOTICS
• “Fluffed up” bird
• Difficulty breathing
• Uncontrolled bleeding
• Collapse
• Any bird that is egg-bound
• Any bird sitting at bottom of cage
• Seizure
• Sudden inability to support a limb
• Sudden onset of neurologic abnormalities
• Severe wounds; lacerations, penetration of a body cavity
• Eye damage
• Deep skin ulceration
• Not eating for 24+ hours
• No defecation for 24 hours (rabbit)
• Severe diarrhea
• Black stool (indicative of GI bleeding)
• Significant weakness/lethargy
• Persistent vomiting
• Known ingestion of any type of foreign material (rabbits and rodents cannot vomit!)
MSPCA-ANGELL WEST
WALTHAM, MA

293 Second Avenue, Waltham, MA
Phone: 781-902-8400 | Fax: 781-622-1410

MSPCA-Angell West in Waltham offers Urgent Care service for cats, dogs, and exotic mammals by appointment only. Specialized services are also available with board-certified doctors throughout the week.

ABOUT MSPCA-ANGELL WEST
MSPCA-Angell West is conveniently located in Waltham, MA, and serves communities west of Boston. The recently launched Urgent Care service for cats, dogs, and exotic mammals is by appointment only. Other specialized service appointments are available throughout the week as well. Expanded Diagnostic Imaging services are available with the addition of a Toshiba Aquilion 16 Series Whole Body CT scanner. The 16-slice CT scanner will allow for full-body workups to be done on-site in Waltham. If needed, an oxygen-equipped courtesy shuttle can transport animals to Boston for further specialized care and then take them back to Waltham. Whether in Boston or Waltham, our specialists regularly collaborate and plan treatments tailored to your pet’s emergency, surgical, and specialty needs. And even with all of our experience and advanced equipment, our specialty care is competitively priced. We offer a broad range of expertise and deliver this care with the one-on-one compassion that our clients and patients deserve. For more information, please visit angell.org/waltham.

24/7 EMERGENCY & CRITICAL CARE
Phone: 781-902-8400 Fax: 781-622-1410
Jordana Fetto, DVM jfetto@angell.org
Kimberly Freid, DVM kfreid@angell.org
Mina Gergis, DVM mgergis@angell.org
Ashley Lockwood, DVM alockwood@angell.org
Amanda Lohin, DVM alohin@angell.org
Courtney Peck, DVM, DACVECC cpeck@angell.org
Jessica Seid, DVM jseid@angell.org
Catherine Sumner, DVM, DACVECC csumer@angell.org

AVIAN & EXOTIC MEDICINE
Phone: 617-989-1561 Fax: 617-989-1668
Patrick Sullivan, DVM, DABVP (Avian Practice)
psullivan@angell.org

BEHAVIOR
Phone: 617-989-1520 Fax: 617-989-1627
Terri Bright, Ph.D., BCBA-D, CAAB
tbright@angell.org

CARDIOLOGY
Phone: 617-541-5038 Fax: 617-989-1653
Katie Hogan, DVM, DACVIM (Cardiology)
khogan@angell.org

DERMATOLOGY
Phone: 617-524-5733 Fax: 617-989-1613
Meagan Painter, DVM, DACVD
mpainter@angell.org
Brooke Simon, DVM (Residency Trained)
b Simon@angell.org

DIAGNOSTIC IMAGING
Phone: 781-902-8400 Fax: 781-622-1410

INTERNAL MEDICINE AND OUTPATIENT ULTRASOUND
Phone: 617-541-5186 Fax: 617-989-1657
Lisa Gorman DVM, DACVIM
lgorman@angell.org
Daniela Vrabelova Ackley, DVM, DACVIM
dv rabelova@angell.org

PHYSICAL REHABILITATION
Phone: 781-902-8400 Fax: 781-622-1410
Jennifer Palmer, DVM, CCRT
jpalmer@angell.org
Amy Straut, DVM, CCRT
astraut@angell.org

SURGERY
Phone: 617-541-5048 Fax: 617-989-1660
Emily Ulfelder, BVetMed, DACVS (Residency Trained)
eulfelder@angell.org

URGENT CARE
Phone: 781-902-8400
Alina Ermilio, DVM aermilio@angell.org
ABOUT ANGELL'S PHYSICAL REHABILITATION PROGRAM

Our Physical Rehabilitation Center is located at 293 Second Avenue, Waltham at Angell West. The goals of canine and feline physical rehabilitation include reducing pain, improving muscle strength and tone, remodeling scar tissue, and improving function for overall improvement of life. Rehabilitation is vital in increasing recovery speed, improved performance and quality of movement, and increased stretch and endurance. Treatments are used to treat a wide variety of orthopedic and neurological conditions. Other benefits include improved biomechanics and flexibility, reduced pain, and a non-invasive approach with minimal complications. Dogs can substantially benefit from rehab, whether recovering from an injury, cross training, or facing mobility issues.

PHYSICAL REHABILITATION SERVICES

- Hydrotherapy
- Land-based exercise
- Manual therapy
- Therapeutic laser
- Massage
- Consultation and fitting of assistive devices
- Chiropractic
- Underwater treadmill

For more information, visit angell.org/rehab.

Hydrotherapy is an important component of most canine physical rehabilitation programs.
ANGELL CLINICS

ANGELL AT ESSEX
565 Maple Street, Danvers, MA
Phone: 978-304-4648 | angell.org/essex

ANGELL AT NASHOBA
100 Littleton Road, Westford, MA
Phone: 978-577-5992 | angell.org/nashoba

ANGELL NOW OFFERS MULTIPLE LOW-COST CLINIC LOCATIONS

Angell at Essex (Danvers, MA) and Angell at Nashoba (Westford, MA) clinics are dedicated to providing quality care to the general public and offering deeply discounted services for qualified low-income families. The clinics offer primary veterinary care, spay and neuter services, vaccinations, and surgery and dental services.

TO FINANCIALLY QUALIFY

To qualify for discounted services, clients must present a photo ID and one of the following:

- Women, Infants, and Children (WIC) Program card
- Supplemental Nutrition Assistance Program (SNAP) card (formerly known as Food Stamps/EBT)
- Massachusetts Animal Fund low-cost spay/neuter certificate
- Letter/lease from the owner’s local housing authority showing that the owner is a participant in public housing
- Letter/bill demonstrating government fuel assistance
- The most recent tax return (Form 1040) showing total income at or less than 200% of the federal poverty level, adjusted for household size

In addition to our low-income program:

- Essex North Shore Agricultural and Technical School employees receive a 20% discount on services at Angell at Essex
- Nashoba Valley Technical High School employees, students, and alumni receive a 15% discount on services at Angell at Nashoba
- Active duty military personnel and veterans receive a 15% discount on services (applicable at Angell at Essex and Angell at Nashoba)

The person whose name is on the card or documents must be present (i.e., they can’t send a relative or friend). The only exception is a spouse with the same last name and address.

Open weekdays from 7:45am–4:00pm throughout the year, the clinics do not provide overnight care, specialty service care, or 24/7 emergency service as Angell’s Boston and Waltham facilities do, but will refer cases as appropriate to surrounding veterinary referral hospitals.

To schedule an appointment with the Angell at Essex clinic, please call 978-304-4648.

To schedule an appointment with the Angell at Nashoba clinic, please call 978-577-5992.
THE STAFF AT ANGELL AT ESSEX

Erin Turowski, DVM
Medical Director
eturowski@angell.org

Laura Shields, BS, CVT, CCFP
Practice Supervisor
lshields@angell.org

Arleia Tringale, AS, CVT
Practice Coordinator
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THE STAFF AT ANGELL AT NASHOBA

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Danielle Tetreault
Practice Coordinator
dtetreault@angell.org
MSPCA-Angell Clinics in Boston, Methuen, and Cape Cod

OFFERING SUBSIDIZED VETERINARY CARE TO HELP KEEP PETS AND FAMILIES TOGETHER

The vision of the MSPCA-Angell Clinics is simple yet powerful: provide affordable veterinary care that helps keep pets and families together. By providing subsidized, low-cost veterinary care, the clinics offer a new pathway for families in need.

The clinics provide spay/neuter services as well as acute, outpatient, surgical care. They are meant for families who cannot afford urgent medical care and are faced with a painful choice between euthanasia, surrender, or bringing an animal home against medical recommendations. We welcome your referral to our clinics. For more information, please visit angell.org/clinics.

Medical Procedures Performed at the MSPCA-Angell Clinics

- Diagnostics: bloodwork, urinalysis, radiographs, histopathology
- Spay for pyometra or dystocia
- Wound and laceration care
- Amputation (tail, digit, limb)
- Splinting
- Umbilical hernia repair
- Cystotomy
- Mass removal when quality of life is impacted
- Nasopharyngeal/oral polyp removal
- Enucleation
- Foreign body surgery for stable pets who do not require 24-hour hospitalization

Clients Must Financially Qualify for Treatment

To receive care at MSPCA-Angell clinics, clients must be on one of the public assistance programs listed below or have an income under the Massachusetts poverty guidelines (https://aspe.hhs.gov/poverty-guidelines). The ultimate determination of suitability for this program will be made on a case-by-case basis at the discretion of the MSPCA-Angell managers and veterinarians.

- SNAP/EBT benefits
- WIC
- Residency in public housing
- SSI
- Fuel assistance
- TAFDC
- EAEDC
- VA assistance

For more information, please visit angell.org/clinics.
COLOR ATLAS OF CANINE & FELINE LIVER CYTOLOGY

PATTY EWING, DVM, MS, DACVP
(ANATOMIC AND CLINICAL PATHOLOGY)
angell.org/pathology | pathology@angell.org | 617-541-5014

INTRODUCTION
Image-guided, fine-needle aspiration (FNA) cytology of the liver can be a rewarding, practical, and economical diagnostic tool for diagnosing certain liver disorders. Moderate to highly cellular aspirates are readily obtained in many cases. Judicious use of this diagnostic tool is warranted because results can be incomplete or inaccurate in some instances. This article reviews how FNA liver cytology helps to diagnose indications, limitations, contraindications, and common cytologic findings of selected common liver disorders.

INDICATIONS
Indications for performing liver cytology or incisional biopsy include persistently abnormal liver parameters, hepatomegaly, and abnormal echogenicity or masses noted on abdominal ultrasound (AUS). Liver cytology is often useful for the initial evaluation of hepatomegaly or mass lesions but frequently requires incisional biopsy/histopathology for definitive diagnosis. Liver conditions that may be diagnosed via liver cytology include certain types of neoplasia (e.g., hematopoietic neoplasia such as lymphoma, mast cell tumor, sarcoma, and metastatic neoplasia), inflammation and infectious disease, hepatic lipidosis, and non-lipid hepatocellular vacuolar changes.

LIMITATIONS
Liver cytology does not allow for architectural assessment required to diagnose specific liver abnormalities, such as ductal plate malformation and circulatory disorders (e.g., portal vein hypoperfusion/microvascular dysplasia and congenital portosystemic shunts). Liver cytology may miss patchy, focal, or multifocal disease in distribution, such as inflammation or hepatocellular degeneration/necrosis. The zone of liver affected by inflammation, copper accumulation, or degeneration/necrosis cannot be determined cytologically. Likewise, diagnosis of hepatic fibrosis, lobular atrophy, or parenchymal collapse requires histopathologic assessment. Subtle features of canine chronic hepatitis are routinely missed by cytologic evaluation.

