<table>
<thead>
<tr>
<th>CONTENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referral Contact Information .................................................. 2</td>
</tr>
<tr>
<td>Contact Sheet ........................................................................... 3</td>
</tr>
<tr>
<td>Appointment Times ................................................................. 5</td>
</tr>
<tr>
<td>Referral Forms ........................................................................ 6</td>
</tr>
<tr>
<td>Outpatient Ultrasound Referral ................................................ 10</td>
</tr>
<tr>
<td>Angell Image Transfer Express ............................................... 10</td>
</tr>
<tr>
<td>Angell Referring Veterinarian Portal ...................................... 13</td>
</tr>
<tr>
<td>Angell Direct Connect Program ............................................... 14</td>
</tr>
</tbody>
</table>

**INFORMATION & CLINICAL ARTICLES**

- MSPCA-Angell West ..................................................................... 16
- Physical Rehabilitation ............................................................. 17
- Clinics: Angell at Essex and Angell at Nashoba .......................... 18
- MSPCA-Angell Community Clinics .............
- Top Ophthalmology Tips for the Practicing Veterinarian ............. 21
- Canine Oral Masses .................................................................... 24
- Current Concepts in Fluid Therapy ........................................... 27
- Feline Friendly ........................................................................... 23

**ANGELL SERVICES**

- 24/7 Emergency & Critical Care Service .................................... 33
- Anesthesiology Service .............................................................. 35
- Avian & Exotic Medicine Service .............................................. 36
- Behavior Service ....................................................................... 37
- Cardiology Service .................................................................... 38
- Dentistry Service ...................................................................... 40
- Dermatology Service ................................................................. 41
- Diagnostic Imaging Service ....................................................... 42
- Internal Medicine Service ......................................................... 43
- I-131 Treatment Program .......................................................... 45
- Neurology Service ..................................................................... 46
- Oncology Service ....................................................................... 47
- Angell’s Team Approach to Treating Cancer .............................. 49
- Ophthalmology Service .............................................................. 51
- Pathology Service ...................................................................... 52
- Pathology Service: Necropsy ..................................................... 54
- Physical Rehabilitation .............................................................. 17
- Surgery Service .......................................................................... 55
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 as well as limited service clinics in Westford, MA and Danvers, MA.

This Referral Guide contains important information to ensure that both you and your clients have a positive experience while using the services at Angell in Boston, MSPCA-Angell West in Waltham, Angell at Nashoba in Westford, and Angell at Essex in Danvers. 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 (with the exception of Emergency & Critical Care)

### 24/7 EMERGENCY & CRITICAL CARE

Boston: 617-522-5011 | Waltham: 781-902-8400

### 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

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

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

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

#### PHYSICAL REHABILITATION*
Phone: 781-902-8400  Fax: 781-209-5721  
physicalrehab@angell.org  
angell.org/rehab

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

#### 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

#### 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

REFERRAL ASSISTANCE
Boston
Phone: 617-522-5011
Fax: 617-989-1635

Waltham
Phone: 781-902-8400
Fax: 781-622-1410

24/7 EMERGENCY & CRITICAL CARE, BOSTON
angell.org/emergency
emergency@angell.org
Phone: 617-522-5011 Fax: 617-989-1633

Alison Allukian, DVM
aallukian@angell.org

Justina Bartling, DVM
jbartling@angell.org

Jami Becker, DVM
jbecker@angell.org

Kiko Bracker, DVM, DACVECC
kbracker@angell.org

Maria Brandifino, DVM
mbrandifino@angell.org

Callie Cazlan, DVM
ccazlan@angell.org

Elton Chan, DVM
echan@angell.org

Sara Doyle, DVM
sdoyle@angell.org

Morgan Kelley, DVM
mkelley@angell.org

Audrey Koid, DVM
akoid@angell.org

Virginia Sinnott-Stutzman
DVM, DACVECC
vsinnottstutzman@angell.org

Kelsey Turley, DVM
kturley@angell.org

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

24/7 EMERGENCY & CRITICAL CARE, WALTHAM
Phone: 781-902-8400 Fax: 781-622-1410

Jordana Fetto, DVM
jfetto@angell.org

Mina Gergis, DVM
mgergis@angell.org

Ashley Lockwood, DVM, DACVECC
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
Chief Medical Officer, Waltham
csumner@angell.org

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

Kate Cummings, DVM, DACVAA
kcummings@angell.org

AVIAN & EXOTIC MEDICINE
BOSTON & WALTHAM
angell.org/avianandexotic
avianexotic@angell.org
Phone: 617-989-1561 Fax: 617-989-1668

Brendan Noonan, DVM, DABVP
(Avian Practice)
Boston & Waltham
bnoonan@angell.org

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

Patrick Sullivan, DVM, DABVP
(Avian Practice)
Waltham
psullivan@angell.org

BEHAVIOR
BOSTON & WALTHAM
angell.org/behavior
behavior@angell.org
Phone: 617-989-1520 Fax: 617-989-1627

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

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

Katie Hogan, DVM, DACVIM
(Cardiology)
Boston & Waltham
khogan@angell.org

Michelle Oranges, DVM
moranges@angell.org

Elizabeth Wiley, DVM
ewiley@angell.org

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

Alice Ekerdt, DVM
(Residency Trained)
eaerdt@angell.org

Jessica Riehl, DVM, DAVDC
jriehl@angell.org

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

Klaus Loft, DVM
kloft@angell.org

Meagan Painter, DVM, DACVD
mpainter@angell.org

Brooke Simon, DVM
Boston & Waltham
bsimon@angell.org
# APPOINTMENT TIMES

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

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon</td>
<td>10am–11am; 1pm–4pm</td>
<td>(Waltham: 11am–1pm)</td>
</tr>
<tr>
<td>Tues</td>
<td>10am–11am; 1pm–4pm</td>
<td></td>
</tr>
<tr>
<td>Wed</td>
<td>10am–11am; 1pm–4pm</td>
<td>(Waltham: 9am–10:40am; 1:20pm–3pm)</td>
</tr>
<tr>
<td>Thurs</td>
<td>10am–11am; 1pm–4pm</td>
<td>(Waltham: 9am–10:40am; 1:20pm–3pm)</td>
</tr>
<tr>
<td>Fri</td>
<td>10am–11am; 1pm–4pm</td>
<td>(Waltham: 9am–10:40am; 1:20pm–3pm)</td>
</tr>
<tr>
<td>Sat</td>
<td>10am–11am; 1pm–4pm</td>
<td>(Waltham: 9am–10:40am; 1:20pm–3pm)</td>
</tr>
<tr>
<td>Sun</td>
<td>10am–11am; 1pm–4pm</td>
<td></td>
</tr>
</tbody>
</table>

**BEHAVIOR (ONE-HOUR APPOINTMENTS)**
617-989-1520  angell.org/behavior

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tues</td>
<td>by appointment</td>
<td></td>
</tr>
<tr>
<td>Wed</td>
<td>10:30am, 1pm, 2:30pm, 4pm, 5:30pm</td>
<td>(Waltham)</td>
</tr>
<tr>
<td>Thurs</td>
<td>1pm, 2:30pm, 4pm, 5:30pm</td>
<td>(Waltham)</td>
</tr>
<tr>
<td>Fri</td>
<td>11am</td>
<td>(Waltham &amp; Methuen by appointment)</td>
</tr>
</tbody>
</table>

**CARDIOLOGY**
617-541-5038  angell.org/cardiology

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon</td>
<td>8:45am–6pm</td>
<td>(9:30am–1:30pm Waltham)</td>
</tr>
<tr>
<td>Tues</td>
<td>9am–7pm</td>
<td>(1:00pm–6pm Waltham)</td>
</tr>
<tr>
<td>Thurs</td>
<td>8:45am–7pm</td>
<td>(9:30am–1:30pm Waltham)</td>
</tr>
<tr>
<td>Fri</td>
<td>9am–12pm</td>
<td>(9am–11pm Waltham)</td>
</tr>
<tr>
<td>Sat</td>
<td>9am–1pm</td>
<td>(9am–11am Waltham)</td>
</tr>
<tr>
<td>Sun</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon</td>
<td>8am–11am; 1pm–4pm</td>
<td></td>
</tr>
<tr>
<td>Tues</td>
<td>8am–11am; 1pm–4pm</td>
<td>(Waltham: 8am–11am; 1pm–4pm)</td>
</tr>
<tr>
<td>Wed</td>
<td>8am–11am; 1pm–4pm</td>
<td>(Waltham: 8am–11am; 1pm–4pm)</td>
</tr>
<tr>
<td>Thurs</td>
<td>8am–11am; 1pm–4pm</td>
<td>(Waltham: 8am–11am; 1pm–4pm)</td>
</tr>
<tr>
<td>Fri</td>
<td>8am–11am; 1pm–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**
617-524-5733  angell.org/dermatology

