Puppy Breath & Kitten Tails
The Ins & Outs of Pediatric Spay-Neuter

Brian A. DiGangi, DVM, MS, DABVP (Canine & Feline Practice, Shelter Medicine Practice)
Senior Director of Shelter Medicine
Shelter Outreach
ASPCA
How do we know the best time to vaccinate our pets?
How do we know the best time to vaccinate our pets?
When do you recommend spay-neuter?
When do you recommend spay-neuter?

What is the evidence?
Learning Outcomes

- Describe the role of pediatric spay-neuter in animal welfare
- Understand the evidence
- Ensure safety of pediatric patients
What is pediatric spay-neuter?

Elective sterilization surgery performed between 6 and 20 weeks of age.

Feline Fix by Five: Veterinarians Update Best Practice for Spay Neuter

This campaign advocates that the age for spaying/neutering cats be reduced to five months or earlier, instead of the commonly accepted six months. This small change would help decrease the risk of mammary gland cancer as well as the risk of unwanted litters by ensuring that these kittens will not have accidental first litters.

“Historically, many cat owners have been puzzled about when cats should be spayed/neutered. Leading veterinary organizations, such as the American Veterinary Medical Association, the American Animal Hospital Association, the Association of Feline Practitioners, and the Association of Shelter Veterinarians are trying to clear up the confusion. Since cats can get pregnant at five months of age, these veterinary associations support spay/neuter of cats prior to five months. Spay/neuter by five months of age prevents the birth of unwanted litters of kittens, thereby reducing relinquishment of kittens to animal shelters.”

~ Phil Bushby, DVM, MS, DACVS, Feline Fix by Five Veterinary Consultant
Marcia Lane Endowed Chair of Humane Ethics and Animal Welfare
College of Veterinary Medicine, Mississippi State College of Veterinary Medicine
Why *pediatric* spay-neuter?

Pet overpopulation

- 1.5 million companion animals euthanized in U.S. (2016)
- Includes healthy puppies & kittens
Why *pediatric* spay-neuter?
Why *pediatric* spay-neuter?

Misinformed pet owners

- >50% litters are unintentional (PSC 2009, New 2004)
- Cats fertile at 3.5 months of age (Griffin 2001)
- Up to 20% of cats have litters prior to neutering
- Lifetime litter production is the same between neutered and intact animals! (Manning 1992)
Why *pediatric* spay-neuter?

For shelters...

- Neuter-before-adoption is often required by law
- Voucher systems have poor compliance (50-60%)
  (Moulton 1990)

For private practitioners...

- 18-30% of pets are acquired from shelters (AHA 2012)
- Most will get neutered somewhere, why not at your clinic?
Why *pediatric* spay-neuter?

• For communities seeking non-lethal population control…

- Sterilization
- Education & Laws
- Adoption
- Owner Retention
Why *pediatric* spay-neuter?

- For communities seeking non-lethal population control…

- Pediatrics
- 100% NBA
- Free-roaming
- Low-income

**Diagram:**
- Sterilization
- Education & Laws
- Adoption
- Owner Retention
Pediatric Spay-Neuter: A Best Practice

American Animal Hospital Association

American Veterinary Medical Association

Association of Shelter Veterinarians

British Small Animal Veterinary Association

Canadian Veterinary Medical Association
Evaluating the Evidence

REMEMBER:
Statistical association ≠ Cause & Effect
Evaluating the Evidence

Golden retriever study suggests neutering affects dog health

By Pat Bailey on February 13, 2013 in Human & Animal Health

“...disease rates...were significantly increased when neutering was performed....”

Early Neutering Poses Health Risks for German Shepherd Dogs, Study Finds

By Trina Wood on May 26, 2016 in Human & Animal Health

Joint disorders, a common in German shepherd dogs, might be less likely to occur if spaying or neutering procedures are delayed until the dog is at least one year old, this study suggests. (breedlove/ Getty Images)
Evaluating the Evidence

Who was studied?

What is “early-age”?