Correlating cytology results with biochemical findings may help overcome some of the limitations of liver cytology and better characterize the liver disease. For example, finding increased serum bilirubin and serum alkaline phosphatase (ALP) markedly higher than serum alanine aminotransferase (ALT) with increased numbers of inflammatory cells in the liver aspirate is supportive of cholangitis/cholangiohepatitis.

Cytologic evaluation cannot differentiate nodules or masses composed of hepatocytes, including nodular hyperplasia, regenerative nodules, hepatocellular adenoma, and well-differentiated hepatocellular carcinoma. Cystic liver lesions generally require histopathology for diagnosis given low cell yield or non-specific findings on cytology.

CONTRAINDICATIONS
Primary contraindications of liver FNA include abnormal hemostasis and risk for clinically significant hemorrhage. A platelet count, assessment of platelet function (if warranted), and standard coagulation profile (aPTT and PT) are recommended precautionary tests. It is advisable to ask about recent bleeding episodes, nonsteroidal anti-inflammatory drug (NSAID) use, and anti-coagulant drug use. A cavitary mass or lesion (such as suspicion of a vascular tumor, septic abscess, or risk of rupture) is a relative contraindication for liver FNA.

NORMAL LIVER
FNA of the liver typically produces a moderately cellular smear. Hepatocytes, frequently in clusters, represent the majority of nucleated cells obtained. Hepatocytes are four to five times the diameter of an RBC, polygonal in shape, and have distinct cell margins. Nuclei are round, centrally located, and have a single prominent nucleolus. Hepatocytes have abundant lightly basophilic cytoplasm with fine pink to blue granularity (see Figure 1). Occasion canine hepaticocyte nuclei have rectangular inclusions, which are an incidental finding of no known diagnostic significance (see Figure 2). A low proportion of hepatocytes may be binucleated, have enlarged nuclei or cytoplasmic vacuolation. Small to moderate amounts of finely to coarsely granular green cytoplasmic pigment can be observed in normal hepatocytes (see Figure 2). Other cell types found in low numbers include endothelial or stromal cells, differentiating hematopoietic precursors, and bile duct epithelium. Bile duct epithelium occurs in cohesive aggregates. The cells are of uniform size, noticeably smaller than hepatocytes, and have a small amount of pale basophilic cytoplasm and a round, regular nucleus (see Figure 1).
PIGMENTS

Different types of pigment are commonly found in both normal and abnormal liver aspirates. Because most of the pigment is within the cytoplasm of hepatocytes and green in color in Wright-Giemsa- or Diff-Quik-stained cytologic specimens, special stains are usually required to differentiate the various types definitively. The most common pigment found in the cytoplasm of normal hepatocytes is lipofuscin, which is a “wear and tear” pigment associated with accumulated indigestible material within lysosomes. Large amounts of granular dark green pigment may be observed in the hepatocytes of older dogs and cats (see Figure 2). Accumulation of lipofuscin is considered part of the normal aging process and is not representative of disease. A modified Ziehl-Neelsen stain is used to confirm the presence of lipofuscin pigment. Bile accumulation in hepatocytes appears as variably-sized yellow to olive green or dark green to black pigment. Abundant amounts, especially when present as bile-filled canalicular plugs, suggest cholestasis and may precede clinical icterus or hyperbilirubinemia. The plugs appear as distinctive intact and fragmented tubular accumulations of dark green, yellow or olive green pigment in cytologic specimens (see Figure 3). A Hall’s bile stain may be useful for confirming the presence of bile (bilirubin). The cause of cholestasis, such as hepatic lipidosis or a neoplastic cell infiltrate, may be observed in cytologic specimens, although the cause is not identified in many cases. Copper may be visible in liver aspirates stained with Diff-Quik or Wright-Giemsa as coarse, granular, pale blue, refractile pigment in hepatocytes when present in large amounts, although confirmation requires a special stain, such as rubeanic acid. Excess amounts of copper may cause hepatocyte injury or necrosis with inflammation. Copper accumulation can be a primary disorder such as the familial condition in Bedlington Terriers or a secondary finding in chronic hepatitis and other liver disorders. Hemosiderin appears as a granular golden-brown to blue-back pigment in the cytoplasm of hepatocytes stained with Diff-Quik- or Wright-Giemsa-stained cytologic specimens. Confirmation requires a special stain, Prussian blue. Hemosiderin is an iron-containing pigment that accumulates in hepatocytes during disease states such as hemolytic anemia, chronic inflammation, and patients who have received repeated blood transfusions or iron injections.

HEPATOCELLULAR VACUOLAR CHANGES

The two most common types of hepatocellular vacuolar change, lipid and non-lipid, are compared to normal hepatocytes in Figure 4. Lipid vacuolar change in hepatocytes represents the accumulation of triglycerides. The discrete clear (non-staining) vacuoles may be of variable size (very small to large). Lipid content can be confirmed with special stains, including Sudan Black and Oil Red O. The most common clinical condition with marked hepatocellular lipid vacuolation is feline hepatic lipidosis, which may be primary (idiopathic) or secondary to underlying diseases such as pancreatitis, gastroenteritis, non-infectious or infectious cholangiohepatitis (see Figure 6), and neoplasia. Obese cats are predisposed to developing hepatic lipidosis. The patient history often includes a period of anorexia. Other possible causes of hepatocellular lipid vacuolation are shown in Table 1. Non-lipid vacuolar change typically results from the accumulation of glycogen or water in the cytoplasm and appears as rarefaction or pale and feathery to indistinctly vacuolated cytoplasm. It is the most common type of hepatocellular vacuolation in the canine liver. Glycogen content can be confirmed with a special stain, periodic acid-Schiff (PAS). One of the most common types of glycogen
accumulation is induced by exogenous or excessive endogenous corticosteroids (including hyperadrenocorticism), referred to as steroid hepatopathy. Marked elevation in serum ALP, together with the finding of non-lipid hepatocellular vacuolar change, is supportive of steroid hepatopathy. Other possible causes of non-lipid vacuolar change are shown in Table 1. Hepatocytes can exhibit a combination of lipid and non-lipid vacuolar change (see Figure 7).

**HEPATIC INFLAMMATION**

Evaluation of hepatic inflammation via cytology is typically incomplete because of the inability to assess inflammation relative to lobular architecture and because foci of inflammation may be missed in fine-needle aspirates. Additionally, inflammation may be incorrectly diagnosed due to blood contamination with peripheral neutrophilia or lymphocytosis.
Table 1. Hepatocellular Vacuolar Change and Associated Conditions

<table>
<thead>
<tr>
<th>Vacuolar Type</th>
<th>Associated Conditions</th>
</tr>
</thead>
</table>
| Lipid                                | • Idiopathic feline hepatic lipidosis  
• Secondary feline lipidosis (anorexia, pancreatitis, gastroenteritis, hepatitis, neoplasia)  
• Certain drug toxicities (example: canine aflatoxicosis)  
• Lysosomal Storage Disease  
• Juvenile hypoglycemia  
• Diabetes mellitus                   |
| Non-lipid (gycogen or water)        | • Corticosteroid administration  
• Endogenous corticosteroid excess (hyperadrenocorticism)  
• Breed-specific progressive vacuolar hepatopathy (Scottish Terrier)  
• Hyperaldosteronism  
• Progestin excess  
• Diabetes mellitus  
• Insulinoma  
• Hyperglucagonemia  
• Metabolic disorders  
• Copper chelation therapy  
• Hepatotoxic insults  
• Foci of nodular hyperplasia or regenerative hyperplasia  
• Hepatocellular adenomas and carcinomas |

Figure 4. The panel shows normal hepatocytes (left), lipid-laden hepatocytes from a cat with hepatic lipidosis (middle), and cell swelling with indistinct vacuolation or rarefied cytoplasm in a dog with steroid hepatopathy (right). Diff-Quik stain, 1000x magnification.
that creates the illusion of inflammation. Inflammation may be primary, reactive, clinically insignificant, multisystemic, or secondary to inflammation at other locations such as the pancreas, gallbladder, or gastrointestinal tract. Inflammation can be characterized as neutrophilic, lymphocytic, eosinophilic, mixed cell, or granulomatous/pyogranulomatous. Finding inflammation in liver aspirates should always prompt a search for infectious agents (bacteria-see Figure 5, fungal or protozoa-see Figure 6). Finding pyogranulomatous inflammation or mixed cell inflammation in a feline liver aspirate may also prompt consideration of feline infectious peritonitis. Neutrophilic inflammation is suggested in aspirates with a high concentration of segmented neutrophils relative to the amount of peripheral blood contamination present or when clusters of neutrophils are associated with aggregates of hepatocytes (see Figure 5). A diligent search for bacteria is warranted, but they are infrequently found. A bile culture may be worthwhile to evaluate for a bacterial cause when cholangiohepatitis is suspected. Lymphocytic-predominant hepatic inflammation is more commonly found in cats than dogs. Older healthy cats can have mild lymphocytic or lymphoplasmacytic inflammation restricted to portal tracts of no clinical significance. Moderate to marked numbers of lymphocytes found in feline liver aspirates may suggest lymphocytic cholangitis/cholangiohepatitis. Differentiation of lymphocytic cholangitis/cholangiohepatitis and small- to intermediate cell lymphoma can be nearly impossible based on cytology alone. Integration of all clinicopathologic findings, histopathology, and immunophenotyping +/- PARR (PCR for antigen receptor rearrangement) assay may help differentiate these two causes of hepatic lymphocytic infiltrates. Canine chronic hepatitis requires histopathology for diagnosis, given the limitations of liver cytology. A wide range of inflammatory cells types (neutrophils, lymphocytes, plasma cells, macrophages, and eosinophils) can be found in aspirates of canine chronic hepatitis. In some cases, inflammation is not detected due to patchy distribution, low numbers of inflammatory cells, or fibrosis that leads to low cell yield.

EXTRAMEDULLARY HEMATOPOIESIS (EMH)

The adult feline and canine liver retains the ability to produce hematopoietic precursor cells. EMH is typically a non-specific finding in liver aspirates. The canine liver commonly develops EMH (especially granulopoiesis) in response to chronic hepatic disease due to a wide variety of causes. Late stages of erythroid precursors +/- granulocytic (see Figure 6) and megakaryocytic precursors are commonly found in liver aspirates from anemic patients, especially when hemolysis or hemorrhage is the cause of the anemia. Hematopoietic precursors are also found with mature adipocytes in aspirates of myelolipomas.

NEOPLASIA AND HEPATIC MASSES

**Hepatocellular Masses**

Masses composed of hepatocytes are commonly observed in the liver of middle-aged and older dogs and less commonly in older cats. Cytologic appearance of nodular hyperplasia, regenerative nodules, hepatocellular adenoma, and well-differentiated overlap; thus histopathology is typically required for differentiation. Aspirates may be composed of normal-appearing hepatocytes or hepatocytes exhibiting variable cytologic atypia. Some hepatocellular carcinomas exhibit sufficient cytologic atypia to warrant a presumptive diagnosis of carcinoma (see Figure 8).