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon</td>
<td>8am–11am; 1pm–4pm</td>
<td></td>
</tr>
<tr>
<td>Tues</td>
<td>8am–11am; 1pm–4pm</td>
<td>(Waltham: 8am–11am; 1pm–4pm)</td>
</tr>
<tr>
<td>Wed</td>
<td>8am–11am; 1pm–4pm</td>
<td>(Waltham: 8am–11am; 1pm–4pm)</td>
</tr>
<tr>
<td>Thurs</td>
<td>8am–11am; 1pm–4pm</td>
<td>(Waltham: 8am–11am; 1pm–4pm)</td>
</tr>
<tr>
<td>Fri</td>
<td>8am–11am; 1pm–4pm</td>
<td></td>
</tr>
</tbody>
</table>

**INTERNAL MEDICINE**
617-541-5186  angell.org/internalmedicine

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon</td>
<td>9am–2pm</td>
<td>(9am–3pm Waltham)</td>
</tr>
<tr>
<td>Tues</td>
<td>10am–6:40pm</td>
<td>(9am–3pm Waltham, every other Tues)</td>
</tr>
<tr>
<td>Wed</td>
<td>10am–7:20pm</td>
<td>(9am–3pm Waltham)</td>
</tr>
<tr>
<td>Thurs</td>
<td>9am–8pm</td>
<td></td>
</tr>
<tr>
<td>Fri</td>
<td>9am–5pm</td>
<td></td>
</tr>
<tr>
<td>Sat</td>
<td>9am–1:30pm</td>
<td></td>
</tr>
<tr>
<td>Sun</td>
<td></td>
<td>(One Saturday a month; please call to schedule (Boston))</td>
</tr>
</tbody>
</table>

**NEUROLOGY**
617-541-5140  angell.org/neurology

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon</td>
<td>9am–12pm</td>
<td></td>
</tr>
<tr>
<td>Tues</td>
<td>9am–12pm</td>
<td>1pm–3pm</td>
</tr>
<tr>
<td>Wed</td>
<td>9am–3:30pm</td>
<td>(Waltham: 9am–11am, 1pm–2pm select Wednesdays)</td>
</tr>
<tr>
<td>Thurs</td>
<td>9am–12pm</td>
<td>1pm–3pm</td>
</tr>
<tr>
<td>Fri</td>
<td>9am–5pm</td>
<td>(Waltham: 8am–10am, 12pm–1pm select Thursdays)</td>
</tr>
<tr>
<td>Sat</td>
<td>9am–11am</td>
<td></td>
</tr>
<tr>
<td>Sun</td>
<td>9am–12pm</td>
<td>1pm–3pm</td>
</tr>
</tbody>
</table>

**MRI services available seven days a week**

**ONCOLOGY**
617-541-5136  angell.org/oncology

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon</td>
<td>8:30am–3pm</td>
<td></td>
</tr>
<tr>
<td>Tues</td>
<td>8:30am–3pm</td>
<td></td>
</tr>
<tr>
<td>Wed</td>
<td>9:30am–3pm</td>
<td></td>
</tr>
<tr>
<td>Thurs</td>
<td>8:30am–3pm</td>
<td></td>
</tr>
<tr>
<td>Fri</td>
<td>9:30am–3pm</td>
<td></td>
</tr>
</tbody>
</table>

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

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

**OPHTHALMOLOGY**
617-541-5139  angell.org/ultrasound

Please call 781-902-8400 for Waltham appointment times

**PHYSICAL REHABILITATION**
781-902-8400  angell.org/rehab

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon</td>
<td>12pm–7pm</td>
<td>(Waltham)</td>
</tr>
<tr>
<td>Tues</td>
<td>10am–7pm</td>
<td>(Waltham)</td>
</tr>
<tr>
<td>Wed</td>
<td>10am–5pm</td>
<td>(Waltham)</td>
</tr>
<tr>
<td>Thurs</td>
<td>10am–7pm</td>
<td>(Waltham)</td>
</tr>
<tr>
<td>Sat</td>
<td>9am–5pm</td>
<td>(Waltham)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon</td>
<td>8:30am–11:40am</td>
<td>(Waltham: 8:30am–10:30am)</td>
</tr>
<tr>
<td>Tues</td>
<td>8:30am–11:30am</td>
<td>12:30pm–2:30pm</td>
</tr>
<tr>
<td>Wed</td>
<td>8:30am–10:30am</td>
<td>(Waltham: 8:30am–10:30am)</td>
</tr>
<tr>
<td>Thurs</td>
<td>9am–12:20pm</td>
<td>4pm–8pm</td>
</tr>
</tbody>
</table>

**ANZELL AT ESSEX**
1987-304-4648  angell.org/essex

Mon–Fri  7:30am–4pm

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

Mon–Fri  7:30am–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: ____________________________
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.
ONCOLOGY 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
Oncologic Diagnosis: ________________________________________
Diagnosis confirmed with Histology or Cytology? Yes or No: ________________________________________
Summary of Current Problem: ________________________________________
Were radiographs taken? Yes or No: ________________________________________
Please list other diagnostics performed: ________________________________________
Current Medication and Dosages: ________________________________________
Other Medical History or Surgical Problems: ________________________________________
Current Medication and Dosages: ________________________________________
Additional Information: ________________________________________

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

Waltham Phone: 781-902-8400  |  Waltham Fax: 781-209-5721  |  physicalrehab@angell.org  |  angell.org/rehab
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: ____________________
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 is the information sheet outlining the service, as well as a referral form that you will need 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 mail or fax.

This service is available to all of our referring hospitals Monday - 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 patients sick enough to 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 time of 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 and 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”
As a service to our referring veterinarians, Angell offers outpatient abdominal ultrasound exams in Waltham with our internists.

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 prior to their arrival.

- 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, at your discretion and in consultation with the client, you should prepare the client for possible admission to the hospital via the Emergency Service. We can facilitate this process if required. Additional fees will be incurred.
- Angell’s internist will communicate findings to your office via fax. You can share the report with the client at that time.
- Clients will be encouraged to direct follow-up questions to you, their primary care doctor of record. The internist does not typically speak to the client at the completion of 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

Waltham Phone: 781-902-8400 | Waltham Fax: 781-622-1410 | Online referral submission available at angell.org/referrals

<table>
<thead>
<tr>
<th>TODAY’S DATE: ____________________</th>
<th>□ WALTHAM</th>
</tr>
</thead>
</table>

## 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

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.
ANGELL DIRECT CONNECT PROGRAM

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 keep you informed 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:

- Client does not need to hang up the phone after receiving the voice message at your practice; instead, they can just press a number and connect to Angell.
- 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
To help you and your clients identify when an animal is experiencing an emergency after hours, Angell has created the following guide. 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 right, 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!)
ABOUT MSPCA-ANGELL WEST

Angell Animal Medical Center offers the convenience of our MSPCA-Angell West facility in Waltham, MA. Along with 24/7 Emergency & Critical Care service and two board-certified criticalists on staff, the Waltham facility also offers specialized service appointments Monday through Sunday. MSPCA-Angell West now offers expanded Diagnostic Imaging services 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 in 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.
ABOUT ANGELL’S PHYSICAL REHABILITATION PROGRAM

Our Physical Rehabilitation Center is located in a beautiful, newly-constructed space at our 293 Second Avenue location in Waltham. The goals of canine and feline physical rehabilitation include reduction of pain, improving muscle strength and tone, remodeling scar tissue, and improving function for overall improvement of life. Rehabilitation is important in increasing speed of recovery, 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. Whether recovering from an injury, cross training, or facing mobility issues, dogs can substantially benefit from rehab.

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.
ANGELL CLINICS

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

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

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 as well as offering deeply discounted services for qualified low income families. The clinics provide 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
- 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 employee receive a 10% 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.
Expertise, Compassion, and Care.

THE STAFF AT ANGELL AT ESSEX

Erin Turowski, DVM
Medical Director
eturowski@angell.org

Tracy McNair, AS, CVT
Practice Coordinator
tmcnair@angell.org

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

THE STAFF AT ANGELL AT NASHOBA

Laurence Sawyer, DVM
lsawyer@angell.org

Taylor Joslyn, CVT
tjoslyn@angell.org

Andrea Lombardi, CVT
alombardi@angell.org

Danielle Tetreault
dtetrault@angell.org
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 provide a new pathway for families in need.

The clinics provide spay/neuter services as well as acute, outpatient, surgical care. We welcome your referrals to our clinics. The clinics 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. By providing subsidized, low-cost veterinary care, the clinic provides a new pathway for families in need.

