

RADIOLOGY RESIDENT 4TH YEAR INFORMATICS PATHWAY

The overall goal is to graduate a resident with a sophisticated and practical understanding of radiology informatics in the modern era — including clinical AI governance, FDA regulatory frameworks, institutional IT operations, and emerging technologies — and with the professional foundation to contribute to informatics leadership throughout their career. This will be a 6–12 week elective with time divided into short blocks (1–2 weeks) during the 12 months of the 4th year.

Core Requirements (6 & 12 Weeks)	Additional Expectations (12 Weeks Only)
• Orientation lecture with elective supervisor • RSNA Imaging AI Certificate modules • DHMC network review with administrative leader • Radiology IT meeting attendance • Written AI product evaluation (at least one deployed tool) • Required readings: Elahi & Cook; Lindqwister et al. (AI-RADS) • CPHAI meetings with Dr. Sin • Scholarly project: QI proposal or focused literature review • Noon conference presentation • Annual SIIM meeting (department-funded)	• Supplemental reading: Topol, Deep Medicine; Wachter, The Digital Doctor • CPHAI project participation (if available) • Annual CPHAI Symposium (typically mid-April) • Magnuson Center meeting attendance • Scholarly project option expanded to include multidisciplinary research project with radiology and AI mentors (requires mentor identification in spring of R3) • National Imaging Informatics Course (NIIC) — strongly encouraged • Abstract submission to national meeting (encouraged)

ELECTIVE SUPERVISOR

Matthew Maeder MD

Vice Chair of Informatics, Department of Radiology, DHMC

ADDITIONAL EDUCATORS

Jessica Sin MD PhD

Vice Chair of Research, Department of Radiology, DHMC

Dartmouth Center for Precision Health and Artificial Intelligence (CPHAI)

ELECTIVE STRUCTURE

The elective encompasses five areas of study and engagement. A single project may fulfill assignments across multiple areas. Residents will develop an individualized plan with the elective supervisor at the outset of the elective.

1. FOUNDATIONS OF RADIOLOGY INFORMATICS

Learning Objectives

Upon completion of this section, the resident will be able to:

- Define core terminology in radiology informatics, including RIS, VNA, DICOM, HL7, FHIR, IHE profiles, and interoperability standards, with emphasis on concepts tested on the ABR Core Exam
- Describe the technical architecture of a modern academic radiology department and health system IT environment
- Identify major cybersecurity and HIPAA considerations relevant to radiology informatics
- Navigate the Branstetter Practical Imaging Informatics textbook as a reference resource

Assignments

1. Attend a one-hour orientation lecture with the elective supervisor covering essential terminology and foundational concepts in radiology informatics
2. Complete the RSNA Imaging AI Certificate program modules (a current residency program requirement; if not yet completed, prioritize during the first weeks of the elective)
3. Use the Branstetter *Practical Imaging Informatics* textbook selectively as a reference for terminology and core concepts
4. Review the DHMC radiology department network diagram with a departmental administrative leader to understand the institutional IT and network architecture
5. Complete supplemental readings as assigned (see Resources section)

Evaluation

- Qualitative evaluation by elective supervisor
- Engagement documented through regular supervisor meetings

2. CLINICAL ARTIFICIAL INTELLIGENCE AND REGULATION

Learning Objectives

Upon completion of this section, the resident will be able to:

- Describe the FDA regulatory framework for AI/ML-based Software as a Medical Device (SaMD), including 510(k), De Novo, and PMA pathways
- Evaluate a clinical AI product using publicly available FDA clearance documentation, including predicate device claims, intended use, and validation data
- Critically appraise AI tools deployed at DHMC with attention to performance characteristics, algorithmic bias, and clinical integration
- Articulate principles of institutional AI governance, strategic planning, and post-market surveillance

Assignments

1. Review the publicly available FDA 510(k) clearance documentation for at least one AI tool currently deployed at DHMC (e.g., AIDOC, Transpara), with attention to the predicate device, intended use, and validation methodology
2. Produce a structured written evaluation of at least one deployed AI tool, critically appraising its clinical evidence base, FDA regulatory pathway, potential for algorithmic bias, and workflow integration at DHMC
3. Complete assigned readings on AI regulation, governance, and bias (see Resources section)

Evaluation

- Written AI product evaluation reviewed by elective supervisor
- Qualitative feedback from supervisor on understanding of regulatory framework

3. INSTITUTIONAL INFORMATICS ENGAGEMENT

Learning Objectives

Upon completion of this section, the resident will be able to:

- Describe the structure and function of radiology department informatics and IT operations at an academic medical center
- Identify how clinical and operational informatics decisions are made within a complex health system
- Participate constructively in informatics governance and IT planning discussions

Assignments

1. Attend Radiology IT meetings regularly throughout the elective period. The elective supervisor will add the resident to relevant email lists and calendar invitations.
2. Meet with the elective supervisor at regular intervals to discuss observations from IT meetings and overall progress

Evaluation

- Qualitative evaluation by elective supervisor based on participation and engagement

4. COMMUNITY ENGAGEMENT IN HEALTH INFORMATICS AND AI

Learning Objectives

Upon completion of this section, the resident will be able to:

- Engage with the broader Dartmouth informatics and AI research community beyond the clinical environment

- Describe ongoing AI and technology innovation projects at a major academic and research institution
- Identify potential mentors, collaborators, and career pathways in health informatics and clinical AI

Assignments

1. Engage with the Dartmouth Center for Precision Health and Artificial Intelligence (CPHAI): attend regular meetings with Dr. Jessica Sin and, if available, participate in a small project. The nature and scope of participation will be determined by Dr. Sin.
2. Attend the annual CPHAI Symposium, which typically takes place in mid-April.
3. Attend meetings at the Magnuson Center at Dartmouth to gain exposure to AI and technology innovation projects in the broader Dartmouth community, complementing or supplementing CPHAI engagement.