Figure 5. Aspirates of septic neutrophilic hepatitis in a dog. **Left:** Low magnification view showing a marked increase in neutrophils (green arrows) relative to the amount of peripheral blood contamination present and clusters of neutrophils associated with degenerate hepatocytes (yellow arrows). (Diff-Quik, 200x magnification) **Right:** Higher magnification view showing degenerate neutrophils containing phagocytized bacterial rods (yellow arrows) and extracellular bacterial rods. (Diff-Quik, 1000x magnification)
Figure 6. Aspirates of feline protozoal hepatitis and concurrent hepatic lipidosis. Left: Note mixed inflammation (neutrophils-green arrow, macrophages-red arrow), myeloid (neutrophilic) precursor shown by the blue arrow (extramedullary hematopoiesis), lipid-laden hepatocytes (black arrows), and a cluster of Toxoplasma gondii tachyzoites (yellow arrow). (Diff-Quik, 500x magnification) Right: Higher magnification view showing a cluster of Toxoplasma gondii tachyzoites (yellow arrow), neutrophils (green arrow), a lymphocyte (red arrow), and a macrophage (black arrow). (Diff-Quik, 1000x magnification)

Figure 7. Aspirates of feline hepatic lymphocytic infiltrate and canine chronic hepatitis. Left: Note the increased number of lymphocytes relative to the amount of peripheral blood contamination present. Lymphocytes are small (green arrow) to intermediate (black arrows) in size. Cytologic differentiation of feline lymphocytic hepatitis/cholangiohepatitis and small- to intermediate-cell lymphoma is often not possible, as in this case. Hepatocytes exhibit both lipid and non-lipid vacuolar change (yellow arrows). (Diff-Quik, 500x magnification) Right: Note the cluster of hepatocytes (yellow arrows) adjacent to a large number of inflammatory cells that include neutrophils (green arrows), lymphocytes (red arrows), and macrophages (black arrows). A presumptive diagnosis of canine chronic hepatitis was made based on histopathology. (Diff-Quik, 500x magnification)
**Bile Duct-Associated Masses**

Masses or cysts of bile duct origin occur more commonly in cats than dogs. Cholangiocellular carcinoma (CCC) is the most common primary hepatic neoplasm of cats. Feline congenital polycystic disease frequently involves the liver. These entities can appear as many nodules (CCC) or cysts of variable size involving multiple liver lobes. Ultrasonographic appearance may help differentiate them. Aspirates of biliary cysts may yield mostly clear or pale yellow fluid and very few cells for cytologic evaluation. Aspirates of CCCs tend to yield more cellular aspirates. The epithelial cells obtained from either entity can be relatively uniform cuboidal epithelial cells with scant cytoplasm arranged in tubular/acinar formations or cohesive aggregates (see Figures 1 and 8) or densely packed sheets. Despite the well-differentiated cytologic appearance, bile duct carcinoma exhibits aggressive biological behavior and a high rate of metastasis. Canine cholangiocellular carcinomas may exhibit a greater degree of cytologic atypia but often cannot be differentiated cytologically from metastatic ductal carcinomas.

**Hemolymphatic Neoplasia**

Lymphoma and hematopoietic neoplasia typically result in diffuse hepatomegaly (lymphoma or leukemia) and less often in one or more mass lesions (lymphoma). Large cell lymphoma involving in the liver of dogs is usually a component of multicentric lymphoma. Hepatosplenic lymphoma of dogs is a rare subtype of T-cell lymphoma. Lymphoma in the liver of cats can be either large cell multicentric lymphoma or small-to intermediate cell lymphoma (refer to the discussion under Inflammation). Cytology is often a useful diagnostic tool for confirming large cell or high-grade lymphoma in the liver if sufficiently cellular aspirates are obtained (see Figure 9). Acute leukemia (myeloid, lymphoid, or other) can infiltrate the liver and produce aspirates with large numbers of immature hematopoietic cells types that may overlap in appearance with lymphoma cells. Flow cytometry and immunophenotyping may be useful in differentiating acute leukemia and lymphoma.

Mast cell neoplasia (mastocytosis) involving the liver represents visceral (hepatosplenic or GI) mast cell neoplasia in cats. In dogs, metastasis of cutaneous mast cell tumors can involve the liver. Low numbers of mast cells can be found in hepatitis and rarely normal livers; however, significantly increased numbers of mast cells, often in sheets or clusters, warrants a diagnosis of mastocytosis. Cell morphology can vary from unremarkable to atypical (decreased cytoplasmic granulation and pleomorphism).

Disseminated histiocytic sarcoma is a biologically aggressive round (discrete) cell tumor that may involve the liver of dogs, and less commonly, cats. Aspirates are often highly cellular and consist of pleomorphic mononuclear or multinucleated round cells exhibiting marked cytologic atypia and cytophagia. Immunocytochemistry (CD18 marker) may be useful in differentiating histiocytic sarcoma from other pleomorphic neoplasms. EMH is a common concurrent finding. A hemophagocytic variant of histiocytic sarcoma exists in dogs. Marked erythrophagocytosis is a common finding in this variant. Neoplastic histiocytes may appear well-differentiated and be difficult to differentiate from typical macrophages.

Plasma cell neoplasia is uncommonly found in liver aspirates, generally falls under myeloma-related disorders, and occurs more commonly in feline than canine livers. Cytologic features include high numbers of plasma cells occurring in sheets or clusters. Plasma cells may be well-differentiated or exhibit a variable degree of cytologic atypia (see Figure 9).

Figure 8. Aspirates from feline hepatocellular carcinoma (left) and cholangiocellular carcinoma (right). Left: Note the cohesive aggregate of hepatocytes exhibiting cytologic atypia, including increased nuclear to cytoplasmic ratio, moderate anisocytosis and anisokaryosis, one or multiple prominent nucleoli, and multinucleation. Histopathology is required for a definitive diagnosis. (Diff-Quik, 500x magnification) Right: Note epithelial cells that are smaller than hepatocytes and have a small amount of pale blue cytoplasm (black arrow) forming cohesive aggregates and vague acinar/tubular arrays (yellow arrows). The epithelial cells exhibit more variable cell and nuclear size than normal bile duct epithelium, and the chromatin is coarsely reticular rather than smooth (see Figure 1 for comparison to normal bile duct epithelium). (Wright-Giemsa, 500x magnification)
**Figure 9. Canine hepatic lymphoma (left) and plasma cell neoplasia (right).** Left: The yellow arrows identify numerous neoplastic, medium to large lymphoid cells with round or cleaved nuclei, finely granular chromatin, and occasional bizarre mitotic figures (green arrows). A cluster of hepatocytes exhibiting vacuolar change is between the two black arrows. (Diff-Quik, 500x magnification) Right: Image shows a high density of neoplastic plasma cells in a liver aspirate. Black arrows identify more well-differentiated plasma cells. Yellow arrows identify larger plasma cells exhibiting cytologic atypia. The green arrow identifies a very large binucleated plasma cell with coarse reticular nuclear chromatin. The red arrow identifies a neutrophil for size comparison. (Diff Quik, 750x magnification)

**Figure 10. Aspirates of canine metastatic carcinoma (left) and metastatic osteosarcoma (right).** Left: Note the cohesive aggregate of neoplastic polygonal epithelial cells (black arrows) that are smaller in size than hepatocytes (yellow arrows) and have larger nuclei. They exhibit mild anisocytosis and anisokaryosis and have multiple round to angular nucleoli of variable size. (Diff-Quik, 1000x magnification) Right: Note the dense aggregates of neoplastic pyriform to spindle cells (red arrows) exhibiting moderate morphologic atypia (medium to large round nuclei, multiple round to irregular nucleoli, moderate anisocytosis, and anisokaryosis). The yellow arrows identify intercellular pink smudgy matrix that correlated with osteoid matrix on histopathology. (Diff-Quik, 600x magnification)
Metastatic Epithelial and Mesenchymal Neoplasms

The liver is a common site of metastasis for many carcinomas and sarcomas. Liver metastasis is especially common for intestinal carcinomas and pancreatic carcinomas because of the vascular and lymphatic relationships. In most cases, the tissue of origin cannot be determined cytologically for metastatic neoplasms to the liver (see Figure 10). Furthermore, differentiating metastatic carcinoma (especially ductal carcinomas) and primary cholangiocellular carcinomas based on cytology alone is challenging or impossible. Cytology may be used for the oncology staging process or for further evaluation to identify a primary neoplasm.

Primary sarcomas of the liver are far less common than metastatic sarcomas. Hemangiosarcoma is the most commonly observed spindle cell tumor of the canine liver. Neoplastic spindle cells must be differentiated from native/reactive stromal or endothelial cells and reparative fibroblasts, which can prove challenging in some cases. Moderate to marked cytologic atypia is useful in making a presumptive cytologic diagnosis of sarcoma (see Figure 10).

SUMMARY

Image-guided, fine-needle aspiration (FNA) cytology of the liver can be a rewarding, practical, and economical diagnostic tool for diagnosing certain liver disorders. Liver cytology is most useful for the initial evaluation of diffuse hepatomegaly and hepatic mass lesions. It is not useful for diagnosing hepatic fibrosis, cystic lesions, ductal plate malformation, and cirrhotic disorders, such as congenital portosystemic shunts and portal vein hypoperfusion. Incisional liver biopsy and histopathology are often required for definitive diagnosis. Subtle features of canine chronic hepatitis are routinely missed by cytologic evaluation. Correlating cytology results with biochemical findings may help overcome some of the limitations of liver cytology and better characterize the liver disease.

REFERENCES


"KITTY KRUISERS" AND SEPARATE WAITING ROOMS HELP REDUCE STRESS OF FELINE PATIENTS

As part of our commitment to feline comfort and care, Angell has three feline-friendly exam rooms (two exclusively for cats). To further reduce the stress of feline patients, Angell provides “Kitty Kruisers” at the hospital entrance to enable cats to avoid anxiety-invoking, eye-level proximity with canine patients. Blankets are available to cover carriers to further enhance security and comfort, as well as a separate feline waiting room and express check-in/check-out in a feline-only area during weekdays. These efforts and more have earned Angell Gold Level accreditation in the Cat Friendly Practice Program® of the American Association of Feline Practitioners (AAFP). The AAFP requires rigorous guidelines to be met for accreditation.
OSTEOARTHRITIS IN COMPANION ANIMALS

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Osteoarthritis (OA) is a common condition that affects dogs and cats. It is characterized as a low-grade inflammatory, progressive degenerative joint disease. OA results from degeneration and aberrant repair of articular cartilage associated with alterations in subchondral bone metabolism, osteophytosis, and synovial inflammation. OA is almost always secondary to an underlying abnormality in companion animals, such as joint laxity, osteochondrosis, trauma, etc. It is a pathological process that includes joint capsule fibrosis and periosteal reactions, leading to an altered gait and range of motion. In turn, there is a deterioration of the musculoskeletal system and secondary joint stabilizers, resulting in further deterioration of articular cartilage due to abnormal loading and wear.