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 program listed below or have an income under the Massachusetts poverty guidelines (https://aspe.hhs.gov/poverty-guidelines). Ultimate determination of suitability for this program will be made on a case-by-case basis at the discretion of MSPCA 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.
TOP OPHTHALMOLOGY TIPS FOR THE PRACTICING VETERINARIAN

MARTIN COSTER, DVM, MS, DACVO
angell.org/eyes
ophthalmology@angell.org
617-522-7282

1. IT’S ALL IN THE HOLDER
The key to performing a decent eye exam is to have the animal restrained appropriately, which may take one or two (and sometimes even three) assistants. The pet’s eyes should be at the examiner’s eye level, which means in most cases the pet should be on an exam table, with the examiner seated at a good height to make eye-to-eye contact without sacrificing ergonomics. An adjusting stool and/or table will therefore be needed. The pet’s head should be restrained with one hand under the chin and one at the back of the skull. This means a second holder may be needed to control the body if the patient will not stay still. A third assistant may be needed to open the eyelids or control front legs. Pre-visit sedation or anti-anxiety medications to facilitate a less stressed, less fearful visit can be very helpful to performing a complete eye exam.1,2

2. DARKNESS IS KEY
The ideal examination room is one in which external light sources (windows, doors, and even light seeping in around doors) can be completely blocked out. An easily accessible dimmer switch on the room lights can help greatly to allow the eye exam to be performed at varying levels of light intensity. A red light can be used to provide working illumination. This reduces incidental light reflections on the surface of the eye, which maximizes the examiner’s ability to look into the eye with direct illumination.

3. DON’T FORGET THE BASIC TESTS
Performing Schirmer tear test, fluorescein stain, and intraocular pressure are essential tests in order to make a diagnosis. Dry eye in particular is often overlooked for lack of a tear test, the normal value of which is 15mm/min or greater, in the absence of clinical signs. Intraocular pressure should be interpreted in light of other exam findings. For example, although a normal pressure of approximately 15mmHg is expected, this may be considered glaucomatous in a case of severe uveitis. As a variety of Icare® TONOVETs have become increasingly popular due to ease of use compared with the Tono-Pen®, knowing the normal values for your instrument is important. For example, the TONOVENT Plus may read around 4 to 5 mmHg higher than the standard TONOVENT, although the TONOVENT Plus may be providing a truer pressure measurement.3

4. FOLLOW AN ORDERED EXAM
A thorough eye exam should have an ordered approach that is consistent every time. This maximizes the chance that every structure will be looked at and thus all conditions can be diagnosed. An “outside-in” approach is most common, assessing global vision and pupillary light reflex assessments, facial conformation and orbit, eyelids including third eyelid, conjunctiva, cornea, anterior chamber, iris, lens, vitreous, and retinal exam. Most practices do not have a slitlamp biomicroscope as used by ophthalmologists. Therefore, the magnification provided by a head loupe is very helpful, and having a well-charged bright transilluminator can make a huge difference over a dimmer light source. An ophthalmoscope can be used with its slitbeam for further anterior chamber assessment. Fundic examination is best performed with an indirect lens (20 or 28 diopter) and bright transilluminator.
5. PRESCRIBE OUT WHEN NECESSARY
Many veterinarians are unable to carry numerous ophthalmic medications in their pharmacies. Fortunately, most ophthalmic drugs are also used in humans, and thus do not all need to be stocked in-house. This may sound like a simple tip, but all too often we see referral patients in whom a correct diagnosis was made but appropriate medications were not prescribed due to “lack” of availability.

6. DRUGS THAT PENETRATE INTO THE EYE
Not all topical drugs penetrate through an intact corneal epithelium. For antibiotics, choices are limited to fluoroquinolones (e.g., ofloxacin and ciprofloxacin) or chloramphenicol. Non-steroidal anti-inflammatory drugs (NSAIDs, e.g., diclofenac, flurbiprofen, and ketorolac) and of course all glaucoma drops penetrate into the eye, but only certain steroid salts will penetrate. These are prednisolone acetate and the dexamethasone found in neo-poly-dexamethasone; in this latter case, solution may penetrate better than ointment. Antibiotics, NSAIDs, and steroids will not penetrate much deeper than the aqueous humor, and so posterior segment disease must be treated with systemic medications.

7. NEO-POLY-HYDROCORTISONE IS RARELY USED BY THIS AUTHOR
This steroid does not penetrate into the eye, so it cannot treat uveitis, and is rarely strong enough for ocular surface inflammation. Its use is thus quite limited. Allergic inflammation might respond, but may do better with specific antihistamine eye drops such as patanol or ketotifen.

8. NEVER UNDERESTIMATE PAIN
Clients frequently report that their pet is comfortable, while also reporting the animal squinting at home. A careful history can elucidate other symptoms of pain, such as reduced appetite or altered behavior, or rubbing at the eye or face. Whether treating corneal ulcers, conjunctivitis, glaucoma, or uveitis, pain control should not be overlooked. Topical anesthesia (e.g., proparacaine) is inappropriate except for diagnostics, due to potential epithelial toxicity. Systemic pain control with an oral NSAID, gabapentin, fentanyl patch, and/or injectable/oral opioids should be considered as indicated.

9. SCLEROSIS VS. CATARACT
One of the hardest determinations to make is whether an eye has cataract versus lenticular, a.k.a. nuclear, sclerosis (complicated even further when both are present). Generally, nuclear sclerosis should not occur in an animal younger than 7–8 years of age, and should be bilaterally symmetrical when present. Iatrogenic dilation with tropicamide or dark room examination with a relatively dim (so as not to elicit the pupillary light reflex) direct light source may be needed to visualize the perimeter of the lens. Dense nuclear sclerosis can obscure the fundus and behave like a cataract, but generally the fundus should be easily visualized, even through sclerosis. The outer cortex should be clear with sclerosis. True cataract can be bilaterally symmetrical, but is rarely homogenous throughout the lens, and obscures fundic examination.

10. TIPS FOR A FUNDIC EXAM
The retinal exam is the hardest part of an eye exam and is thus often unfortunately overlooked or skipped entirely. Iatrogenic dilation with tropicamide (assuming intraocular pressure is normal and glaucoma or lens luxation is not suspected) is extremely important for a full retinal exam; however, the time limitations of private practice, and owner constraints on time, can often preclude this. In these instances, dark room examination using a slightly dimmer light source and a 28 diopter lens (as opposed to a 20 diopter lens used for dilated exams) can provide visualization through a mid-range pupil. Once again, it is essential to have a trained assistant or two, to restrain the patient and hold open the eyelids as needed. Standing an arm’s length away from the eye, bring a transilluminator up close to the patient’s eye, obtain a tapetal reflection, and
then bring the light source back to the level of your own eye, still directed at the fundus. At this point, bring an indirect lens into alignment with the light and patient’s eye, close enough to the eye that you can observe the iris and pupil. Once the pupil is centered in the lens, bring the lens closer to you until it is about a finger’s length away from the eye (stabilize your hand by extending a finger to touch the side of the face or bridge of the nose). If you lose the view of the fundus, or need to alter position, swing the lens away, regain the tapetal reflection, and swing the lens back into place.

Figure 4: Nuclear cataract, in the right eye of a dog. Note the dense, heterogeneous white opacity obscuring the central view of the yellow/green tapetal reflection.

FOOTNOTES & REFERENCES

1. In an abstract presented at the 49th annual scientific meeting of the American College of Veterinary Ophthalmologists, Minneapolis, Minnesota, Sept 26–29, 2018, titled “Effects of oral trazodone on canine tear production and intraocular pressure,” Pelych et al. concluded that “administration of 5 or 9 mg/kg of trazodone does not significantly affect tear production or IOP in dogs within 6 hours.”

2. If used for pre-visit sedation, gabapentin might lower intraocular pressure in the dog, but not a clinically significant amount; however, its effects on glaucoma have not been studied: Shukla AK, Pinard CL, Flynn BL, Bauman CA. Effects of orally administered gabapentin, tramadol, and meloxicam on ocular variables in healthy dogs. Am J Vet Res. 2020 Dec; 81(12):973–984. doi: 10.2460/ajvr.81.12.973. PMID: 33251843.