What is the risk?
Evaluating the Evidence

Who was studied?

- Admitted to single tertiary care hospital
- Single breed

What is “early-age”?

- <12 months
Evaluating the Evidence

What is the risk?

- **Golden Retrievers**
  - Early neutering: increased LSA (M), HD (M), CCL
  - Late neutering: increased MCT, HSA (F)

- **German Shepherds**
  - Early neutering: increased CCL
  - Neutering 6-11mos.: increased UI (F)
Evaluating the Evidence

What is the risk?

• Joint disorders
  • Neuter status and BCS are “fairly highly confounded”
  • “…body weight probably plays a role in the development of a joint disorder in overweight dogs”

• LSA, MCT, HSA
  • Low overall prevalence in study population
Evaluating the Evidence

Headline

• “...disease rates...were significantly increased when neutering was performed....”

Take Home

• Depending on sex, neutering may be associated with increased risk of specific cancers in GRs and UI in GSs
Long-Term Risks & Benefits

- >3,500 dogs and cats
- Early-age <5.5 months
- Up to 11 years follow-up
- Adopter questionnaire & veterinary records
- Medical & behavioral conditions evaluated
Long-Term Risks & Benefits

<table>
<thead>
<tr>
<th>Increased</th>
<th>Decreased</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cystitis (F)</td>
<td>Obesity</td>
</tr>
<tr>
<td>Urinary incontinence (F)</td>
<td>Separation anxiety</td>
</tr>
<tr>
<td>Hip dysplasia*</td>
<td>Escaping behaviors</td>
</tr>
<tr>
<td>Noise phobias</td>
<td>Inappropriate elimination</td>
</tr>
<tr>
<td>Sexual behaviors</td>
<td>Relinquishment</td>
</tr>
</tbody>
</table>

*Traditional age S-N dogs with HD were 3x as likely to be euthanized as a result of the condition
Long-Term Risks & Benefits

Increased

Hiding
Shyness

Abscesses (M)
Aggression (M)
Sexual behaviors (M)
Urine spraying (M)
Asthma
Gingivitis
Hyperactivity

Decreased
Health Benefits of Spay-Neuter

• Decreased mammary neoplasia, BPH, perineal hernias, perianal tumors
• Decreased fighting, roaming, and spraying
• No risk of testicular, uterine, ovarian cancer, pyometra

<table>
<thead>
<tr>
<th>lifespan for cats</th>
<th>lifespan for dogs</th>
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<tbody>
<tr>
<td><strong>spayed</strong></td>
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</tr>
<tr>
<td><img src="image1" alt="Spayed cats graphic" /></td>
<td><img src="image2" alt="Spayed dogs graphic" /></td>
</tr>
<tr>
<td><img src="image3" alt="Unspayed cats graphic" /></td>
<td><img src="image4" alt="Unspayed dogs graphic" /></td>
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<td><img src="image5" alt="Neutered cats graphic" /></td>
<td><img src="image6" alt="Neutered dogs graphic" /></td>
</tr>
<tr>
<td><img src="image7" alt="Unneutered cats graphic" /></td>
<td><img src="image8" alt="Unneutered dogs graphic" /></td>
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Banfield 2013
# Health Benefits of Spay-Neuter

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Banfield 2013
The Argument Against Spay-Neuter

Female Cats

- Increased risk of obesity

Female Dogs

- Increased risk of specific neoplasias, USMI, CCL, obesity

Male Dogs

- Increased risk of specific neoplasias, CCL, obesity
## Weighing the Evidence

**Female Dogs**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Risk</th>
<th>Prognosis</th>
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<tbody>
<tr>
<td>Obesity</td>
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<td>Good</td>
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<tr>
<td>Mammary cancer</td>
<td>High</td>
<td>Poor</td>
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<tr>
<td>Pyometra</td>
<td>High</td>
<td>Good</td>
</tr>
<tr>
<td>CCL</td>
<td>Moderate</td>
<td>Varies</td>
</tr>
<tr>
<td>USMI</td>
<td>Moderate</td>
<td>Good</td>
</tr>
<tr>
<td>Neoplasia</td>
<td>Low</td>
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### Female Dogs