In human medicine, it has been shown that synovial macrophages act as immune cells and are essential players in the structural progression and resulting clinical signs associated with OA. Interactions between macrophages and chondrocytes play a vital role in the initiation and development of OA by secreting inflammatory cytokines, which lead to subsequent cartilage degradation and destruction.

Since OA is a disease process rather than a disease entity, management should intervene along the way. This can be difficult at times given the insidious onset and variation in clinical presentations seen in companion animals. History and clinical signs can vary significantly and include reluctance to exercise, exercise intolerance, stiffness after activity, gait abnormalities, inability to jump (up or down), and behavioral changes. The tendency is for clinical signs to worsen gradually, but animals can have episodic flares, making diagnosis all the more challenging during the early phase. Physical exam findings also tend to vary and can include focal or diffuse muscle atrophy, joint swelling, capsular/extracapsular fibrosis, joint effusion, reduced range of motion, crepitus, and pain on joint manipulation.

Cats pose an even greater diagnostic challenge than dogs, given their elusive nature. They can show very few signs, but those typical include a general reduction in activity, reluctance to jump, reduction in maximum jump height, unkempt appearance, and even aggression. Gathering physical findings also proves to be challenging in our feline friends, given that many resent even a basic physical exam, never mind invasive orthopedic assessment. Asking clients to get videos of their cats at home in their natural environment can provide a plethora of information that is often difficult to obtain in the exam room. A subtle sign to look for in the clinic includes a reluctance to jump off the exam table. Cats with elbow discomfort may land harshly when they jump, bringing their pelvic limbs to the ground quickly or landing on their pelvic limbs simultaneously with forelimbs.

Once the discomfort has been localized, baseline diagnostics include radiographs to confirm signs of arthritis and rule out other causes that may contribute to the clinical signs. This should be addressed if there is an obvious underlying condition, such as a cranial cruciate tear. Common radiographic findings consistent with OA include osteophytosis, enthesisophytosis, effusion, soft tissue swelling, subchondral sclerosis, and intra-articular mineralization.

While it can be difficult to quantify joint pain in animals, it is well accepted that OA leads to ongoing nociceptive input into the central nervous system resulting in somatosensory system deterioration and central sensitization, contributing to the
such as chasing a ball or going for long runs. Those animals who may be used to a more rigorous form of activity, maintenance. Additionally, it is a great way to mentally stimulate can also be highly beneficial for general body conditioning and decreasing activity. Completely restricting activity leads to a decrease in musculature, which therefore weakens the dynamic joint stabilizers. Exercises such as frequent, low-impact walks and swimming are a few of many activities that can keep our pets active and healthy. Veterinary physical rehabilitation is a growing specialty, and the benefit of these programs cannot be understated. Low-impact activity is another goal that can be set early if we suspect or diagnose OA early in the disease process. (It is not recommended to restrict our pet’s exercise completely.) Growing evidence in human and veterinary medicine supports regular, moderate, controlled exercise as highly beneficial. Certain activities, such as running and chasing a ball, may need to be abolished given this movement’s ‘start and stop,’ high-impact nature. However, a change in exercise routine if the current form is causing problems is a more ideal solution, rather than decreasing activity. Completely restricting activity leads to a decrease in musculature, which therefore weakens the dynamic joint stabilizers. Exercises such as frequent, low-impact walks and swimming are a few of many activities that can keep our pets active and healthy. Veterinary physical rehabilitation is a growing specialty, and the benefit of these programs cannot be understated. Physical rehabilitation is not just for post-operative care but can also be highly beneficial for general body conditioning and maintenance. Additionally, it is a great way to mentally stimulate those animals who may be used to a more rigorous form of activity, such as chasing a ball or going for long runs. Overall perception of pain. Growing evidence indicates that the COX enzymes play a role in this central sensitization, and COX inhibitors have been shown to prevent the establishment of central sensitization. Early intervention is becoming recognized as important and effective management in long-term joint health.

The pillars of OA management include weight management, low-impact activity, and pain management. Obesity is a well-known key risk factor for the development of OA. Being overweight is a contributing factor for OA by several mechanisms, including increased load on the joints. Still, it also results in a subclinical proinflammatory state with increased concentrations of proinflammatory cytokines and adipokines. Weight management is a key goal that can be included in OA management from a young age. Keeping pets active helps them to maintain a healthy muscle mass development and reduces fat.

Analgesics are also essential in both early and late stages of OA management. While it was previously thought that non-steroidal anti-inflammatories (NSAIDs) were best used to treat moderate-late stage OA, there is growing evidence to show the benefits of implementing COX inhibitors early on. Galliprant® is a new therapeutic that targets the prostaglandin EP4 receptor, a primary mediator of pain and inflammation involved in the pathogenesis of OA. By targeting EP4 specifically, Galliprant® has been shown to alleviate signs of joint pain in dogs associated with osteoarthritis while decreasing the risks associated with blocking cyclooxygenase. Other commonly used NSAIDs in dogs include Carprofen and Meloxicam. Currently, there are no NSAIDs licensed for use in OA in cats.

It is well recognized that NSAIDs are the best at targeting joint pain related to OA; however, some animals cannot tolerate NSAIDs or need additional analgesics. Gabapentin and amantadine are drugs intended to manage chronic pain. Gabapentin is a structural analog of gaba-aminobutyric acid and appears to decrease central sensitization by inhibiting presynaptic calcium channels in the dorsal horn, although its exact mechanism is unknown. Amantadine acts on N-methyl D-aspartate receptors. These medications work best in conjunction with NSAIDs but can also be used alone or in combination in animals that cannot tolerate NSAIDs. Gabapentin has been shown to improve owner-identified impaired activities of osteoarthritis in cats.

OA in companion animals is a common and often diagnostically challenging disease process. Early recognition and intervention are essential to long-term joint health.

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PRIMARY SECRETORY OTITIS MEDIA (PSOM)

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INTRODUCTION
Primary secretory otitis media (commonly abbreviated as PSOM) is a relatively uncommon disease reported primarily in Cavalier King Charles Spaniels. Very few other reports have been noted in breeds outside the Cavaliers, and unfortunately, the breed predilection is unknown.

PATHOGENESIS
The pathogenesis of PSOM is unfortunately unknown as well. The theories that have been postulated include that either an increase in mucus production, decreased drainage of the middle ear through the Eustachian tube, or a combination of both is contributing factors. In human patients, chronic drainage of the tympanic cavity occurs through the Eustachian tube; if we assume that this is a similar pathomechanism in our canine patients, there is likely impaired patency of the Eustachian tube and tympanic cavitary mucociliary clearance that is compromised in cases of PSOM.

CLINICAL SIGNS
The primary presenting complaint in this author's experience is gradual hearing loss that can occur over a three to eight-month period, sometimes concurrently with head-shaking/ear irritation with no evidence of concurrent otitis externa.

In other cases, pain can be localized to the head/neck with spontaneous episodes of neck guarding. Intense pruritus affecting the pinna and/or external ear canals (with no concurrent otitis externa), head tilt, nystagmus, ataxia, facial nerve paralysis, fatigue, and varying degrees of otitis externa can also be seen.

DIAGNOSIS
Diagnosis of PSOM is dependent on signalment, clinical signs, and clinical findings. Otoscopic examination in a PSOM patient should reveal a bulging pars flaccida and pars tensa; however, a normal appearance to the tympanic membrane does not rule out PSOM. In many cases, if one tympanic membrane appears affected on otoscopy but the other appears overtly normal, there will be some level of disease still present in the normal-appearing side (bilateral in approximately 60% of cases according to one study).

Diagnostic imaging with either radiography or computer tomography (CT is preferred) of the bulla should reveal changes consistent with effusion of the middle ear, with or without concurrent osteitis.
Definitive diagnosis is achieved after myringotomy to reveal a typically viscous, opaque, grey to yellow plug of mucous present in the bulla.

**TREATMENT**

The primary treatment recommendation in a symptomatic patient affected with PSOM is to remove the plug of mucous in the tympanic cavity through a myringotomy incision. Repeated myringotomies/bulla flushings have been required in some cases due to the healing of the myringotomy site and continued accumulation of mucoid discharge in the bulla over time.

Pharmacological intervention in some PSOM cases has not been fully explored, including mucolytics and leukotriene inhibitors which appear ineffective. However, pharmacological interventions have largely been unrewarding in this disease process.

A few studies have been performed to assess whether tympanostomy tubes (as those used in human medicine) provided enough continued tympanic cavity ventilation and drainage.

Post-operative medications have included corticosteroids (both topical and systemic), antibiotics, and in some cases, a mucolytic (acetylcysteine or bromhexine).

Recurrence of PSOM is common, with one study reporting almost 20% of dogs having relapses of clinical PSOM 6 to 18 months after their first procedure.

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FLAIL CHEST

Rib fractures and flail chest most commonly occur after blunt or penetrating trauma. Blunt trauma can be from motor vehicle or high-rise trauma. Penetrating trauma causing rib fractures is from bite wounds or gunshot wounds. There is a spectrum of clinical signs associated with thoracic trauma that can range from superficial wounds to respiratory failure. Flail chest is a condition when proximal and distal fracture in two or more adjacent ribs creates a free-floating chest wall segment. Patients can present with severe dyspnea due to concurrent conditions of pulmonary contusions, pneumothorax, and hemothorax that can be exacerbated by flail chest. Stabilization of the affected chest wall should be delayed until the patient’s shock is stabilized but may need attention if it is causing impairment of ventilator function. Medical or surgical stabilization of rib fractures is controversial in human medicine, and less information is available in veterinary medicine.

AUTOLOGOUS BLOOD TRANSFUSION

Auto-transfusion is the administration of autologous blood from the patient and re-administration back to the patient. Trauma is a common reason for blood transfusion. The clinical signs that trigger autologous blood transfusions are usually the treatment of shock, clinically relevant worsening anemia, perioperative hemodynamic optimization (for penetrating wounds), and coagulopathy. Fluid resuscitation with crystalloids is a standard practice in veterinary emergency medicine for treating hypoperfusion. Still, in the context of severe acute hemorrhage, the administration of large volume crystalloids may worsen hemostatic dysfunction and induce further hemorrhage. Blood product resuscitation is appealing due to the positive effects of colloidal support, replacement of clotting factors and hemostatic proteins, and increasing oxygen-carrying capacity. In a pinch, autologous blood transfusion is a reasonable resuscitative measure in scenarios with ongoing hemorrhage secondary to trauma. It is readily accessible, cost-efficient, and avoids compatibility issues of using allogeneic red cells or risks associated with the storage of red blood cells. A sterile technique should be used for thoracocentesis or abdominocentesis, and typically collected blood does not need to be anti-coagulated. It should be re-infused through an appropriate blood administration filter. Blood can be transfused as a bolus if required.
HEATSTROKE

Heatstroke is a form of hyperthermia associated with a systemic inflammatory response leading to a syndrome of dysfunction in which encephalopathy predominates. It is a disease process that is progressive and life-threatening. There is a spectrum of heat-related illnesses that span from heat cramps (muscle spasms) to heat exhaustion, heat prostration, and heat stroke, the most severe. Dogs confined to automobiles, tied outdoors without access to shade or water, or on walks/runs on the first few days of warm weather are commonly susceptible to heatstroke. Early aggressive treatment of heat-related signs and pro-active treatment protocols directed at the complications of heatstroke may reduce patient morbidity and mortality. The most essential part of initial treatment is lowering the core temperature quickly. Secondly, the dog should be resuscitated to optimize cardiovascular support and manage secondary complications (shock, hypoglycemia, AKI, DIC, ARDS, etc.).