ANGELL HAS EARNED FELINE FRIENDLY GOLD ACCREDITATION

angell.org/felinefriendly

"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.
CANINE ORAL MASSES

PAMELA MOUSER, DVM, MS, DACVP
angell.org/lab
pathology@angell.org
617-541-5014

Oral masses, especially from dogs, are a common submission to Angell’s biopsy service. This may be in part due to clinical signs alerting the owner to the presence of an oral mass, such as drooling, oral bleeding, halitosis, or anorexia, leading to veterinary evaluation of affected dogs. A subset of oral masses may also be detected on physical examination during a wellness visit or during veterinary assessment for another condition. At Angell, the dentistry service is a large contributor of oral masses. Veterinary dentistry has progressed beyond “dental cleaning” or “dental prophylaxis” to encompass a much broader and more detailed orofacial evaluation termed Comprehensive Oral Health Assessment and Treatment (COHAT). Since this examination is performed annually (sometimes more often, depending on the patient) under general anesthesia, it has the added benefit of providing early detection of oral masses, which can then be sampled or excised during the procedure. This article retrospectively summarizes data from canine oral masses submitted to Angell Pathology over a period of approximately five years, and compares Angell submissions to published reports.

STUDY DESIGN

Surgical biopsies submitted to Angell Pathology from October 2014 to January 2020 were searched to identify any samples designated as “oral cavity,” “maxilla bone,” or “mandible bone.” The designation of “oral cavity” encompassed typical intraoral structures, including gingiva, tongue, tooth, palate, cheek, etc. The data set was limited to canine patients. Lesions not considered masses or mass-like in nature (including inflammation, ulceration, or granulation tissue) were removed from the data. Duplicate patient entries were evaluated to exclude multiple instances of the same lesion, such as repeat biopsy or re-excision of the same mass. Data were summarized and descriptive statistics were applied.

RESULTS

The data set included 673 dogs with 942 masses. Of these, 522 dogs (78%) had a single mass and 151 (22%) had multiple masses. The number of masses in dogs with multiple lesions ranged from two to 10; some dogs with multiple lesions had masses submitted on more than one occasion. Dogs ranged from 0.6 to 16 years old, with a mean and median of 9 years old. There were 391 males (58.1%) of which 347 (51.6% of total population) were designated as castrated, and 282 females (41.9%) with 278 spayed (41.3%). Over 100 dog breeds were represented. Labrador retrievers (or Labrador retriever crosses) accounted for 80 (12%) of the patients, followed by 51 golden retrievers/crosses (7.6%) and 38 boxers/crosses (6%). The most common breeds are listed in Table 1.

Table 1. Most common breeds in submissions of canine oral masses from October 2014 to January 2020.

<table>
<thead>
<tr>
<th>BREED</th>
<th>NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labrador retriever/cross</td>
<td>80</td>
</tr>
<tr>
<td>Golden retriever/cross</td>
<td>51</td>
</tr>
<tr>
<td>Boxer/cross</td>
<td>38</td>
</tr>
<tr>
<td>Pit bull/cross</td>
<td>28</td>
</tr>
<tr>
<td>German shepherd dog/cross</td>
<td>20</td>
</tr>
<tr>
<td>Maltese/cross</td>
<td>19</td>
</tr>
<tr>
<td>Terrier/cross</td>
<td>18</td>
</tr>
<tr>
<td>Yorkshire terrier/cross</td>
<td>18</td>
</tr>
<tr>
<td>Mixed Breed</td>
<td>16</td>
</tr>
<tr>
<td>Cocker spaniel/cross</td>
<td>15</td>
</tr>
<tr>
<td>Pug/cross</td>
<td>14</td>
</tr>
<tr>
<td>Shih Tzu/cross</td>
<td>13</td>
</tr>
<tr>
<td>Boston terrier</td>
<td>13</td>
</tr>
<tr>
<td>Bulldog (English/American/cross)</td>
<td>12</td>
</tr>
<tr>
<td>Chihuahua/cross</td>
<td>12</td>
</tr>
<tr>
<td>Dachshund/cross</td>
<td>12</td>
</tr>
<tr>
<td>Schnauzer/cross</td>
<td>12</td>
</tr>
<tr>
<td>Bernese Mountain Dog</td>
<td>11</td>
</tr>
<tr>
<td>Standard poodle</td>
<td>9</td>
</tr>
<tr>
<td>Shetland sheepdog</td>
<td>9</td>
</tr>
<tr>
<td>French bulldog</td>
<td>8</td>
</tr>
<tr>
<td>Jack Russell terrier</td>
<td>8</td>
</tr>
</tbody>
</table>
Non-neoplastic and benign diagnoses accounted for 812 (86%) of the 942 masses. The most common diagnosis was gingival fibrous hyperplasia (412 masses or 44%), followed by peripheral odontogenic fibroma (223 masses or 24%). The most common malignant diagnoses were squamous cell carcinoma and melanoma (33 masses or 3.5% each), as well as sarcoma (31 masses or 3.3% of total masses). A summary of histopathologic diagnoses is included in Table 2. In addition, Figure 1 depicts various presentations of oral masses in dogs biopsied at Angell. Note that the clinical manifestation of masses may overlap, making it difficult to impossible to distinguish between some non-neoplastic, benign, and malignant entities based on gross appearance alone.

Table 2. Histopathologic diagnosis of canine oral masses from October 2014 to January 2020.

<table>
<thead>
<tr>
<th>HISTOPATHOLOGIC DIAGNOSIS</th>
<th>NUMBER OF MASSES (PERCENT TOTAL)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Non-neoplastic diagnoses</strong></td>
<td></td>
</tr>
<tr>
<td>• Gingival fibrous hyperplasia</td>
<td>412 (43.7%)</td>
</tr>
<tr>
<td>• Mucosal hyperplasia (not gingival)</td>
<td>42 (4.5%)</td>
</tr>
<tr>
<td>• Cyst</td>
<td>16 (1.7%)</td>
</tr>
<tr>
<td>• Bony exostosis</td>
<td>7 (0.7%)</td>
</tr>
<tr>
<td>• Lymphoid hyperplasia</td>
<td>3 (0.3%)</td>
</tr>
<tr>
<td>• Inflammatory/nasopharyngeal polyp</td>
<td>3 (0.3%)</td>
</tr>
<tr>
<td>• Sialocele</td>
<td>2 (0.2%)</td>
</tr>
<tr>
<td>• Calcinosis cutis</td>
<td>1 (0.1%)</td>
</tr>
<tr>
<td><strong>Benign neoplasms</strong></td>
<td>326 (34.6%)</td>
</tr>
<tr>
<td>• Peripheral odontogenic fibroma</td>
<td>223 (23.7%)</td>
</tr>
<tr>
<td>• Acanthomatous ameloblastoma</td>
<td>49 (5.2%)</td>
</tr>
<tr>
<td>• Plasma cell tumor</td>
<td>20 (2.1%)</td>
</tr>
<tr>
<td>• Papilloma (squamous or viral)</td>
<td>13 (1.4%)</td>
</tr>
<tr>
<td>• Melanocytoma</td>
<td>7 (0.7%)</td>
</tr>
<tr>
<td>• Benign spindle cell tumors (fibroma,</td>
<td></td>
</tr>
<tr>
<td>ossifying fibroma, schwannoma, neuroma)</td>
<td></td>
</tr>
<tr>
<td>• Granular cell tumor</td>
<td>5 (0.5%)</td>
</tr>
<tr>
<td>• Ameloblastic fibro-odontoma/odontoma</td>
<td>2 (0.2%)</td>
</tr>
<tr>
<td><strong>Malignant neoplasms</strong></td>
<td>130 (13.8%)</td>
</tr>
<tr>
<td>• Squamous cell carcinoma</td>
<td>33 (3.5%)</td>
</tr>
<tr>
<td>• Melanoma</td>
<td>33 (3.5%)</td>
</tr>
<tr>
<td>• Sarcoma</td>
<td>31 (3.3%)</td>
</tr>
<tr>
<td>• Multilobular tumor of bone</td>
<td>7 (0.7%)</td>
</tr>
<tr>
<td>• Osteosarcoma</td>
<td>7 (0.7%)</td>
</tr>
<tr>
<td>• Carcinoma</td>
<td>5 (0.5%)</td>
</tr>
<tr>
<td>• Lymphoma</td>
<td>3 (0.3%)</td>
</tr>
<tr>
<td>• Mast cell tumor</td>
<td>3 (0.3%)</td>
</tr>
<tr>
<td>• Chondrosarcoma</td>
<td>2 (0.2%)</td>
</tr>
<tr>
<td>• Ameloblastic carcinoma</td>
<td>1 (0.1%)</td>
</tr>
<tr>
<td>• Hemangiosarcoma</td>
<td>1 (0.1%)</td>
</tr>
<tr>
<td>• Histiocytic sarcoma</td>
<td>1 (0.1%)</td>
</tr>
<tr>
<td>• Liposarcoma</td>
<td>1 (0.1%)</td>
</tr>
<tr>
<td>• Invasive odontogenic neoplasm</td>
<td>1 (0.1%)</td>
</tr>
<tr>
<td>• Malignant round cell neoplasm</td>
<td>1 (0.1%)</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Canine oral masses submitted to Angell Pathology over the specified time period were predominantly non-neoplastic or benign. It is important to note that Angell submissions are potentially skewed to include a greater number of small or incidental lesions detected and removed at the time of COHAT. Similar lesions may be missed during physical examination of a non-anesthetized patient or, if detected, cannot be immediately sampled and therefore biopsy may be delayed or not pursued in the absence of clinical signs. Similar numbers of squamous cell carcinoma, melanoma, and sarcoma were diagnosed in the malignant category of this population. It is possible that some oral masses diagnosed as sarcoma represent a spindleoid variant of amelanotic melanoma, but were not further characterized due to lack of ancillary testing. Thus, application of immunohistochemistry to cases of oral sarcoma may have increased the total number of melanoma diagnoses (and decreased sarcoma cases). The following paragraphs highlight statistics from prior reports on canine oral masses, in comparison with Angell data.

