Residency in Diagnostic Imaging: Program Specifics

Please see “House Officer Programs: General Information” for basic information common to all internship and residency programs. The following information highlights specific program requirements of the Diagnostic Imaging residency program.

Program Director: Dr. Kristina Miles, DVM, MS DACVR (kmiles@iastate.edu; 515-291-5166)
Faculty in direct support of this program:
- Kristina G. Miles, DVM, MS, DACVR; percentage clinical service: approximately 70%
- Elizabeth Riedesel, DVM, DACVR; percentage clinical service: approximately 65%
- Jennifer Fowler, DVM

Listed below are the ISU imaging faculty accepting PRIMARY responsibility for training in each of the following core areas:
- Roentgen diagnosis: Dr. Riedesel
- Diagnostic ultrasound: Dr. Miles
- Computed Tomography: Dr. Riedesel
- Magnetic Resonance Imaging: Dr. Riedesel
- Nuclear Medicine: Dr. Miles

Note: only faculty with Diplomate status may serve as resident advisers.

Specialty College: American College of Veterinary Radiology
- The resident must register with the ACVR and follow their requirements. Requirements for candidate registration, certification, and credentials application, examination are available online (www.acvr.org).
- The resident must register with the specialty college prior to August 31st of the first year of residency and follow ACVR requirements.

Clinical program requirements

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
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<tbody>
<tr>
<td>Required Rot:</td>
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<tr>
<td>• Imaging Physics &amp; Radiation Biology @ UnityPoint Health in Des Moines</td>
<td>• 2 wks. LA ultrasound @ New Bolton Center in April/ May</td>
<td>• 3 wks. cardiac ultrasound with ISU cardiology service</td>
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<td></td>
<td>• 3 wks. radiation oncology &amp; nuclear medicine in Sept @ UMC</td>
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<tr>
<td></td>
<td>• 3 d nuclear med course</td>
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<tr>
<td>30 months @ ISU Diagnostic Imaging Service (radiology, US, CT, MRI, Nuc medicine)</td>
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<tr>
<td>6 months Research/SA/vacation</td>
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<tr>
<td>(to include 1 semester course Radiation Physics &amp; Biology)</td>
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Seminar/Rounds requirements
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<thead>
<tr>
<th>Rounds type</th>
<th>Frequency</th>
<th>Day/Time</th>
<th>Commitment</th>
</tr>
</thead>
<tbody>
<tr>
<td>HO Seminar/Case Presentation</td>
<td>Weekly</td>
<td>Thursdays @ 8am</td>
<td>Required</td>
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<tr>
<td>Radiology Journal Club</td>
<td>Weekly</td>
<td></td>
<td>Required</td>
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<tr>
<td>Radiology Textbook Review</td>
<td>Weekly</td>
<td></td>
<td>Required</td>
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<tr>
<td>Radiology-Equine Case Rounds</td>
<td>Monthly</td>
<td></td>
<td>Required</td>
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<tr>
<td>Radiology-Pathology (RadPath) Rounds</td>
<td>Monthly</td>
<td>4th Tuesday @ 8am</td>
<td>Required</td>
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<tr>
<td>Known Case Conference</td>
<td>Approx. q3 weeks</td>
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<td>Required</td>
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<tr>
<td>Morbidity &amp; Mortality Rounds</td>
<td>Monthly</td>
<td>2nd Tuesday @ 8am</td>
<td>Optional</td>
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<tr>
<td>Anatomic Pathology Rounds</td>
<td>Weekly</td>
<td></td>
<td>Optional</td>
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<tr>
<td>SAIM Book Club</td>
<td>Weekly</td>
<td>Fridays @ 9am</td>
<td>Optional</td>
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<tr>
<td>ECC Rounds</td>
<td>Weekly</td>
<td>Wednesdays @ 3pm</td>
<td>Optional</td>
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<tr>
<td>ECG Rounds</td>
<td>Monthly</td>
<td>4th Weds @ 8am</td>
<td>Optional</td>
</tr>
<tr>
<td>Student Grand Rounds</td>
<td>Weekly</td>
<td>Fridays @ 8am</td>
<td>Not required</td>
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</table>

**Teaching and scholarship requirements**

- Total length of the training program in months: 36 Months
- Total duration of supervised clinical training in the program: 30 Months
- Responsibilities of the resident in the remaining non-clinical portion of the program:
  1. To complete a residency research project, to draft the results in a manuscript suitable for publication, and to present the research findings to an audience of peers in the second or third year of the program.
  2. To successfully complete course instruction in radiation physics and radiation biology.
  3. To participate in instructional delivery of the normal anatomy of veterinary diagnostic imaging to first year veterinary students.