GASTRIC DILATATION-VOLVULUS

Gastric dilatation-volvulus (GDV) is a life-threatening condition requiring aggressive emergency medical stabilization and surgical intervention. It is typically a syndrome of large breed dogs (i.e., Great Dane, Weimaraner, Saint Bernard, Gordon Setter, Irish Setter, Standard Poodles) and likely has a genetic influence. However, small dogs, cats, and other mammals can develop GDV as well. Once GDV occurs, there is cardiovascular compromise secondary to obstructive shock. The gastric distention compresses abdominal veins so that venous return to the heart is impeded. Respiratory compromise can also be appreciated due to increased abdominal pressure preventing normal diaphragmatic movement. Gastric necrosis is a potential complication of GDV. It can be secondary to a compilation of shock, thrombosis, avulsion of the splenic and short gastric arteries, and reduced cardiac output. Gastric necrosis is unfortunately associated with increased morbidity and mortality. Diagnosis of gastric necrosis is performed during abdominal surgery, but lactate and lactate clearance may raise suspicion. Lidocaine has been evaluated and may decrease AKI incidence, post-op arrhythmias, and length of hospital stay. Treatment goals are aimed at treatment of shock and stabilizing the patient before surgery.
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OVERVIEW

The highly-trained veterinarians who comprise the Emergency and Critical Care Service—the 24/7 pulse of the Angell care network—treat pets suffering from life-threatening trauma and disease. Referring veterinarians may alert the staff to an incoming case via our referral phone line; the general public may use our walk-in emergency clinics any hour of the day, 365 days a year.

The Critical Care Unit is equipped with continuous cardiac telemetry, blood pressure, pulse oximetry, blood gas, and other monitoring devices. Specially constructed oxygen cages provide an oxygen-enriched temperature- and humidity-controlled environment for our most critical patients. Advanced techniques, such as blood component therapy, peritoneal dialysis, and ventilator therapy are also available.

EMERGENCY & CRITICAL CARE SERVICES

- Board-certified criticalists in Boston and Waltham
- Dedicated nursing staff in emergency receiving and critical care. The nursing staff is trained in monitoring critically ill patients on mechanical ventilators, those requiring continuous drug infusions, and a host of other technical procedures.
- On-site blood bank with a dedicated technical staff, emphasizing blood component therapy. Whether dealing with emergency transfusion needs from trauma or immune disease, or managing the chronically ill with repeated transfusions, blood products are available at all times.
- Multiple means of oxygen administration, including high-flow oxygen therapy and mechanical ventilation with a state-of-the-art ventilator. The staff veterinarians, residents, and critical care nurses take a team approach to managing these cases and other critically ill patients.
- Point-of-care 24-hour monitoring capabilities include direct and indirect arterial blood pressure, coagulation parameters, blood chemistries and blood gases, lactate, and co-oximetry. Co-oximetry allows the staff to measure blood for methemoglobin and carboxyhemoglobin levels when suspected of acetaminophen or carbon monoxide poisonings. The staff can also monitor blood osmolality and colloid oncotic pressure. This enables the staff to further fine-tune fluid therapies and medication administration to individual patient needs.
- Consultations are available with specialists throughout the hospital. Daily cage-side rounds provide an environment for repeated case re-evaluation and allow the team to adjust treatment promptly.
- A critical care team is in the Critical Care Unit every day, backing up the veterinarians, receiving emergencies, and helping to assess and monitor the patients. The team is made up of senior staff, residents, associate veterinarians, and nurses. The staff provides peritoneal dialysis; management of open abdomen; mechanical ventilation; and management of severe pancreatitis, diabetic ketoacidosis, sepsis, and poly-trauma, among other critical conditions. The use of enteral and parenteral nutrition techniques is a routine part of the practice.
OVERVIEW

Angell’s first priority is the care and safety of our patients. Our anesthesiologists work with Angell’s specialists to ensure that the safest and most effective anesthesia protocols are administered. In addition, our experienced, certified/licensed veterinary technicians monitor each patient during anesthesia using cutting-edge equipment to measure blood pressure, carbon dioxide, oxygen, and heart rate. Cases can range from providing routine sedation for radiographs to performing general anesthesia on patients undergoing brain or open-heart surgery.

The focus of Angell's Anesthesia Service is on making anesthesia and sedation safe and comfortable. This includes peripheral and regional nerve blockade, anesthetic management of polytrauma and critical care cases, and acupuncture and multimodal approaches to pain management.

ANESTHESIA SERVICES

Case Consultation and Continuing Education

The Anesthesiology Service provides individualized and optimal analgesia to patients during and after procedures. Drs. Kate Cummings and Sandra Allweiler are available for case planning and consultation to provide safe and effective anesthesia for all patients. Clients and referring veterinarians can ask for specialized services for difficult or concerning problems related to anesthesia and pain management. Continuing education is available on multiple topics related to pain management and anesthesia.

Locoregional Anesthesia

- Epidural anesthesia/analgesia
- Spinal analgesia/anesthesia
- Specific nerve blocks (nerve stimulation and ultrasound-guided localization)
- Specific regional blocks
- Intra-articular analgesia
- Local catheter infusions

Multimodal Anesthesia

- Total or partial intravenous anesthesia protocols
- Continuous-rate analgesic infusions

Special Species Anesthesia

- Consults or direct management
- Avian, reptile, and small mammal anesthesia
- Sedative and analgesic protocols

Specialized Airway/Ventilation Management

- Difficult intubation solutions
- Tracheostomy and pharyngostomy tube
- Positive end-expiratory pressure
- Pressure and volume control and support ventilation
AVIAN & EXOTIC

OVERVIEW

Drs. Simone-Freilicher, Sullivan, and Noonan are board-certified avian specialists. They also have completed specialty training in exotic medicine, including rabbit and rodent dentistry, medical and surgical treatment of ferret diseases, and reptile medicine and surgery. They provide wellness care and emergency and critical care for avian and exotic pets.

Optimal wellness care and emergency and critical care for avian, fish, small mammal, reptile, or other exotic pets requires experienced veterinary management, specialized diagnostic and treatment protocols, and state-of-the-art equipment and facilities designed for these special species. Angell provides this environment as well as the compassion these animals deserve.

Our doctors are available by appointment for primary care and consultation or referral of avian and exotic cases.

AVIAN & EXOTIC SERVICES

- Emergency and critical care for avian and exotic pets available 24 hours, seven days a week through our Emergency and Critical Care Service
- Wellness appointments available seven days a week
- Board-certified veterinarians with years of experience treating numerous exotic species, including birds, rabbits, ferrets, guinea pigs, small rodents, special small mammals (such as chinchillas or hedgehogs), reptiles, and amphibians
- Specifically designed general and isolation wards for care of avian and exotic patients, including avian incubators and specialty reptile hospital caging
- Veterinary care for individual fish or aquarium collections. Services include water quality evaluation and recommendations, physical examination, fin and gill biopsies, fecal examinations, radiographs, anesthesia and surgery, humane euthanasia, and necropsy.
- Specialists in surgery, radiology, dentistry, internal medicine, and ophthalmology assist in providing in-depth case management for special species
- Services include endoscopy, radiology, clinical pathology, ultrasonography, avian and exotic animal surgery, and advanced diagnostics, including infectious disease testing
BEHAVIOR

Behavior Phone: 617-989-1520 | Behavior Fax: 617-989-1627 | behavior@angell.org | angell.org/behavior

OVERVIEW

Terri Bright, Ph.D., BCBA-D, CAAB, and Jocelyn Strassel, M.S., CVT, see patients at Angell in Boston, Waltham, and Methuen.

Dr. Bright earned her Master’s of Science degree and Ph.D. at Simmons College in Applied Behavior Analysis (ABA) with an animal specialty, and she is a Board-Certified Behavior Analyst (BCBA-D) and a Certified Applied Animal Behaviorist (CAAB). She is the President of the Applied Animal Behavior Special Interest Group in the Association of Applied Behavior Analysis International (ABAI), and her dissertation research entailed developing a dog behavior assessment and analysis tool that will help standardize how dog trainers evaluate why problem behaviors happen. She is a mentor for future BCBAs, teaches Behavior Analysis at Northeastern University, and lectures nationally on the subject of Applied Animal Behavior Analysis.

Dr. Bright has been training dogs as a hobby and professionally for many years, and her research on stimulus equivalence (matching-to-sample training) earned her a Marian Breland Bailey (MBB) Award from the Association of Applied Behavior Analysis International (ABAI). Dr. Bright won another MBB Award from ABAI for her research on the use of errorless teaching to train a shelter dog to sit at the sound of a bell (“Pavlov’s Shelter”) when she was not in the dog’s sight. She uses evidence-based methods of training.

Dr. Bright launched the Training Department at the MSPCA-Angell Boston location in 2007 and has grown the program to over 30 classes a week. She helps evaluate homeless dogs surrendered at the MSPCA-Angell for proper placement, and she designs training and enrichment programs for dogs at the MSPCA-Angell. She also designs and implements curriculum and teaching for staff and volunteers in the SAFEWALK program, which she created in 2009, and lectures locally and nationally on behavior analysis.

BEHAVIOR SERVICES

• Behavior consultations for cats and dogs
• Plan development: following consultation, clients receive a detailed plan for their pet to modify behavior, and each consultation includes six weeks of follow-up to see how their pet is doing after our consultation
• Positive-based behavior modification treatment plans for issues such as:
  – Aggression toward people and other animals
  – Separation anxiety
  – Situational anxiety (car rides, slippery floors, vet visits)
  – Noise phobias
  – Generalized anxiety
  – House soiling and marking
  – New baby acclimations
  – Furniture scratching
  – Excessive vocalization
  – Cognitive dysfunction
  – Compulsive behavior

To make an appointment, please call 617-989-1520.
CARDIOLOGY

OVERVIEW

Angell’s Cardiology Service consists of a full-time board-certified veterinarian and two cardiology residents. Our size and expertise allow us to provide extensive outpatient hours and collaboration and subspecialization for excellence in all areas of cardiovascular medicine and interventional cardiology.

Angell’s cardiology staff is focused on clinical excellence and optimal client service, and animal care. We provide on-site availability of cardiologists six days per week, with consultation and emergency services through our Emergency Critical Care Service on Sundays, holidays, and overnight. The staff size allows us to accommodate last-minute emergency referrals (by prior arrangement).

Our cardiology training program emphasizes resident education (clinical and didactic). It provides intense continuing education opportunities for the staff cardiologists, allowing us to keep current on the latest techniques and clinical findings.

Echocardiograms are available in both Boston and Waltham.