A 2019 retrospective study by Mikiewicz et al. documented 486 cases of oral masses in dogs and cats. Similar to the data shown above, there was a predominance of benign and hyperplastic lesions in dogs, although composing a much lower overall percentage of cases (53.2%) when compared to Angell submissions (86%). The difference in proportions between the two data sets may be related to increased detection/submission of small or “incidental” gingival masses in the Angell population, as described above; the inclusion of multiple masses from individual Angell dogs; and also because the 2019 retrospective study included inflammatory lesions, without which the percentage of benign/hyperplastic lesions would have been 62.4%. The most common malignant diagnoses in the 2019 study were melanoma followed by squamous cell carcinoma and fibrosarcoma, similar to the top three malignancies seen by Angell Pathology.

A 2018 retrospective study of canine and feline oral biopsies from a dental specialty practice reported 62% of the 403 canine lesions were classified as either inflammatory or odontogenic. The study did not specify how hyperplastic lesions were categorized. Squamous cell carcinoma, fibrosarcoma, and melanoma (with equal numbers of osteosarcoma) were the most common malignant diagnoses in descending order. The 2018 study included plasma cell tumor in the “malignant” category, while this tumor was considered benign in the Angell data and in the above 2019 retrospective study.

A 2010 retrospective study of 280 oral biopsies in Swedish dogs reported a predominance of reactive or benign diagnoses (66% of cases), with gingival hyperplasia (24%) and peripheral odontogenic fibroma (21%) most common. Melanoma, sarcoma, and squamous cell carcinoma were the most common malignant diagnoses in descending order.

A retrospective summary of canine oral biopsies from the University of California-Davis Dentistry and Oral Surgery Service had 75% of all diagnoses categorized as benign or non-neoplastic (including inflammation and hyperplasia). Melanoma, squamous cell carcinoma, and fibrosarcoma were the most common malignancies reported.
The summarized data from canine oral biopsies submitted to Angell Pathology over a five-year period is similar to retrospective studies, specifically the predominance of benign/non-neoplastic lesions and the most prevalent malignancies. Interestingly, the proportion of benign or non-neoplastic lesions is highest in the Angell group, likely related to selection bias (the types of cases submitted to Angell Pathology). The proportion of benign/non-neoplastic diagnoses in the Angell population would have been even higher if inflammatory lesions had been included. In general, canine oral masses are more often benign or non-neoplastic. When malignant, the most common lesions include squamous cell carcinoma, melanoma, and sarcoma.

**REFERENCES**


*Figure 1. Clinical and gross photographs of canine oral masses submitted for histopathology at Angell. A: A pink smooth firm raised mass of the palatal gingiva diagnosed as peripheral odontogenic fibroma. B: A formalin-fixed, partial mandibulectomy sample with a smooth nodular mass bearing some resemblance to image A, but compatible with a sarcoma on histopathology. C: A formalin-fixed rostral mandibulectomy sample showing a rough, pale tan to white verrucous gingival mass diagnosed as acanthomatous ameloblastoma. D: A gross image from Angell archives showing irregular, coalescing gingival expansion and hyperemia, corresponding to T-cell lymphoma. E: A multinodular pink-red mass on the buccal mucosa of a dog with disseminated osteosarcoma. The oral mass was an amelanotic melanoma. F: An ulcerated, irregular plaque-like mass of the upper gingiva corresponding to squamous cell carcinoma.*
Intravenous fluid therapy has been a cornerstone of medical and surgical management in human as well as veterinary medicine for decades. The primary goal behind using intravenous fluids is to maintain or restore intravascular volume, tissue perfusion, and reverse dehydration. Different types of fluids (such as crystalloids, natural or synthetic colloids, or blood products) have different compositions in terms of tonicity, acid-base, oncotic properties, hemostatic, and immunologic effects. These differences translate into varying effects in our patients.

Historically, fluids were thought to operate within the parameters established by Starling’s forces, where hydrostatic pressure worked to push fluids out of the vasculature, and oncotic pressure worked to retain fluid within. More recently, this theory has been updated after the identification of the endothelial glycocalyx, a meshwork of long glycosaminoglycans (GAGs) linked to other proteins (glycoproteins and proteoglycans) that lines the luminal surface of the vasculature. Identification of this structure has led to a revision of Starling’s forces, as we have realized the significant role of the glycocalyx in how the body responds to fluid therapy (and explains why our fluid plans don’t always do what we think they are going to do). The hydrostatic and oncotic pressure gradients between the microvascular lumen and the interstitium rely heavily on the integrity and health of the endothelial glycocalyx.

As advances in understanding fluid therapy and the physiology behind its use occur, many debates and disagreements have developed in both human and veterinary medicine about fluid therapy. Standardized fluid therapy recipes (a.k.a. “one size fits all”) are no longer supported; instead, current recommendations urge that fluid therapy be detailed for the individual patient, taking into consideration their clinical illness, needs/deficits, and comorbidities. Recommendations for continued evaluation of our patients while on fluid therapy, and using goal-directed resuscitation, are currently in favor.

So how do we incorporate this into our daily practice?
The different body fluid compartments are separated by membranes. The endothelial membrane and endothelial glycocalyx separate intravascular and interstitial space, while cell membranes separate the ICF from the ECF. Fluid movement across the different compartments depends on membrane characteristics, hydrostatic pressure, colloid oncotic pressure, and osmolarity.

**FLUID BALANCE AND IMBALANCE**

In a normal healthy state, fluid balance is maintained between the various compartments as described above. Normal physiology also normally maintains fluid balance between our patients and their environment. Healthy animals mostly obtain fluids through drinking and eating, as well as a small gain of water via metabolic reactions. They lose water through panting as well as urination and defecation. In certain disease states, such as fever, gastrointestinal disease (decreased intake of water/food, vomiting, diarrhea), respiratory disease, and hemorrhage, additional fluid losses occur.

When disruptions in fluid balance occur, disorders in hydration and perfusion develop. Most commonly, fluid loss will exceed fluid intake; however, in some cases, such as with congestive heart failure, there can be a positive fluid balance. Evaluating a patient’s fluid balance incorporates physical exam findings, diagnostic results, and assumptions based on patient history and signalment. Determining from which compartment(s) a patient has lost fluid is an important first step in determining what type of fluid therapy they may need.

**HYDRATION VERSUS PERFUSION**

It is helpful to remember this distinction when considering fluid therapy in our patients. Hydration status refers to TBW and the role of this fluid in tissue support and cellular processes. We assess this through skin turgor, mucus membrane moisture or lack thereof, and ocular position. Dehydration occurs through decreased water intake relative to fluid losses. Fluid loss with dehydration results in interstitial fluid loss as well as intracellular fluid loss. Interstitial fluid loss occurs through standard dehydration, as well as changes in the interstitial colloid oncotic pressure (fluid moves from the intravascular space into the interstitium), resulting in increased plasma sodium and hemoconcentration. Intracellular fluid loss can occur as well.

Perfusion refers to the intravascular volume, which plays a role in providing oxygen and other nutrients to the tissues. Hypoperfusion results from loss of fluid from the intravascular space. Most commonly this occurs with acute hemorrhage; however, severe dehydration will eventually result in hypoperfusion as well. The body can normally shift fluid volumes to temporarily compensate for small or controlled losses from the intravascular compartment, but if the losses are significant, clinical signs of shock will develop. These include tachycardia, hypotension, delayed CRT, and depressed mentation.