Evaluation

- Qualitative evaluation by Dr. Sin
- Qualitative evaluation by elective supervisor

5. SCHOLARLY ACTIVITY AND PROFESSIONAL DEVELOPMENT

Learning Objectives

Upon completion of this section, the resident will be able to:

- Produce a scholarly deliverable relevant to radiology informatics
- Deliver a formal presentation on an informatics topic to a professional audience
- Engage with the national radiology informatics professional community

Assignments

1. Complete a scholarly project of the resident's choice from the following options:
 - (a) Quality improvement proposal** — identify an informatics-driven solution to a departmental or health system workflow challenge
 - (b) Multidisciplinary research project** — a mentored project involving radiology and AI (e.g., a radiology faculty mentor and an AI faculty mentor from CPHAI). Residents choosing this option must identify mentors and define a project scope in the *spring of R3* in order to secure both a radiology mentor and an AI mentor. The project will be developed over the R4 year, with the 6–12 weeks of dedicated elective time used for focused execution.
 - (c) Focused literature review** — a structured review of current evidence on a defined topic in radiology informatics
2. Present the results of the scholarly project to the department during noon conference. Where possible, the topic should be relevant to the ABR Core Exam.
3. Attend the annual SIIM meeting typically in May or June (SIIM membership and meeting attendance are department-funded)

4. Attend the National Imaging Informatics Course (NIIC)
5. Consider submitting an abstract to SIIM, RSNA, or another national meeting based on the scholarly project (long-term goal)

Evaluation

- Elective supervisor evaluation of the scholarly project
 - Faculty evaluation of noon conference presentation
 - Optional: abstract acceptance at a national meeting
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SUMMARY OF RESIDENT DELIVERABLES

Requirements

1. Written AI product evaluation: structured critical appraisal of at least one AI tool deployed at DHMC
2. Scholarly project: quality improvement proposal, multidisciplinary research project (with radiology and AI mentors), or focused literature review. Residents choosing the research project option must identify mentors in the spring of R3.
3. Noon conference presentation on an informatics topic, with ABR Core Exam relevance where possible
4. Regular attendance at Radiology IT meetings throughout the elective year
5. Engagement with CPHAI: meetings with Dr. Sin and project participation if available

Optional / Encouraged

- Abstract submission to a national meeting (SIIM, RSNA, or similar) based on the scholarly project
 - Attendance at the National Imaging Informatics Course (NIIC)
 - Attendance at Magnuson Center meetings at Dartmouth
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SUMMARY OF RESIDENT EVALUATIONS

- Regular (at least quarterly) qualitative one-on-one evaluation with the elective supervisor
 - Elective supervisor evaluation of the AI product write-up and scholarly project
 - Faculty evaluation of noon conference presentation
 - Qualitative evaluation from Dr. Sin (CPHAI)
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RESOURCES

Textbook

Practical Imaging Informatics. Branstetter BF, ed. Springer. *Use as a terminology and concept reference; not intended to be read cover to cover.*

Required Programs

- RSNA Imaging AI Certificate modules (current residency program requirement)
- SIIM membership and Annual SIIM Meeting — department-funded (membership includes the *Journal of Digital Imaging*)
- National Imaging Informatics Course (NIIC)

Required Reading — Articles

- Elahi A, Cook TS. Artificial intelligence governance and strategic planning: how we do it. *J Am Coll Radiol*. 2023;20(9):825–827.
- Lindqwister AL, Hassanpour S, Lewis PJ, Sin JM. AI-RADS: an artificial intelligence curriculum for residents. *Acad Radiol*. 2021;28:1810–1816.

Supplemental Reading — Books

- Topol EJ. *Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again*. Basic Books; 2019.
- Wachter RM. *The Digital Doctor: Hope, Hype, and Harm at the Dawn of Medicine's Computer Age*. McGraw-Hill; 2015.

Supplemental Reading — Articles

- Topol EJ. High-performance medicine: the convergence of human and artificial intelligence. *Nat Med*. 2019;25:44–56.
- Bluemke DA, et al. Assessing radiology research on artificial intelligence: a brief guide for authors, reviewers, and readers. *Radiology*. 2020;294(3):487–489.
- Gichoya JW, et al. AI recognition of patient race in medical imaging: a modelling study. *Lancet Digit Health*. 2022;4(6):e406–e414.

Online Resources

- FDA Digital Health Center of Excellence: [fda.gov/medical-devices/digital-health-center-excellence](https://www.fda.gov/medical-devices/digital-health-center-excellence)
- Radiology: Artificial Intelligence (RSNA open-access journal): pubs.rsna.org/journal/ai
- ACR AI-LAB: <https://ailab.acr.org/Account/Home>
- SIIM Learning Center: <https://siim.org/learning-events/learning/>

Matthew Maeder MD

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