CARDIOLOGY SERVICES

Outpatient and Inpatient Echocardiography

- Three state-of-the-art echocardiography machines (GE Vivid E9 Color Flow Doppler and GE Vivid I Portable Echocardiogram with transesophageal capability)
- Owners may remain with their pet during routine outpatient cardiology visits (including the echocardiogram)
- Available in both Boston and Waltham

Outpatient and Inpatient Electrocardiography

- HP Pagewriter 300 machine
- Dextronix digital ECG system

Outpatient and Inpatient Blood Pressure Determination

- Parks Doppler, Dynamap, and Passport
- Pet MAP

Outpatient Ambulatory ECG Diagnostic Services

- 24-hour Holter monitor evaluation (for animals with diagnosed or suspected paroxysmal arrhythmia)
- Event monitoring (for recurrent syncopal activity)
- Inpatient continuous telemetric ECG recording
Full-Service Cardiac Catheterization Laboratory
- Balloon dilatation for pulmonic stenosis, aortic stenosis
- Amplatz canine ductal occluder (ACDO) placement
- Coil embolization for patent ductus arteriosus
- Diagnostic cardiac catheterization and angiography

Full-Service Pacemaker Program
- Transvenous pacemaker implantation (temporary, permanent)
- Surgically placed epicardial pacemaker implantation

Cardiac Surgery Program
(Run in Conjunction with the Angell Surgery Department)
- Pericardiectomy
- Surgical PDA ligation
- Valvotomy for pulmonic stenosis
- Epicardial pacemaker implantation

Minimally Invasive Thoracic Surgery Program—Thoracoscopy
- Pericardial window for recurrent pericardial effusion
- Exploratory thoracoscopy for idiopathic pleural effusion
OVERVIEW
The Dentistry Service at Angell Animal Medical Center has been proud to provide quality oral health care to pets and education to clients and veterinarians since 1998. We are a dentistry-dedicated technical staff with experience treating high-anesthesia-risk patients.

Coordination and consultation with the specialty services at Angell help to provide optimal patient care. Some of the specialty services we work with include Cardiology, Emergency and Critical Care, Internal Medicine, Oncology, and Surgery.

DENTISTRY SERVICES

Periodontal Treatment
- Dental examination
- Dental radiography
- Dental scaling and polishing
- Advanced periodontal pocket therapy
- Surgical tooth extraction

Fractured Teeth
- Dental radiography
- Endodontics
- Root canal treatments with Lightspeed

Endodontic System
- Vital pulpotomy
- Surgical tooth extraction

Malocclusion
- Deciduous/permanent tooth extractions
- Orthodontic treatment

Oral Neoplasia
- Dental radiography
- Biopsy/histology
- Maxillectomy/mandibulectomy
- Coordination with Oncology Department for adjunctive therapy

Jaw Fractures
- Dental radiography
- Intraoral fixation
- Fracture fixation

Alice Ekerdt, DVM
(Residency Trained)
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Joyce Tai, DVM, MS
jtai@angell.org

Jessica Riehl, DVM, DAVDC
jriehl@angell.org
OVERVIEW

The Angell Dermatology Service offers a comprehensive approach to veterinary dermatology in a multispecialty hospital environment. This enables us to work closely with internal medicine, surgery, radiology, oncology, and pathology to diagnose and manage a wide variety of dermatologic and otic conditions.

The Angell Dermatology Service sees patients by appointment only. We also offer extended appointment hours. Referring veterinarians, please fax a referral form along with the medical record to our dermatology communications coordinator at 617-989-1613 before the appointment.
DIAGNOSTIC IMAGING

Diagnostic Imaging Phone: 617-521-5139  |  Diagnostic Imaging Fax: 617-989-1617  |  diagnosticimaging@angell.org  |  angell.org/diagnosticimaging

Naomi Ford, DVM, DACVR  
nford@angell.org

Steven Tsai, DVM, DACVR  
stsai@angell.org

Ruth Van Hatten, DVM, DACVR  
rvanhatten@angell.org

OVERVIEW

The Diagnostic Imaging Service at Angell Animal Medical Center supports the specialty services of the hospital by providing comprehensive in-house diagnostic expertise and technology for both our Boston and Waltham locations.

SERVICES

• Access to a full range of imaging technologies to evaluate the many and varied clinical problems that animals present

• In-house services include:
  – Radiology
  – Ultrasonography
  – Fluoroscopy
  – Multi-detector Computed Tomography (16-slice CT)
  – Magnetic Resonance Imaging (1.5 Tesla MRI)
  – Nuclear Scintigraphy
  – Iodine 131 Treatment for Feline Hyperthyroidism

• 1.5 MRI has improved our ability to image neurologic patients, orthopedic disease, as well as abdominal and vascular abnormalities

• The 80-slice CT is capable of image reconstruction in multiple planes, including 3-D reconstructions, for optimal surgical planning. Given the rapid acquisition time, many orthopedic patients, if they are good anesthetic candidates, can be scanned under heavy sedation alone. The CT can also perform computed tomographic angiography (CTA), thoracic CT, and abdominal CT

• Fine-needle aspirates and biopsies are performed under ultrasonographic, fluoroscopic, and CT guidance

• Nuclear medicine procedures available include bone scans, real-time GFR analysis for evaluation of renal function prior to nephrectomy, and transplenic portosystemic shunt studies

• Reading and reporting on referral radiographs, MRI, and CT studies

• OFA hip and elbow exams
INTERNAL MEDICINE

Douglas Brum, DVM
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Susan O’Bell, DVM, DACVIM
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Daniela Vrabelova Ackley
DVM, DACVIM
Waltham
dvrabelova@angell.org
OVERVIEW
The Internal Medicine Service at Angell Animal Medical Center offers specialized care and outpatient services for cats and dogs.

Angell’s internal medicine group has decades of clinical experience and offers state-of-the-art diagnostics and therapeutic treatment options. The service provides expertise in many medical disciplines, including endocrinology, nephrology, hepatology, gastroenterology, immune disorders, hematology, and infectious diseases.

INTERNAL MEDICINE SERVICES

• Appointments seven days a week in Boston.
• 24-hour continuous monitoring for hospitalized patients
• Abdominal ultrasound available in Waltham and Boston
• Complete capabilities for endoscopic diagnosis of gastrointestinal, respiratory, and urogenital disease. Multiple endoscopic services are available, including upper and lower gastrointestinal endoscopy (for diagnostic biopsies and foreign body retrieval), cystoscopy, rhinoscopy, and bronchoscopy.
• Advanced diagnostic imaging, including on-site CT and MRI. Angell’s MRI unit delivers high-quality images, allowing our doctors to detect smaller and more subtle lesions to enable intervention at earlier stages in the disease process.
• Close collaboration with clinical pathology and radiology to obtain cytologic diagnoses through the least-invasive means possible
• Full services available for transfusions of packed red blood cells, fresh frozen plasma, cryoprecipitate, and platelet-rich plasma
• Fecal transplants
• Laparoscopic liver biopsies for dogs and cats
• Tracheal and urethral stenting
• Laboratory and pathologic analyses of body fluids and tissues. Angell offers an advanced, full-service, on-site laboratory with clinical pathology and histopathology services. The Pathology Service is led by one double-board-certified clinical and anatomic pathologist and a board-certified anatomic pathologist.
• Feeding tube placement in compromised patients (PEG, esophagostomy, NE tube)
• Bone marrow aspires and core biopsies for evaluation of hematologic disorders and cancer staging
• I-131 treatment for hyperthyroid cats (generally released three days post-treatment)
• An integrated approach to medicine with full support of Critical Care, Cardiology, Ophthalmology, Neurology, Oncology, Radiology, and Surgery Services
WHAT IS FELINE HYPERTHYROIDISM?
Feline hyperthyroidism is caused by spontaneous thyroid masses, most of which are benign (adenoma) and some of which are malignant (carcinoma). Fortunately, both conditions can be treated by radioiodine (I-131); however, the doses and results may differ depending on the animal's condition. The goal in treating the disease is to attain normal thyroid hormone levels, which lead to a normal, healthy weight. The overall success rate of this treatment is between 85 and 90 percent.

WHAT ARE SOME SYMPTOMS OF FELINE HYPERTHYROIDISM?
• Significant weight loss
• Loss of the normal hair coat
• Increased appetite
• Irritability and/or restlessness

HOW DOES I-131 WORK?
This treatment is radioactive, so once injected into the body, it is absorbed by the thyroid gland. Once the abnormal thyroid tissue is destroyed by the radioiodine, the remaining tissue will perform normally.

WILL THE RADIATION HURT THE NORMAL THYROID TISSUE?
The normal tissue is relatively protected from the radiation because most of the hyperfunctional (abnormal) tissue takes in the radioiodine.

HOW LONG WILL THE TREATMENT AND RECOVERY TAKE?
Hospitalization varies from six days to about two weeks. Initially, the thyroid must be scanned to determine the necessity and proper dosage of I-131. Following the scan, there is only a single injection; however, once injected, the cat cannot be released any earlier than three days after treatment under any circumstances due to radiation safety concerns.

WHAT MAKES ANGELL’S I-131 PROGRAM UNIQUE?
• We are the only thyroid treatment program that scans cats first. Some hyperthyroid cats do not need to be treated because they do not have thyroid tumors, despite an elevated T4 level. The scan identifies these cats and negates the need for treatment with I-131.
• Our program has a doctor on the premises 24 hours a day
• We are the only facility that treats cats with major medical issues that could complicate I-131 treatment of hyperthyroidism
• Our license permits release after three days, but we also provide boarding for clients who do not want the responsibility of the radiation issues and handling concerns at home

For more information on radioiodine treatment or to refer a client, please call 617-541-5186.
NEUROLOGY

Rob Daniel, DVM, DACVIM (Neurology)
Boston & Waltham
rdaniel@angell.org

Michele James, DVM, DACVIM (Neurology)
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Jennifer Michaels, DVM, DACVIM
Boston & Waltham
jmichaels@angell.org

OVERVIEW

Angell Animal Medical Center offers diagnostic evaluation and treatment in the specialty of small animal neurology.

Our neurologists provide optimal care in diagnosing and treating small animal neurological diseases, both medical and surgical, with state-of-the-art equipment and facilities.

Our services include diagnosis and treatment of seizure disorders, disc disease, granulomatous meningoencephalomyelitis (GME), infectious diseases of the nervous system, brain tumors, vertebral malformations/instability (Wobblers Syndrome), and numerous types of central and peripheral nervous system diseases.

NEUROLOGY SERVICES

- Appointments Tuesday–Sunday
- Neurologists are available six days per week for consultations for patients who are admitted to the hospital as emergencies
- Diagnostic equipment includes radiography, ultrasonography, CSF analysis, electrodiagnostic capabilities, fluoroscopy, and myelography, all available Monday through Saturday
- MRI and CT units are available seven days a week
- Neurosurgical procedures include laminectomies, craniotomies, and cervical vertebral stabilization with methyl methacrylate and locking plate implants
- The facility includes veterinarians board-certified in emergency and critical care, diagnostic imaging, cardiology, oncology, ophthalmology, internal medicine, and surgery for readily available consultation dictated by the case
- 24-hour Critical Care Unit includes a dedicated and experienced team of specialty technicians, as well as regular ward care
- Laboratory and pathologic analyses of body fluids and tissues. Angell offers an advanced, full-service, on-site laboratory with clinical pathology and histopathology services. The Pathology Service is led by one double-board-certified clinical and anatomic pathologist and a board-certified anatomic pathologist.
OVERVIEW

Angell Animal Medical Center offers an advanced, multidisciplinary approach to cancer diagnosis and treatment. We are committed to improving the quality of life in an atmosphere of caring and compassion.