A patient who is dehydrated has different fluid therapy needs than a patient who is experiencing hypoperfusion. Once you have identified which type of fluid loss you are dealing with, you can start to make a fluid therapy plan. Fluid therapy also has different phases, depending on what your goal is. Fluid resuscitation refers to correcting perfusion abnormalities, while rehydration refers to correcting hydration abnormalities. Fluid maintenance refers to ongoing fluid therapy once dehydration and/or hypoperfusion have been corrected. Evaluating your goals for a patient will help further determine your fluid therapy plan. Is the patient in shock? Dehydrated? Both? Can your patient drink and eat? Enough to maintain any losses? Is your goal with fluid therapy to correct clinical dehydration or achieve endpoints of resuscitation (normal heart rate, improved blood pressure, CRT < 2 seconds, mentally appropriate)?

**WHY SHOULD WE CARE ABOUT FLUID THERAPY?**

While there are many obvious benefits of fluid therapy, ongoing research in human and veterinary medicine has suggested that fluid therapy (and specific types of fluids) may have unwanted or adverse effects. By tailoring a fluid plan to an individual patient’s needs, we reduce the risk of adverse effects and increase positive outcomes. Having established goals prior to starting fluid therapy will help guide your decisions and provide objective data on whether you are achieving those goals or need to come up with a different plan. Goals can include correcting dehydration, correcting electrolyte abnormalities, and improving blood pressure. In human medicine, targeted end points of resuscitation have improved patient outcome.

**FLUID BASICS AND CHOICES**

In general, there are four main categories of fluids: crystalloids, colloids, blood products, and hemoglobin-based oxygen carriers (oxyglobin). Transfusion medicine is beyond the scope of this lecture, and HBOCs have been unavailable in the US for years, so I will not cover them either. However they may make a comeback at some point, so it is prudent to remember that they may someday be potentially useful. As such, in clinical practice, we tend to have crystalloids and colloids to choose from when creating a fluid plan.

**CRYSTALLOIDS**

Crystalloids remain the mainstay of fluid therapy in human and veterinary medicine. These fluids contain small solutes (usually electrolytes, <500g/mole), which allows them to easily cross the capillary endothelium into the ECF. Crystalloids are categorized into balanced or unbalanced solutions. Balanced solutions have an electrolyte composition similar to the ECF, while unbalanced (such as 0.9% NaCl) don’t. Crystalloids can also be categorized based on whether they are replacement or maintenance solutions. Replacement solutions (Normosol-R, Lactated Ringers Solution, Plasmalyte-148), also called isotonic crystalloids, are ideal for correcting fluid deficits in a patient. Maintenance solutions (Normosol-M, Plasmalyte-56) tend to have lower sodium and higher potassium concentrations than the ECF, and are best for providing fluid therapy to replace fluid lost through normal physiologic functions. (I would say that in general, while there are a variety of types of crystalloids, we tend to use replacement fluids only, because as soon as a patient is able to replace their normal physiologic fluid losses with eating and drinking, they are off of fluid support.)
Crystalloids are attractive because they are readily available, are relatively inexpensive, have a long shelf life, and are easy to use – and we are all pretty comfortable using them. However, there are a few things to keep in mind clinically, and this all goes back to what your goal with fluid resuscitation is.

When it comes to using crystalloids in fluid resuscitation, it is important to remember that crystalloids have the largest effect on the interstitial and intracellular compartments, due to their rapid equilibration throughout the ECF. After 30 minutes, half of the volume you deliver remains in the vasculature. This means that while there may be a beneficial immediate effect of blousing crystalloids, their effect is going to be lost rapidly, which may require repeated dosing and may result in fluid overload of your patient. In general, large volumes of crystalloids are needed to achieve goals of resuscitation. Adverse effects with using such large volumes include dilutional coagulopathy, damage to the endothelial glycocalyx, hypothermia, and fluid overload.

Silverstein et al. compared the effects of multiple types of fluids on blood volume, and the results are reflected in this chart (see slides). They used 0.9% saline as the crystalloid representative, and you can see that there is a very nice increase in blood volume in the first 10 to 15 minutes, but that by 30 minutes, the effect is back down to about a 20% increase. Crystalloids provide a rapid volume expansion, but then have a rapid redistribution out of the vasculature.

**COLLOIDS**

When faced with the short-lived effects and potential adverse effects of large volume crystalloid use, creation of colloids became popular. Colloids are fluids which contain large molecular weight solutes (> 10k Da), and can be categorized as natural (such as albumin, some blood products) or synthetic (such as Hetastarch or Vetstarch which contain synthetic starch compounds). This type of fluid tends to remain within the intravascular space due to these large molecules, which prevent it from crossing the (healthy) endothelium. As they remain in the vasculature, they exert a “pulling” effect on fluid in the interstitium, drawing it into the vasculature and keeping it there, thus increasing intravascular volume. This effect allows significant volume expansion without having to deliver a large volume of colloid fluid, because they utilize fluid that is already inside the patient. This volume expansion is also longer lasting that that of crystalloids. In theory, you can volume resuscitate with a smaller amount of colloids than you can with crystalloids. However, these theories have not been supported by human data.

Synthetic colloids are hydroxyethyl starches (HES) that are categorized based on their molecular weight, their concentration in solution, and the degree of hydroxyl group substitutions at positions C2 and C6 of the molecular structure. These differences are relevant in light of more recent concerns about adverse effects of synthetic colloid use; some types of synthetic starches are more commonly associated with complications. Those synthetic colloids with longer half-lives, higher molecular weights, and a higher degree of C2/C6 substitution have been associated with higher complication rates. Synthetic colloids are eliminated by the reticuloendothelial system as well as renal elimination. Currently it is believed that these systems will reach a saturation point, and then any remaining synthetic starches in the body create problems.

Synthetic colloids were heavily used when they first became available in human and subsequently veterinary medicine, and they seemed to solve the problems experienced with crystallloid use. However, over time, concerns about the safety of colloid use in human (followed by veterinary) medicine came to light, creating some controversy and confusion. Human studies implicated induced coagulopathy, acute kidney injury, and increased mortality following use of synthetic colloids. Veterinary medicine has also looked at any relationship between synthetic colloids and these adverse effects, and the results have not been as compelling.

Coagulation effects: Morris (2016) found prolongation of clotting times in vitro with both LRS and HES; however, the HES effects were more severe. Helmbolt (2014) evaluated the effect of HES 670/075 on platelet closure times in vivo (dogs), and found that various CRI rates (1 mL/kg/hr and 2 mL/kg/hr) significantly increased PCT. However, there was no evidence of spontaneous bleeding in any of the dogs. Wurlod (2015) performed an in vitro study comparing the effects of multiple crystallloid and synthetic colloid fluids on coagulation, and found that while synthetic starches affected coagulation parameters, they were no more coagulopathic at clinically relevant doses as compared to saline.

Renal effects: In humans, hydroxyethyl starches were labeled with a black box in 2013 in the US, and banned in the EU, due to concerns over their association with development of acute kidney injury (AKI) in humans. Since then, synthetic colloid use has largely fallen out of favor, with human albumin becoming a popular alternative. On the veterinary side, Hayes (2016) evaluated the incidence of AKI and death following HES administration in dogs over a three-year period, and found HES use was associated with an increase in mortality and AKI. These results caused many in the veterinary E/CC realm to rethink our previously liberal use of synthetic colloids. Yozova (2016) also evaluated the association of HES use with creatinine and mortality in dogs, and found that dogs receiving HES had a higher mortality, but no difference in creatinine or the development of AKI. They concluded that this outcome was not associated with HES use. Boyd (2019) evaluated changes in renal histopathology after the use of gelatin (another synthetic starch) and HES and found that a urinary biomarker of inflammation (uMCP) was increased after gelatin and HES use compared to crystalloids. Zersten (2019) also evaluated HES use in anesthetized dogs and did not find evidence that HES increased creatinine (in fact creatinine decreased with HES administration). The jury is still out in veterinary medicine as to how much of a clinical risk synthetic colloids pose in our patients; in general, their use has dropped off and some loose clinical guidelines have surfaced, including avoiding the use of HES in any azotemic patient or patients with other risk factors for AKI, and limiting the amount of HES to 20 mL/kg/day.
ALBUMIN

Albumin is the most abundant natural colloid; it provides more than 70% of colloid oncotic pressure. Albumin also plays roles in wound healing; coagulation; transportation of hormones, drugs, and cations (such as calcium); and free radical scavenging, and also acts as a weak buffer. It is the most common colloid used in human medicine, which has allowed a pretty easy move away from synthetic colloids. Human albumin has a 79% homology with canine albumin, and the use of human albumin in veterinary medicine has been reported, albeit with some significant adverse effects. Hypersensitivity reactions have been reported in multiple veterinary studies, and the risks have made veterinarians wary of using this product routinely. Canine albumin is a tempting alternative, because theoretically the risk of hypersensitivity reactions would be far lower. However, thus far, availability and cost have prevented propelling the use of canine albumin into routine use. Lyophilized canine albumin is sporadically available, which makes it an appealing alternative due to a prolonged shelf life, but at this point it is just not consistently available. Fresh frozen plasma and frozen plasma also contain albumin; however, the volume of these products needed to significantly increase colloid oncotic pressure is usually cost prohibitive and poses a risk for fluid overload (70 mL/kg/day).