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<td>Low</td>
<td>Good</td>
</tr>
</tbody>
</table>

*All risk factors have specific breed predilections!*
# Weighing the Evidence

## Table 2

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Female Dog</th>
<th>Male Dog</th>
<th>Female Cat</th>
<th>Male Cat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammary neoplasia</td>
<td>+24</td>
<td>—</td>
<td>+19</td>
<td>—</td>
</tr>
<tr>
<td>Pyometra</td>
<td>+100</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<tr>
<td>Surgical complications</td>
<td>—20</td>
<td>—16</td>
<td>—7</td>
<td>—3</td>
</tr>
<tr>
<td>Osteosarcoma</td>
<td>—2</td>
<td>—2</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Hemangiosarcoma</td>
<td>—2</td>
<td>—2</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Transitional cell carcinoma</td>
<td>—7</td>
<td>—7</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Prostate neoplasia</td>
<td>—</td>
<td>—3</td>
<td>—</td>
<td>—</td>
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<tr>
<td>Testicular neoplasia</td>
<td>—</td>
<td>+5</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Urethral sphincter mechanism</td>
<td>—66</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>incompentence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benign prostatic hypertrophy</td>
<td>—</td>
<td>+368</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Rupture of the cranial cruciate ligament</td>
<td>—11</td>
<td>—11</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Obesity</td>
<td>—14</td>
<td>—13</td>
<td>—28</td>
<td>—26</td>
</tr>
</tbody>
</table>

*Positive impact score = benefit from gonadectomy; negative impact score = detriment from gonadectomy.*
Maintain perspective!

In general, neutering... decreases the risk of diseases that occur frequently and are difficult to treat.
Other Benefits

<table>
<thead>
<tr>
<th>Pediatric Spay-Neuter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easier</td>
</tr>
</tbody>
</table>

- Fewer complications
- Quicker recovery
Veterinary Community Outreach Program
College of Veterinary Medicine
UNIVERSITY of FLORIDA

• 2007-2012
  • >10,000 spay-neuter surgeries
    • ~80% pediatrics
  • Performed by junior/senior DVM students
• Peri-operative complications 3%
• Mortality rate <0.05%

<table>
<thead>
<tr>
<th>Reference</th>
<th>Species</th>
<th>Procedure Type</th>
<th>SSI Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vasseur 1988</td>
<td>Dogs &amp; cats</td>
<td>Clean</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clean-contaminated</td>
<td>4.5</td>
</tr>
<tr>
<td>Brown 1997</td>
<td>Dogs &amp; cats</td>
<td>Clean</td>
<td>4.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clean-contaminated</td>
<td>5.0</td>
</tr>
<tr>
<td>Nicholson 2002</td>
<td>Dogs &amp; cats</td>
<td>Clean-contaminated</td>
<td>5.9</td>
</tr>
<tr>
<td>Eugster 2004</td>
<td>Dogs &amp; cats</td>
<td>Clean</td>
<td>6.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clean-contaminated</td>
<td>8.0</td>
</tr>
<tr>
<td>Burrow 2005</td>
<td>Dogs</td>
<td>Clean-contaminated</td>
<td>8.5</td>
</tr>
</tbody>
</table>
Mortality & Pediatric Spay-Neuter

Cats
Brodbelt 2007
- Overall mortality = 0.24% (n=98,036)
- Cats 0-6m less risk vs. 6m-5y
- <2kg at greater risk

Dogs
Brodbelt 2008
- Overall mortality = <0.002% (n=79,178)
- Dogs ≥12y greater risk vs. 6m-8y
- <5kg at greater risk

Body weight
- Drug overdose
- Hypothermia
- Perioperative management (IV catheter, ET tube)
Mortality & Pediatric Spay-Neuter

Perioperative mortality in cats and dogs undergoing spay or castration at a high-volume clinic