Optimal management of cancer improves the quality of life and, in many cases, improves clinical outcomes for veterinary patients. Accurate and timely diagnosis, staging, and thoughtful treatment protocols are required to achieve these goals.

Our team has expertise in cancer diagnostics, chemotherapy, radiation therapy, biological therapies, and immunotherapy.

Our specialists are active members of the Veterinary Cancer Society and Veterinary Oncology Cooperative Group. We participate in multi-institutional veterinary clinical trials and collaborate with medical professionals in the human arena, offering the ability to provide cutting-edge treatments to patients.

ONCOLOGY SERVICES

- Oncology-dedicated technicians and one radiation therapist to support our oncologists
- Routine use of vascular access ports (VAP) for radiation patients, which eliminates the need for catheters and dramatically increases patient comfort
- Board-certified surgeons available for timely surgical intervention, including major tumor resections involving reconstructive surgery
- Critical care team with board-certified criticalists. 24-hour service offered for oncologic emergencies, including state-of-the-art pain management.
- Laboratory and pathologic analyses of body fluids and tissues. Angell offers an advanced, full-service, on-site laboratory with clinical pathology and histopathology services. The Pathology Service is led by one double-board-certified clinical and anatomic pathologist and a board-certified anatomic pathologist.

ONCOLOGY

Oncology Phone: 617-541-5136 | Oncology Fax: 617-989-1668 | oncology@angell.org | angell.org/oncology

Kristine Burgess
DVM, MS, DACVIM
(Medical Oncology)
kburgess@angell.org

J. Lee Talbott, DVM, DACVIM
(Medical Oncology)
jtalbott@angell.org

Jillian Walz, DVM, DACVIM, DACVR
(Medical Oncology)
(Radiation Oncology)
jwalz@angell.org
• Cutting-edge diagnostic imaging facilities, including helical computed tomography, MRI, ultrasound, and fluoroscopy
• Sophisticated equipment for optimal radiation delivery, including a 6MV linear accelerator with electron capability and a computerized treatment planning system. Our Varian 2100 C/D linear accelerator is equipped with a 120-leaf, multi-leaf collimator, allowing us to block critical structures near the tumor bed. This is particularly important, for example, to spare the eye and brain when treating nasal or skull tumors, the heart when treating tumors located within the thorax or abdomen, and the spinal cord when treating tumors close to it.
• Intensity-modulated radiation therapy (IMRT), a technique used by Angell to minimize side effects of radiation treatment by sculpting the beam to the exact size and dimensions of the tumor
• Volumetric modulated Arc Therapy (VMAT) or RapidArc® Radiotherapy Technology, an innovative form of IMRT that delivers precise continuous radiation in a single treatment. While conventional IMRT treats the tumor over 5-10 minutes, in comparison, VMAT can deliver the dose to the entire tumor in a 360-degree rotation in under two minutes.
• Convenient outpatient radiation therapy and chemotherapy services
• A multidisciplinary team approach to provide the best medical care, including involvement of the referring veterinarian and pet owner
• Close access to a large team of specialists in radiology, internal medicine, cardiology, neurology, ophthalmology, nutrition, and dentistry to allow timely cancer patient care management
• Stereotactic radiation treatment that reduces the number of radiation treatments required
At Angell Animal Medical Center, we are a team of specialists dedicated to treating cancer in dogs and cats. Our team begins with the referring veterinarian, who arrives at the initial diagnosis and recommends further treatment for a pet. The team includes the concerned owner, who is seeking treatment for their pet. We strive to work in collaboration with the team, both inside and outside our hospital.

Our cancer care team within Angell Animal Medical Center includes:

- Oncologists
- Surgeons
- Radiologists
- Radiation oncologist and therapist
- Pathologists
- Anesthesiologists

Our team works within one facility in open collaboration to provide the highest level of care and comprehensive treatment possible.

**TREATMENT BEGINS WITH COMMUNICATION**

Before beginning treatment, we discuss goals and offer a range of treatment options. We provide both written and verbal reports to the primary care veterinarian and the pet owner throughout treatment. We believe providing more information to owners eases the decisions an owner faces, which are often challenging and urgent. We are committed to open, transparent communication to facilitate treatment decisions and create a community of support extending from our specialists to the primary care veterinarian and pet owners.

**TREATMENT OPTIONS**

Radiation therapy and chemotherapy have been available to veterinary patients for decades. Improvements have been made in the treatment protocols and the instrumentation to minimize side effects and prolong remission times. Our chemotherapy protocols are frequently updated and altered to provide cutting-edge treatments to improve patients’ outcomes. Metronomic chemotherapy and radiation with curative or palliative intent are among the available options.

**MEDICAL ONCOLOGY**

Dr. Lee Talbott is board certified in medical oncology. Dr. Talbott works alongside Dr. Kristine Burgess and Dr. Megan Duckett. Although a diagnosis is preferred, patients can be referred when a tumor is only suspected. Initiating treatment in a timely fashion is of the utmost importance.

**RADIATION ONCOLOGY**

Dr. Jillian Walz provides radiation treatment planning for each radiation patient. We use a Varian TrueBeam™ linear accelerator, which is equipped with a multileaf collimator. Older units typically had only four leaves and could only form simple rectangles. In contrast, the multileaf collimator has 120 leaves that create highly complex shapes that conform to the tumor outline while sparing normal tissue. The linear accelerator also can generate an electron beam that can treat more superficial tumors while sparing radiation-sensitive underlying tissues such as the lungs, kidneys, or colon.

We routinely treat radiation therapy cases on an outpatient basis. Owners also have the option of dropping a pet off for the day if that is more convenient. Each patient is treated with the utmost care and compassion. Every effort is made to make sure patients feel safe and comfortable before, during, and after treatment.
ANESTHESIA

As part of that approach, the oncologists work closely with the Anesthesia service. Compassion is at the core of our service, and it follows that pain control is integral to the caring process.

Angell anesthesiologists work to ensure that anesthesia and sedation are safe for our radiation and oncology surgery patients. We use advanced monitoring and support equipment, including remote video monitors, electrocardiography, pulse oximetry, blood pressure monitors, and ventilators to support our patients.

EMERGENCY CARE

Our Oncology Service is supported by a 24-hour Emergency Service with a fully equipped critical care unit to support and treat any unforeseen complications.

SURGERY AND PATHOLOGY

Our Surgery Service offers extensive treatment for our patients, including reconstructive surgery to limit pain and allow for pleasing cosmetic results. Angell offers an in-house, full-service laboratory with clinical pathology and histopathology services. The Pathology Service is led by one double-board-certified clinical and anatomic pathologist and a board-certified anatomic pathologist.
OPHTHALMOLOGY

OVERVIEW

The Ophthalmology Service at Angell Animal Medical Center provides extensive diagnosis and treatment of inherited, acquired, or traumatic conditions involving the eyelids, cornea, iris, lens, retina, optic nerve, and orbit.

Examinations are provided on a wide variety of species using direct and indirect ophthalmoscopy, slit-lamp biomicroscopy, Schirmer tear testing, topical fluorescein staining, tonometry, gonioscopy, ocular ultrasonography, CT, MRI, and electroretinography (to detect retinal degeneration).

Cataract removal with lens implantation is available, as well as laser and cryotherapy to treat glaucoma, iris tumors, and retinal detachment.

OPHTHALMOLOGY SERVICES

- Diagnostic, therapeutic, and surgical services using advanced techniques, state-of-the-art equipment, up-to-date knowledge, and years of experience
- Examinations include slit-lamp biomicroscopy, indirect ophthalmoscopy, and standard in-office diagnostic tests, including tonometry
- Emergency and critical care services available 24 hours, seven days a week
- Evening and early morning appointments available

- Urgent care appointments available, often the same day
- Specialty services include cataract surgery with intraocular lens implantation; ocular ultrasound; electroretinography; cryosurgery; glaucoma surgery, including laser cyclophotocoagulation; corneal surgery, including grafting; and eyelid surgery. CERF examinations are available for breeding dogs.
- Specialists in internal medicine, radiology, cardiology, dermatology, and surgery assist in providing in-depth case management
- 24-hour critical care unit for patients needing intensive ocular therapy
- In-house MRI
OVERVIEW

The mission of the Pathology Service at Angell Animal Medical Center is to provide quality diagnostic services, promote education and professional development, and support the mission of the MSPCA-Angell. Our laboratory accepts mail-in submissions for cytology, histopathology, and clinical pathology testing; courier pickup of samples are available in some areas of eastern Massachusetts. Angell’s Pathology Service serves both our Boston and Waltham facilities.

WHY SUBMIT TO ANGELL’S PATHOLOGY SERVICE?

Angell’s Pathology staff takes pride in delivering rapid and accurate test results to contribute to the diagnosis, treatment, management, and/or prognosis of disease in our veterinary patients. We offer clinically oriented pathology services. We are interested in individual cases, encourage clinical correlates and feedback, and welcome case consultations via phone or email. Our anatomic and clinical pathologists maintain high-quality service through detailed reports, practical case comments, and competitive turnaround time. When necessary, we consult other specialists about the more challenging disease processes. Select cases are reviewed in biweekly pathology rounds, allowing open discussion among pathologists, general practitioners, veterinary specialists, residents, interns, and veterinary technicians.

ABOUT US

The Angell Pathology staff includes two board-certified veterinary pathologists (anatomic and clinical pathology), a department manager, two supervisors, a lead technologist, two senior technicians, three clinical laboratory technicians, three histologists, and three pathology assistants. Our highly trained laboratory professionals include ASCP-certified medical technicians, medical laboratory technicians, histotechnicians, and a certified hematology specialist, as well as one certified veterinary technician and one foreign-certified medical technician. State-of-the-art clinical laboratory equipment includes automated hematology, clinical chemistry, coagulation, and urinalysis and microbiology analyzers. Our histology laboratory has recently been renovated and updated with new tissue-processing and slide-staining equipment.

SERVICES OFFERED

Stained and/or unstained glass slides from tissue aspirates, swabs, impression smears, fluids, bone marrow, joint taps, etc., are evaluated by our board-certified veterinary clinical pathologist. Fluid assessment, including automated cell count and cytologic examination of body cavity effusion or cerebrospinal fluid, is also offered. Surgical biopsies or tissue samples from necropsy cases submitted in 10 percent neutral buffered formalin are processed by our in-house histology laboratory, and then they are evaluated by our board-certified veterinary anatomic pathologist. We perform several in-house histochemical stains, and, when necessary to achieve a diagnosis, special stains are applied to cases at no additional cost to the submitter.

In addition to cytology and histopathology, Angell Pathology offers hematology, clinical chemistry, coagulation, urinalysis, microbiology, and parasitology diagnostic services. For a complete list of available tests, submission forms, or sample requirements, please contact us at 617-541-5014 or visit our website at angell.org/lab.
TURNAROUND TIME

We understand that behind every sample submitted, a veterinary patient and its owner are waiting in anticipation for test results. Therefore, for most routine tests, we strive to deliver high-quality, accurate results within 24 to 48 hours (excluding weekends) of the time we receive the sample. Turnaround times for items requiring additional processing—such as decalcifying of bone for histopathology—are slightly longer. Visit our website at angell.org/lab for additional details.