BLOOD PRODUCTS

Discussing all of the various blood products is beyond the scope of this lecture, but newer research and protocols in human medicine are pretty interesting and may be clinically applicable to our patients. Dividing whole blood into its components has been a long-standing practice in human and veterinary medicine. Over the past 10 years, recognition of phenomena such as dilutional coagulopathy and acute traumatic coagulopathy are forcing us to rethink our resuscitation strategies. The most current transfusion recommendation is to transfuse one unit of fresh frozen plasma and one unit of platelet concentrate for every one unit of packed red blood cells. It seems that compartmentalized transfusion medicine is not as easy or simple as we had hoped, which has caused the pendulum to swing back toward reconsidering the benefits of whole blood transfusions. In battlefield medicine, for example, whole blood is now preferred to transfused components. So while not every veterinary practice may have the space or finances to stock blood products, having that big friendly young dog that is otherwise healthy (and screened) may be an effective way to provide a whole blood transfusion.

MONITORING WHILE ON FLUID THERAPY

As mentioned above, fluid therapy should be tailored for each individual patient based on their previous medical history/comorbidities, current illness, and other ongoing needs. Likewise, our patients’ physiology and condition change from day to day (or sometimes more frequently), so it is important that we reevaluate them and adjust our fluid therapy plan frequently. It’s great if fluid therapy works out as planned; however, it’s just as likely that the initial plan will need to be revised at some point.

When evaluating a patient in light of fluid therapy, physical examination can be very useful. Do they appear euhydrated? Do they appear interstitially overhydrated (jiggly SQ) but hypovolemic (hypothermic, dumpy, hypotensive)? Are they still dehydrated? Using objective parameters such as changes in body weight, degree of urine production, blood pressure, and heart rate, as well as laboratory data such as PCV/TS, electrolytes (sodium in particular), and renal values is the best way to assess changes in hydration and perfusion status. Based on these evaluations, you can then adjust your fluid rate or type, and add any supplementation (such as potassium) as indicated. Prolonged fluid therapy when a patient has improved and doesn’t require fluid support can be detrimental, so remembering to taper fluids is also important.

CASE EXAMPLES

The dehydrated but euhydrmic patient:

These are the patients that haven’t been eating or drinking normally, or have increased losses to some degree. These patients may be quiet but are responsive and normothermic, and their vital parameters are usually within normal limits. The goal with these patients is to replace their ECF. Since they do not have decreased perfusion at this point, an isotonic, replacement crystalloid is a great choice, because the goal is to get that fluid out of the vasculature and into the interstitium. Start by calculating the patient’s daily fluid requirement; there are a few ways to do this. Current recommendations for maintenance fluid rates for dogs are 60 mL/kg/day, and for cats are 50 mL/kg/day. An alternate calculation (which I tend to use for larger dogs because the above calculation often will overestimate their requirements) is based on RER: 30(weight in kg) + 70 = daily fluid requirement in mL. If a patient is markedly dehydrated, you can start with 1.5x the maintenance rate and then evaluate in six to eight hours.

The shocky, hypovolemic (not hemorrhaging) patient:

These patients usually suffer from a combination of decreased ECF and intravascular volume, and their physical exam parameters reflect this. These patients are often mentally dull, markedly dehydrated (prolonged skin tent, sunken eyes), bradycardic (cats especially) or tachycardic, hypothermic, and hypotensive. The goal with these patients is to restore intravascular volume quickly, but also replace their ECF fluid loss as well. These patients need fluid replacement more urgently than the above example, so a fluid bolus is usually warranted (caution with preexisting cardiac disease or a murmur/gallop). When thinking about fluid boluses, remember to use the largest IV catheter possible; use more than one if you need to give a large volume (i.e., to a large dog); and ideally place the catheter(s) as close to the heart as possible (cephalic veins or even external jugular veins in some cases). The amount of the bolus depends on the patient status. In general, we start by calculating the patient’s blood volume. Historically we referred to this as their “shock volume.” However, this term has fallen out of favor as we have reevaluated the impact of fluid therapy in our patients (especially the more critical...
ones). In dogs, this is 90 mL/kg. In cats, it is 60 mL/kg. It is currently recommended to start with one-quarter of the patient’s blood volume, and then reassess. This volume can be repeated if needed, but continual reassessment is imperative. By starting with smaller volumes, we reduce the risk of fluid overload. Once your patient’s clinical parameters (heart rate, body temperature, pulse quality/blood pressure, mentation) improve, you can transition to an initial replacement fluid rate as described above.

The shocky, hypovolemic, hemorrhaging patient:

These patients can present similarly to the above cases, but they usually were euvoletic and euvhydrated prior to the hemorrhage event. Their main problem is acute blood loss and secondary shock. We don’t necessarily want our fluid therapy to be lost to the ECF in about 30 minutes; we want it to stick around to support the cardiovascular system and provide perfusion to organs. In these cases, starting with hypertonic crystalloids (such as hypertonic saline) makes sense. Hypertonic saline (HTS) has a high osmolality (2400 mOsm/L, compared to LRS, which has an osmolality of 273 mOsm/L), which creates an osmotic gradient into the vasculature. Because HTS is a crystalloid, it will also leave the intravascular space rapidly (in about 30 minutes), so HTS should be followed by another type of fluid. Colloids historically have been used in this role, as they will tend to keep all that intravascular volume you pulled from the interstitium in the vasculature longer. HTS should be avoided in profoundly dehydrated patients, or patients who can’t regulate their total body water. It can be used in mild to moderate dehydration, but needs to be followed with isotonic crystalloids to allow fluid to move back into the interstitium. HTS (3–4 mL/kg) should be given intravenously over 15 minutes, due to a risk of vagal response to rapid volume expansion.

As discussed earlier, colloid fluid therapy was extremely popular in these types of cases due to its oncotic support, but use of colloids has decreased over the past five years due to safety concerns. Colloids are still helpful for “low volume resuscitation,” where they are combined with HTS (3–4 mL/kg HTS with 4 mL/kg colloid), and can be quite effective in head trauma cases.

Another option in these types of cases would also be blood components (again in a 1:1:1 ratio ideally), or whole blood.

Human and animal studies have shown that survival decreases with large volume crystalloid resuscitation in uncontrolled hemorrhage, so this should be avoided. Large volumes of crystalloids can dislodge clots and dilute coagulation factors. Instead, using “controlled resuscitation” or “hypotensive resuscitation” is recommended in acute trauma patients. This entails giving fluids to achieve a MAP of 40 mmHg (normal MAP = 80 mmHg) on a short-term basis, until hemorrhage can be definitively stopped. Human studies evaluating this strategy revealed decreased coagulopathies, decreased blood loss, and improved splanchnic perfusion. Another popular strategy in human medicine is “delayed resuscitation,” where fluid resuscitation is withheld until definitive control of hemorrhage is achieved (a.k.a. surgery). The applicability of this strategy to veterinary medicine remains unknown, as we tend not to rush every trauma case into surgery immediately.

The oliguric/anuric patient (most commonly renal disease patients):

This category of patients highlights the importance of reassessing your fluid therapy strategy over time. Most animals in renal failure (whether CKD or AKI or acute exacerbation of CKD) are dehydrated, and require fluid therapy to reestablish acid-base and electrolyte derangements, as well as to restore hydration. Historically, renal failure cases needed “fluid diuresis” to remove the uremic toxins and restore renal function. These patients would be automatically placed on up to twice maintenance fluid rates for days. Many of these patients became fluid overloaded and did not survive. When renal function is compromised, urine production is altered (sometimes polyuria, more commonly oliguria or anuria). It is extremely important to monitor the urine output in these patients, because if they are unable to produce urine to the degree that we expect them to, they are at high risk for fluid overload. Additionally, increasing intravascular volume tends to cause some degree of interstitial edema, and this occurs in the kidneys as well. When the kidneys become edematous, renal hypertension can also develop, resulting in a further decrease of urine output. In these cases, it is recommended to create a fluid therapy plan to rehydrate them, not overhydrate them, and monitor their urine output closely. Place a urinary catheter if needed to truly measure urine output, and adjust your fluid therapy accordingly once rehydration is complete. In patients that are euhydrated and remain oliguric with increasing azotemia, or develop anuria, more aggressive fluid therapy will only increase the risk of fluid overload. In these cases, intervention with hemodialysis should be considered, as this is the only modality that can stabilize the anuric or oliguric azotemic patient.