**Other program specifics that differ from ISU-CVM “House Officer Programs: General Information”**

- **Diagnostic Imaging Objectives/Goals**
  - To master the art and science of veterinary diagnostic image interpretation in all core areas, to be able to logically correlate all imaging findings and clinical data in order to formulate accurate conclusions which, in turn, may provide direction for case management and to appreciate the economic and emotional factors related to the health care of veterinary patients.
  - To provide a firm understanding of the underlying radiation physics and anatomic basis of veterinary diagnostic imaging.
  - To develop expertise in interpersonal communications for proper colleague and client relationships.
  - To allow the resident an opportunity to develop teaching skills as they participate in the educational training of veterinary students.
  - To constantly pursue academic enrichment.
  - To complete a residency research project, to draft the results in a manuscript suitable for publication, to obtain instruction and guidance in manuscript writing and submission for publication in refereed journals and to present the research findings to an audience of peers in the second or third year of the program.
  - To satisfy all requirements to sit both the written and oral examinations of the American College of Veterinary Radiology
- **Required external rotations**
  - One semester each of Radiation Physics and Radiation Biology courses – to be completed at Unity Point Health, School of Radiologic Technology, Des Moines. Program Director: Matt Millard, M.S.T.D, R.T.(R) (CT). (Tuition costs covered by VCS Department.)
  - Three-week Radiation Oncology and Nuclear Medicine External Rotation to be completed at the University of Missouri-Columbia in second year. Faculty Contact: Dr. Jimmy Lattimer, Diplomate, American College of Veterinary Radiology / Radiation Oncology. (Travel and housing costs covered by resident.)
  - Two-week Large Animal Ultrasound External Rotation – to be completed at New Bolton Center Campus, University of Pennsylvania in 2nd year. Faculty Contact: Dr. Virginia Reef, DVM. (Travel and housing costs covered by resident.)
  - An alternate option for Large Animal Ultrasound is a three week on-site rotation completed with the Large Animal and Equine Medicine and Surgery services at Iowa State University.
  - Three-day Nuclear Medicine Short Course – to be completed at the University of Tennessee in second year, if offered. Faculty Contact: Dr. Ferderica Morandi, Diplomate, American College of Veterinary Radiology.
  - Three week Cardiac Ultrasound rotation – to be completed in third year. Travel, housing and professional liability costs covered by resident if external rotation site is selected (outside ISU LVMC).
  - The resident will keep a log of cases assessed during external rotations which will be submitted to the residency director following each experience.

- **Diagnostic Imaging Facilities**
  - Sound-Eklin DR digital radiography unit for imaging small animal patients was purchased in 2008 for use with the Philips Clinix unit. DR images are transferred directly to the Fuji Synapse PACS.
  - Innovet X-ray Unit: This 2004 unit is a versatile, high volume small animal diagnostic X-ray machine. The unit has been fitted with an Sound Eklin digital imaging sensor system, purchased in 2008, to provide DR images for the Fuji Synapse Picture Archiving and Communication System (PACS).
  - Philips Overhead Tube & Grid System (Large Animal X-ray Unit): Purchased in 2003, this 1000 mA tube is linked to an overhead rail system and a wall mounted grid to obtain high quality images in large animals.
  - A Sound-NEXT wireless system provides DR images to the Fuji Synapse PACS from the Philips 1000 mA tube. Also purchased in 2008.
  - Equine and bovine distal extremities are obtained with a portable Poskum portable wireless X-ray generator and Sound-NEXT Equine DR wireless system purchased in August 2016 is supported by the Fuji Synapse PACS.
  - Two wall-mounted dental X-ray tubes and Schick digital sensor system provide small animal digital dental images to the Fuji Synapce PACS.
  - Toshiba LB (large bore) 16-slice multidetector Computed Tomography unit: installed in July 2010 in a Phase I dedicated site in the Lloyd Veterinary Medical Center (LVMC). This acquisition includes a separate Universal Equs large animal CT table capable of integrating with the Toshiba MDCT unit.
    - Philips Epiq Ultrasound unit: Purchased in December 2015, this unit is used for all small animal abdominal ultrasound exams. A separate Philips Epiq ultrasound unit has been obtained for the ISU Cardiology service.
    - Diagnostic Nuclear Scintigraphy is performed with an Enhanced Technologies system installed in the Phase I Large Animal hospital.
portion of the LVMC in October 2009. The gamma camera and dedicated nuclear imaging computer operate under a Mirage software system.

- MRI is available on-site utilizing a 1.5 Tesla GE Signa magnet system with Explorer 25.1 software. The magnet received a complete upgrade with completely new RF coils, system electronics and software applications. The magnet was installed in a new, permanent suite in the LVMC in August 2008. The unit is supported with a Shanks non-ferrous pneumatic table for equine distal extremity studies.
- Dragon Naturally Speaking voice recognition software system: allows dictation of imaging reports directly into the electronic medical record.