Patty Ewing, DMV, MS, DACVP
(Clinical and Anatomic Pathology)
Service Director

Dr. Patty Ewing provides medical direction for the Clinical Laboratory, consultation with veterinarians on the interpretation of laboratory test results and diagnostic test selection, and evaluation of hematology and cytology samples. Dr. Ewing is board certified in both clinical and anatomic pathology and has authored more than 30 publications and six book chapters in the field of veterinary medicine.

Education
- Oklahoma State University, MS, Veterinary Pharmacology/Toxicology 1992
- Oklahoma State University, DVM 1988

Specialty Training
- Oklahoma State University, Residency in Veterinary Clinical and Anatomic Pathology 1989-1992

Certification
- Diplomate, American College of Veterinary Pathology, Clinical Pathology 2003
- Diplomate, American College of Veterinary Pathology, Anatomic Pathology 1992

Pamela Mouser, DVM, MS, DACVP
(Anatomic Pathology)

Dr. Pam Mouser evaluates surgical biopsy specimens and histopathology samples collected from necropsy cases. Dr. Mouser’s special interests include ophthalmic and dermatologic pathology.

Education
- Purdue University, MS, Comparative Pathobiology 2008
- Colorado State University, DVM 2005
- Colorado State University, MS, Anatomy 2001

Specialty Training
- Purdue University, Residency in Veterinary Anatomic Pathology 2005-2008

Certification
- Diplomate, American College of Veterinary Pathology, Anatomic Pathology 2008
PATHOLOGY: NECROPSY

The Pathology Service at Angell Animal Medical Center is pleased to offer necropsy services to primary care veterinarians and their clients.

WHY SUBMIT TO ANGELL’S NECROPSY SERVICE?
At Angell Pathology, we understand that sometimes questions remain unanswered at the time of a pet’s death. A necropsy examination may provide answers to some of these questions. Goals of necropsy include determining the cause of death, evaluating the extent of disease, identifying underlying or concurrent disease processes that may have influenced a pet’s clinical signs or response to treatment, and educating the individuals (clients, veterinarians, technical staff, and pathologists) involved in the pet’s care. The detailed, comprehensive necropsy report includes an interpretive comment to address specific concerns posed by the submitter. Angell Pathology takes pride in treating each pet with care and respect, even after death. As with any pathology submission, select necropsy cases will be reviewed in monthly pathology rounds, allowing open discussion among pathologists, general practitioners, veterinary specialists, residents, interns, and veterinary technicians.

NECROPSY SERVICES OFFERED
Full necropsies can be performed on dogs, cats, and small exotic pets (such as rabbits, ferrets, reptiles, and birds) by a board-certified anatomic pathologist at Angell Animal Medical Center. The necropsy examination will include histopathology of collected tissue samples at the discretion of the pathologist. Ancillary tests (e.g., bacterial culture or immunohistochemistry) will result in an additional charge to the submitter. It is important to note that Angell Pathology requires all pets submitted for necropsy to be cremated following the procedure; ashes can be returned to the owner if requested at the time of submission.

TURNAROUND TIME & ADDITIONAL INFORMATION
Necropsies can be performed Monday through Friday at Angell Pathology. Please contact the laboratory at 617-541-5014 to confirm pathologist availability before referring a case. Final results are reported within 7 to 14 days to allow additional processing (such as decalcifying of bone) if necessary.

For a complete list of available tests, submission forms, or sample requirements, please contact us at 617-541-5014 or visit our website at angell.org/lab.

SUBMITTING A NECROPSY CASE
• All necropsy submissions must be accompanied by a necropsy requisition form, which can be completed by the submitting veterinarian and is available on our website at angell.org/lab or by contacting us at 617-541-5014

• Suppose an owner brings a deceased pet to Angell for necropsy examination without a necropsy form completed and signed by their veterinarian. In that case, the owner will be seen by an Angell veterinarian through the emergency service.

• Necropsy is most valuable when performed promptly following death (less than 12 hours) but may still yield relevant information if performed within 24 to 48 hours of death, depending on postmortem preservation. If a pet cannot be brought to Angell immediately following death, it is recommended to keep the body cool (refrigerated) but not frozen. Refrigeration will reduce, but will not eliminate, postmortem decomposition, whereas freezing can introduce significant artifact, often preventing a histopathologic diagnosis.

• The deceased pet should be transported to Angell by the client, veterinarian, or a representative of the veterinarian. This individual will be required to sign a necropsy release form at the time of submission.

• Please clearly indicate on the necropsy requisition form if an infectious disease is suspected, so appropriate precautions can be taken, and testing can be performed if indicated. Specific examples include but are not limited to rabies and other potentially zoonotic diseases.

IMPORTANT POINTS ABOUT NECROPSY FOR THE VETERINARIAN AND PET OWNER
• There is no guarantee that the cause of death will be determined in every case

• Reduced sample quality, such as occurs with postmortem decomposition, can preclude a final diagnosis

• The pet’s body will not be released to the veterinarian/owner following necropsy. Angell Pathology requires cremation, with the option of the pet’s ashes being returned to the owner.

• Ancillary tests, such as bacterial culture or toxicology testing, can result in additional charges to be paid by the submitter

• Microscopic examination of tissues (histopathology) and collection of tissue samples for ancillary tests will occur at the pathologist’s discretion

• Necropsy samples, findings, and/or photographs may be used for teaching purposes, quality-control programs, or scientific publication
OVERVIEW

The Angell Surgery staff members are dedicated full time to surgery and have extensive surgical experience with a broad knowledge base in orthopedic and soft tissue surgery. We take pride in the large pool of dedicated doctors who work and collaborate together for the individual patient. The large, experienced veterinary staff at Angell work collaboratively to diagnose and manage of sick and injured patients referred to our hospital.

Angell’s Surgery Service is equipped with state-of-the-art equipment for a wide range of orthopedic and soft tissue procedures. Veterinarians are welcome to visit Angell, and a tour can be arranged with one of our surgical staff members. We are happy to provide complimentary telephone and email consultations to our referring partners.

SURGERY SERVICES

Orthopedic Surgery

- Cruciate Ligament Repair (TPLO, TTA, Extracapsular)
- Fracture Repair
- Arthroscopic Examination/Procedures
- Limb Prosthetics
- Total Hip Replacement
- Corrective Joint Surgery
- Acquired/Congenital Limb Deformity Repair
- Pulse-Vet Shock Wave Therapy–Muscle and Tendon Injuries

Surgical Oncology Services/Reconstructive Surgery

- Biopsy and Staging of Neoplasms
- In-Hospital Consultations with Oncology & Radiation Therapy Services
- Laser-Assisted Surgery
- Ligasure Surgical Unit
- Tumor Resection and Reconstruction
- Skin and Subcutaneous Tissues
- Oral/Facial/Nasal
- Ear Canal/Pinna
- Cervical
- Thoracic/Abdominal Wall Reconstruction
- Paw/Digits/Metacarpal–Metatarsal Pads
Upper Respiratory Surgery
- Laryngeal Paralysis Tie-Back Procedure
- Soft Palate
- Stenotic Nares
- Tracheal Collapse
- Nasal Cavity Disease
- Nasal Planum Disease

Otic Surgery
- Ear Canal Ablation
- Lateral/Vertical Canal Resection
- Tumors/Trauma of the Pinna
- Bulla Osteotomy Procedures

Cervical Surgery
- Salivary Gland
- Laryngeal
- Tracheostomy Procedures
- Esophageal Procedures
- Thyroid Tumors
- Parathyroid Tumors

Thoracic Surgery
- Pulmonary
- Cardiovascular
- Thoracic Wall Reconstruction

Abdominal Surgery
- Gastric
- Small Intestine
- Large Intestine/Rectum
- Hepatic/Gallbladder
- Spleen, Pancreas, Adrenal
- Urinary Tract, Upper and Lower
- Thoracic Wall Reconstruction

Plastic & Reconstructive Surgery
- Skin Flaps
- Skin Grafts
- Muscle and Myocutaneous Flaps
- Foot Pad Flaps/Grafting Techniques
- Comprehensive Wound Management
- Problematic Wound Closure
- Esophageal Reconstruction
- Thoracic and Abdominal Wall Reconstruction

Neurosurgery
- Brain and Spinal Tumors
- Spinal Fractures
- Disc Disease
- Compressive Spinal Lesions

Dental/Oral Surgery
- Comprehensive Dental Care – Angell’s Dentistry Service
- Maxillary and Mandibular Tumors
- Oronasal Fistulas
- Laser-Assisted Techniques

Minimally Invasive Surgery
- Laparoscopy (Ovariectomy, Gastropexy, Cryptorchid Testicles, Biopsy, etc.)
- Thoracoscopy (Biopsy, Pericardial Windows, etc.)
- Arthroscopy (Knee, Shoulder, etc.)

Laser Surgical Procedures
- Tumor Resection
- Oral – Nasal Surgery
AVIAN & EXOTIC MEDICINE  
avianexotic@angell.org  
angell.org/avianandexotic

BEHAVIOR  
P: 617-989-1520  F: 617-989-1627  
behavior@angell.org  
angell.org/behavior

CARDIOLOGY  
P: 617-541-5038  F: 617-989-1653  
cardiology@angell.org  
angell.org/cardiology

DERMATOLOGY  
P: 617-524-5733  F: 617-989-1613  
dermatology@angell.org  
angell.org/dermatology

DIAGNOSTIC IMAGING  
P: 617-541-5139  F: 617-989-1617  
diagnosticimaging@angell.org  
angell.org/diagnosticimaging

INTERNAL MEDICINE  
P: 617-541-5186  F: 617-989-1657  
internalmedicine@angell.org  
angell.org/internalmedicine

PHYSICAL REHABILITATION*  
P: 781-902-8400  F: 781-622-1410  
physicalrehab@angell.org  
angell.org/rehab

SURGERY  
P: 617-541-5048  F: 617-989-1660  
surgery@angell.org  
angell.org/surgery

URGENT CARE*  
P: 781-902-8400  F: 781-622-1410  
urgentcare@angell.org  
angell.org/urgentcare

ANESTHESIOLOGY  
P: 617-541-5048  F: 617-989-1660  
anesthesia@angell.org  
angell.org/anesthesia

DENTISTRY  
P: 617-522-7282  F: 617-522-4885  
dentistry@angell.org  
angell.org/dentistry

NEUROLOGY  
P: 617-541-5140  F: 617-989-1666  
neurology@angell.org  
angell.org/neurology

ONCOLOGY  
P: 617-541-5136  F: 617-989-1668  
oncology@angell.org  
angell.org/oncology

OPHTHALMOLOGY  
P: 617-541-5095  F: 617-989-1647  
ophthalmology@angell.org  
angell.org/eyes

PATHOLOGY**  
P: 617-541-5014  F: 617-522-7356  
pathology@angell.org  
angell.org/lab

*Boston only

**Service is located in Boston, but serves both Boston & Waltham