CONCLUSIONS/Take-Home Points

• Fluid therapy is not a cookbook, one-size-fits-all strategy; individual patient needs, losses, and parameters should be considered and the fluid therapy plan should be created accordingly.

• Continual reassessment and adjustment of your fluid therapy plan is essential.

• More crystalloids do not improve outcome, and can sometimes make things worse.

• Caution with colloids, especially in coagulopathic or azotemic patients.

• Whole blood is coming back into favor.

• Pay close attention to urine output in patients with renal failure.
24/7 EMERGENCY & CRITICAL CARE

Emergency Veterinarian Referral Line: 617-522-5011
Boston Phone: 617-522-7282  |  Boston Fax: 617-989-1633  |  Waltham Phone: 781-902-8400  |  Waltham Fax: 781-622-1410
emergency@angell.org  |  angell.org/emergency

Alison Allukian, DVM
aallukian@angell.org

Kiko Bracker, DVM, DACVECC
Service Co-Director
kbracker@angell.org

Callie Cazlan, DVM
ccazlan@angell.org

Sara Doyle, DVM
sdoyle@angell.org

Jordana Fetto, DVM
Waltham
jffetto@angell.org

Mina Gergis, DVM
Waltham
mgergis@angell.org

Amanda Lohin, DVM
Waltham
alohin@angell.org

Courtney Peck, DVM, DACVECC
Waltham
cpeck@angell.org

Jessica Seid, DVM
Waltham
jseid@angell.org

Virginia Sinnott-Stutzman
DVM, DACVECC
sinnottstutzman@angell.org

Catherine Sumner, DVM, DACVECC
Chief Medical Officer
Waltham
csumner@angell.org

Megan Whelan
DVM, DACVECC, CVA
Chief Medical Officer
mwhelan@angell.org
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, and 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 and those requiring continuous drug infusions as well as in a host of 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 as well as 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 acetaminophen or carbon monoxide poisonings are suspected. 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 available with specialists throughout the hospital. Daily cage-side rounds provide an environment for repeated case re-evaluation and allow the staff to adjust treatment in a timely manner.
- 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 anesthesiologist works 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 seen 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.

ANESTHESIOLOGY SERVICES

Case Consultation and Continuing Education

Dr. Kate Cummings is available for case planning and consultation to provide safe and effective anesthesia for all patients. The Anesthesiology Service provides individualized and optimal analgesia to patients during and after procedures. Clients and referring veterinarians are able to 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
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 as well as 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

Brendan Noonan, DVM, DABVP
(Avian Practice)
Boston & Waltham
bnoonan@angell.org

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

Patrick Sullivan, DVM, DABVP
(Avian Practice)
Waltham
psullivan@angell.org
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 a mentor for future BCBAs, teaches Behavior Analysis at Northeastern University, and lectures nationally on the subject of Applied Animal Behavior Analysis. 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.

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 to 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
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 as well as 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).

By emphasizing resident education (clinical and didactic), our cardiology training program 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
DENTISTRY

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.

OVERVIEW

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
- Vital pulpotomy
- Surgical tooth extraction

Endodontic System
- 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)
aekerdt@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 prior to the appointment.

DERMATOLOGY SPECIALTY SERVICES

Allergy Diagnosis and Management
- Intradermal and serologic allergy testing
- On-site, custom immunotherapy formulation
- Diet recommendations for food allergies

Ear Clinic for the Diagnosis and Management of Chronic Ear Disease
- Identification and management of underlying skin or systemic disorders affecting ear health
- Ear cytology
- Video otoscopic examination
- Bulla CT with interpretation by the Angell Diagnostic Imaging Service
- On-site aerobic and anaerobic bacterial ear culture
- General anesthesia for deep ear cleanings
- Ear biopsies and myringotomies
- Otic surgical consultations and procedures with the Angell Surgery Service

General Dermatology
- Cytologies, skin scrapes, trichograms
- On-site bacterial cultures
- On-site fungal cultures
- Skin biopsies

Dermatopathology
- Histopathologic evaluations of skin biopsies with the Angell Pathology Service
DIAGNOSTIC IMAGING

Naomi Ford, DVM, DACVR
nford@angell.org

Steven Tsai, DVM, DACVR
stsai@angell.org

Ruth Van Hatten, DVM, DACVR
rvanhattan@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
dbrum@angell.org

Maureen Carroll, DVM, DACVIM
mccarroll@angell.org

Zachary Crouse, DVM, DACVIM
zcrouse@angell.org

Jean Duddy, DVM
jduddy@angell.org

Lisa Gorman, DVM, DACVIM
Waltham
lgorman@angell.org

Shawn Kearns, DVM, DACVIM
skearns@angell.org

Evan Mariotti, DVM, DACVIM
emariotti@angell.org

Susan O’Bell, DVM, DACVIM
Service Director
sobell@angell.org

Daniela Vrabelova Ackley
DVM, DACVIM
Waltham
dvrabelova@angell.org

Internal Medicine Phone: 617-541-5186  |  Internal Medicine Fax: 617-989-1657  |  internalmedicine@angell.org  |  angell.org/internalmedicine
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 aspirates 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 condition of the animal. 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 once again 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

OVERVIEW

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

Our neurologists provide optimal care in the diagnosis and treatment of 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
- 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, multi-disciplinary approach to cancer diagnosis and treatment. We are committed to improving quality of life in an atmosphere of caring and compassion.

Optimal management of cancer results in improvement of quality of life and, in many cases, improved clinical outcome 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.
• 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, which allows us to block critical structures located 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 chemo-therapy 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 case 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 his or her 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. Throughout treatment we provide both written and verbal reports to the primary care veterinarian and the pet owner. We believe providing more information to owners eases the decisions that an owner faces, which are often challenging and urgent. We are committed to open, clear communication to facilitate treatment decisions and create a community of support extending from our specialists to the primary care veterinarian and to the 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 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 allow for creation of highly complex shapes that conform to the tumor outline while sparing normal tissue. The linear accelerator also has the capacity for generating 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 anesthesiologist Dr. Kate Cummings works 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

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

Daniel J. Biros, DVM, DACVO
dbiros@angell.org

Martin E. Coster
DVM, MS, DACVO
mcoster@angell.org

- Urgent care appointments available, often the same day
- Specialty services available include cataract surgery with intraocular lens implantation; ocular ultrasound; electoretinography; 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 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 electoretinography (to detect retinal degeneration).

Cataract removal with lens implantation is available, as well as laser and cryotherapy for the treatment of 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
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. We are pleased to announce that our laboratory accepts mail-in submissions for cytology, histopathology, and clinical pathology testing. Courier pickup of samples will be 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 in order to contribute to the diagnosis, treatment, management, and/or prognosis of disease in our veterinary patients. We offer clinically oriented pathology services. We take an interest 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 with regard to 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 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, there is a veterinary patient and its owner 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 decalcification 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 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 as well as 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
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 prior to referring a case. Final results are reported within 7-14 days to allow time for additional processing (such as decalcification 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
- If an owner brings a deceased pet to Angell for necropsy examination without a necropsy form completed and signed by his/her veterinarian, the owner will be seen by an Angell veterinarian through the emergency service. There is an additional fee for the visit with an Angell emergency veterinarian.
- Necropsy is most valuable when performed promptly following death (less than 12 hours), but may still yield relevant information if performed within 24-48 hours of death, depending on postmortem preservation. In the event that a pet cannot be brought to Angell immediately following death, it is recommended that the body be kept 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
EXPERTISE, COMPASSION, AND CARE.

OVERVIEW

Members of the Angell Surgery staff 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 on the diagnosis and management 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.)
- Thoracoscopic (Biopsy, Pericardial Windows, etc.)
- Arthroscopy (Knee, Shoulder, etc.)

Laser Surgical Procedures
- Tumor Resection
- Oral – Nasal Surgery
BOSTON AND WALTHAM

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

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

PHYSICAL REHABILITATION*
P: 781-902-8400 F: 781-209-5721
physicalrehab@angell.org
angell.org/rehab

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

BOSTON ONLY

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

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

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

FOR ADDITIONAL REFERRAL ASSISTANCE

Boston Phone: 617-522-5011 | Boston Fax: 617-989-1635
Waltham Phone: 781-902-8400 | Waltham Fax: 781-622-1410

Phone numbers apply for both Boston and Waltham
(with the exception of Emergency & Critical Care and Physical Rehabilitation)