**Diagnostic Imaging Clinical Resources**

- **Approximate number of patients seen annually by ISU-LVMC**
  - Small Animal Patients: Approx. 14,217
  - Large Animal Patients: Approx. 5,993
  - Exotic Animal Patients: Approx. 766
  - Total Patients: Approx. 20,976

- **Annual imaging caseload**
  - Small Animal Exams: Approx. 6,982
  - Large Animal Exams: Approx. 989
  - Total Exams: Approx. 7,971

- **Approximate breakdown of the patient population in imaging according to species**
  - Small animals (canine, feline): Approx. 4,855
  - Large animals (equine and food animals): Approx. 688
  - Exotic animals (predominantly raptors): Approx. 50 (ISU Wildlife Care Clinic)

- **Approximate annual imaging caseload of the program**
  - Small Animal Radiology exams: Approx. 6,982
  - Large Animal Radiology exams: Approx. 688
  - Abdominal Ultrasound exams: Approx. 1,000
  - Computed Tomography exams: Approx. 275
  - Nuclear Medicine exams: Approx. 46
  - Magnetic Resonance Imaging: Approx. 70
  - Other (specify): I-131 Treatment: 20

- **Training Content**
  - Percentage of preliminary reports generated from the imaging caseload by the resident:
    - Year One: 65 %
    - Year Two: 75 %
    - Year Three: 85 %
  - Percentage of resident reports reviewed by the imaging faculty prior to finalization of the report: 100 %

**Distribution of the CLINICAL experience the resident receives in full time equivalent months:**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Approximate number of cases</th>
</tr>
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<tbody>
<tr>
<td>Small Animal Radiology</td>
<td>14</td>
</tr>
<tr>
<td>Large Animal Radiology</td>
<td>3.5</td>
</tr>
<tr>
<td>Abdominal Ultrasound</td>
<td>5.5</td>
</tr>
</tbody>
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*Updated 8/2018, JLW 09.14.18*
+ Cardiac Ultrasound
(ISU-Drs. Wendy Ware & Jessica Ward, DACVIM) 0.5
Computed Tomography 3 520
Nuclear Medicine 0.75 90
(+ external rotation at UMC) 0.25
Magnetic Resonance Imaging 1 335
Elective (any of above) 0 40
Required elective (specify): see below
a. large animal ultrasound external rotation (optional) 3 weeks 150
b. radiation oncology external rotation (University of Missouri-Columbia) 2 weeks 15
+ ISU Feline I-131 Therapy Program 1 week 25
Total 30 11,718

Course number and unit assignment required to meet the educational objectives for formal instruction

<table>
<thead>
<tr>
<th>Topic</th>
<th>Course Number</th>
<th>Units</th>
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<tbody>
<tr>
<td>Nuclear Medicine:</td>
<td>1. University of Tennessee Three day Short Course Contact Hours: Approx. 17 2. Contact Director: Jimmy C. Lattimer, DVM, DACVR, DACVRO</td>
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</tr>
<tr>
<td>Ultrasonography:</td>
<td>The Physics of Ultrasound Kremkau, Frederick, PhD. Five disc short course series produced by Wake Forest University, Dept. of Radiology</td>
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<tr>
<td>Ultrasonography Literature Review</td>
<td>Current literature &amp; textbook reviews held every 3 weeks at ISU.</td>
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<tr>
<td>CT:</td>
<td>CT Technology, Principles &amp; Techniques with an Emphasis on Multidetector CT CT Lecture Series (Six of thirty-eight lectures) at <a href="http://www.CTisus.com">www.CTisus.com</a> produced by the Advanced Medical Imaging Laboratory (AMIL). AMIL is a multidisciplinary team dedicated to research, education, and the advancement of patient care using medical imaging with a focus on spiral CT and 3D imaging. The AMIL</td>
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MRI: MRI literature review is headed by Elliot K. Fishman, M.D.
Current literature & textbook reviews held every 3 weeks at ISU.

External classes and short courses will be supplemented with monthly resident review sessions to assure knowledge-base, understanding and familiarity with the above listed Physics topics.

- **Research Environment**
  - Average number of peer reviewed publications over the last 5 years on which the IMAGING faculty are included as authors: Three
  - Number of publications/submissions expected of a resident completing the program: One
  - Advanced degree requirement at ISU to complete radiology residency program: Not at this time

- **Educational Environment**
  - Number of lectures or scientific presentations expected of each resident during the course of their training: 25.

- **Evaluation**
  - Resident performance will be evaluated at 3 month intervals the first year, with six month intervals for the remainder of the program.

- **Known Case Conference (KCC)**
  - Known Case Conference discussions will be held approximately every three weeks.

- **Literature Resources**
  - Nearest medical library: The primary medical collection for the ISU Library is located on-site (both paper and electronic collection). Additional materials are available through the main ISU Parks Library on campus (2 miles). Further materials can be obtained through interlibrary loan from the University of Iowa or other locations.