J.K. Levy\textsuperscript{a, x}, K.M. Bard\textsuperscript{b}, S.J. Tucker\textsuperscript{a}, P.D. Diskant\textsuperscript{a}, P.A. Dingman\textsuperscript{a}

\textsuperscript{a} Maddie’s Shelter Medicine Program, Department of Small Animal Clinical Sciences, College of Veterinary Medicine, University of Florida, 2015 SW 16th Avenue, Gainesville, FL, 32610, USA
\textsuperscript{b} Humane Society of Tampa Bay, 3809 N Armenia Avenue, Tampa, FL, 33607, USA

- Overall mortality = 0.03% (n=56,075 cats; n=37,415 dogs)
- Mortality <6m = Mortality >6 m
- Risk: Females > Males; Cats > Dogs
PEDIATRIC SPAY-NEUTER: SPECIAL CONSIDERATIONS
## Special Considerations

<table>
<thead>
<tr>
<th>Pediatric Physiology</th>
<th>Potential Complication</th>
<th>Preventive Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor compensation for blood loss</td>
<td>Anemia</td>
<td>Meticulous tissue handling&lt;br&gt;Ensure and verify hemostasis</td>
</tr>
<tr>
<td>Low glycogen stores</td>
<td>Hypoglycemia</td>
<td>No fasting&lt;br&gt;Administer Karo syrup</td>
</tr>
<tr>
<td>Large surface area to volume ratio</td>
<td>Hypothermia</td>
<td>Active and passive warming&lt;br&gt;Warm prep solutions&lt;br&gt;Avoid excessive clipping&lt;br&gt;Avoid large incisions&lt;br&gt;Minimize surgical and anesthetic time&lt;br&gt;Warm fluids</td>
</tr>
<tr>
<td>Immature thermoregulatory system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesser fat stores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small body weight</td>
<td>Drug overdose</td>
<td>Accurate body weights&lt;br&gt;Dilute stock concentrations</td>
</tr>
<tr>
<td>Gradual loss of maternal antibodies</td>
<td>Infectious disease</td>
<td>Vaccination protocols&lt;br&gt;Meticulous sanitation&lt;br&gt;Minimize stress</td>
</tr>
<tr>
<td>Fear Imprinting</td>
<td>Sensitization and phobia development</td>
<td>Co-house littermates&lt;br&gt;Low-stress handling techniques&lt;br&gt;Use pre-medications</td>
</tr>
</tbody>
</table>
Special Considerations

Biosecurity

- Vaccination
- Sanitation
- Segregation
Special Considerations

Stress mitigation

- Gentle handling
- Environmental management
- Co-housing
Special Considerations

Hypoglycemia

Hypothermia
Special Considerations

Hypothermia

- Maintain small incisions
- Risk of SSI (Eugster 2004)
  - Increases 1.01x per minute of anesthesia
  - Doubles every 70 minutes
Identification

“Each spay-neuter program should choose a consistent, permanent means of visually identifying animals that have been neutered.”

Identification of neutered animals: Each spay-neuter program should choose a consistent, permanent means of visually identifying animals that have been neutered. Application of a visible, standard, distinct identifying mark is recommended. Specifically, the task force recommends the use of a simple green linear tattoo to identify all neutered pet animals and ear-tipping to identify all community cats.

www.sheltervet.org
Scoring Tattoo

Females

☐ Lateral to incision

Males

☐ Dogs: Pre-scrotal

☐ Cats: Near umbilicus
Listen to the patients!

Libby

☐ 1 hr. post-op
☐ 1 yr, female
☐ Sx time = 1 hr.
Listen to the patients!

AJ & Ali

- 1 hr. post-op
- 8 weeks
- Sx time = 8 min.
- Sx time = 1 hr.
Key Points

• Pediatric spay-neuter is an essential component of a community animal welfare plan.

• The benefits of spay-neuter outweigh the potential risks.

• Elective sterilization surgery can be safely performed on pediatric patients.