DAVID G. BENNETT, PhD

MRI Physicist & Imaging Scientist | Engineer | Physics Educator & Simulation Developer

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PROFESSIONAL SUMMARY

MRI physicist and imaging scientist with a PhD in Biomedical Engineering and degrees in Electrical Engineering, combining more than 10 years in the pharmaceutical and CRO industry with earlier work in embedded software and MRI hardware engineering. Leads imaging biomarker and endpoint strategy for clinical trials, from protocol design and cross-vendor harmonization through imaging CRO oversight and regulatory documents. Teaches college physics, and builds browser-based physics and MRI simulators using AI-assisted development with Claude Code.

CORE COMPETENCIES

- Imaging biomarker & endpoint strategy
- MRI / MRS physics & acquisition
- Quantitative MRI (MR elastography, PC-MRI, PDFF, MRS)
- Cross-vendor protocol harmonization
- Imaging CRO & core lab oversight
- Regulatory imaging documents (FDA briefing)
- MRI hardware, RF coils & systems integration
- Scientific software: MATLAB, C, Python
- AI-assisted app development (Claude Code)
- Physics & MRI teaching, course design

SIMULATION & SOFTWARE DEVELOPMENT

MRI Mastery Simulators 2025 – Present
mrimastery.com

- Designed and built a suite of free, browser-based MRI physics simulators using AI-assisted development with Claude Code: 3D Bloch simulator, k-space explorer, signal processing, coil fields and RF excitation, coil tuning and matching, tissue contrast simulator and a head phantom.
- Created originally to support MRI technologist board-exam tutoring; physics behavior is checked by an automated test suite on every change. Published via GitHub Pages.

Interactive Physics Lab 2026 – Present
physicslabbench.com

- Built interactive introductory-physics experiments for General Physics I at Merrimack College (Newton's laws, circular motion, drag and damped springs, a lab bench with measurement uncertainty), built around a predict, test, explain approach.
- Built an in-class "MRI Contrast Lab" (TR/TE sliders over spine and knee views) for a kinesiology guest lecture, opened by students on their own devices via QR code.

PROFESSIONAL EXPERIENCE

Adjunct Professor, Physics September 2026 – Present
Merrimack College | North Andover, MA

- Instructor of record for General Physics I (PHY2201), an algebra-based lecture course: syllabus, lectures, exams, problem sets and grading, delivered through Canvas with online homework via The Expert TA.
- Serve as Physics Lab Instructor, managing the online physics laboratories (Pivot Interactives) for five course sections: my own General Physics I section, two additional General Physics sections, one calculus-based Physics I section and one calculus-based Physics II section.
- Guest lecturer on MRI physics and T1/T2 contrast for EXS 4080 Kinesiology II: Pathomechanics (2026).

Director, Clinical Imaging January 2025 – September 2025
AstraZeneca | Waltham, MA

- Imaging lead for inflammatory bowel disease (IBD) clinical programs, overseeing design and implementation of MRI and endoscopy endpoints from Phase I through Phase II.
- Led early imaging planning for a rare liver disease study and prepared an FDA briefing document proposing MR elastography and gadoxetate-enhanced MRI as endpoints for an early-stage primary sclerosing cholangitis (PSC) study.
- Authored image acquisition guidelines and analysis protocols for multi-site international trials; managed imaging CROs and academic core labs to ensure protocol fidelity.
- Championed AI-assisted imaging validation workflows; analyzed imaging data in Spotfire.

Engineering & Robotics Teacher September 2024 – January 2025
Methuen High School | Methuen, MA

- Taught three sections of College Prep Engineering and two sections of Honors Robotics (VEX), including computer-aided design. Massachusetts provisional license in Technology/Engineering (MTEL passed).

Associate Scientific Director, Clinical Imaging (GI Clinical Imaging Lead) June 2020 – July 2024
Takeda Pharmaceuticals | Cambridge, MA

- Primary MRI subject matter expert within the GI therapeutic area, providing scientific and strategic guidance to drug development teams from target identification through proof-of-concept.
- Led imaging strategy for a Phase 3 cell therapy program in perianal fistulizing Crohn's disease, where the MRI-based central imaging read was a co-primary endpoint; contributed to the regulatory submission.
- Designed and oversaw clinical methodological studies using qualitative MRI and quantitative MR elastography and phase-contrast MRI as efficacy endpoints.
- Led cross-vendor MRI protocol harmonization across GE, Siemens and Philips platforms at 100+ global clinical sites, authoring acquisition guidelines and QC frameworks.
- Took part in validating an AI-assisted imaging algorithm for IBD readouts, and co-led collaborations validating PET radiotracers in liver fibrosis and fibrostenotic Crohn's disease.
- Managed imaging CRO partnerships and academic collaborators; negotiated SOWs and ensured deliverables met regulatory and scientific standards.

Associate Director, Medical Imaging April 2014 – June 2020
Parexel (now Perceptive) | Billerica, MA

- Directed imaging science for a global imaging CRO, supporting Phase I–III trials for 20+ pharmaceutical sponsors in oncology, musculoskeletal and metabolic disease.
- Built Parexel's first complete imaging workflow for a NASH (now MASH) study (2016): partnered with the sponsor on study design, created a new imaging phantom with a key opinion leader, collaborated with a leading academic authority in liver MRI, and worked with internal engineering to build a liver fat mapping tool integrated into the company's image processing platform.
- Developed MRI protocol libraries, site qualification programs and QA/QC pipelines for multi-site trials involving MRI-PDFF, DCE-MRI and structural imaging.
- Led scientific review of image acquisition guidelines, image review charters and core lab deliverables; authored regulatory-facing imaging documents.
- Presented regularly in bid defenses, RFP responses and capability presentations; mentored junior imaging scientists.

MRI Research Engineer & Lab Manager November 2012 – April 2014
Beth Israel Deaconess Medical Center / Harvard Medical School | Boston, MA

- Developed quantitative MRI acquisition sequences and post-processing pipelines for neuroimaging and cardiovascular research; managed scanner operations and multi-investigator research protocols.
- Collaborated with scientists on advanced imaging and structural MRI biomarker studies supporting NIH-funded programs.

Adjunct Professor 2012 – 2018
University of Massachusetts Lowell | Lowell, MA

- Created and taught an online graduate course, BMBT.5160 Basic Principles of Nuclear Magnetic Resonance Imaging (3 credits), and taught the in-person graduate course BMBT.5200 Ethical Issues in Biomedical Research.

Senior Scientist, Pre-Clinical MRI November 2010 – November 2012
Pfizer | Andover, MA

- Developed quantitative MRI methods, including magnetization transfer mapping and PDFF assessment, writing extensive MATLAB image processing and analysis code.
- Collaborated with translational imaging and early clinical development teams to advance MRI endpoints from preclinical validation into Phase I/II trial protocols.

MRI Physicist / Systems Engineer June 2008 – November 2010
Aurora Imaging Technology | North Andover, MA

- Designed and optimized acquisition sequences and image reconstruction for a dedicated breast MRI system; worked on RF and gradient hardware and software integration and performance verification.
- Worked on breast PET-MRI detector integration with Brookhaven National Laboratory; supported clinical installations and site training at academic medical centers.

Postdoctoral Research Fellow; Founder & CEO, RF coil company June 2007 – June 2008
McLean Hospital / Harvard Medical School | Belmont, MA

- Managed installation of a new 9.4T preclinical MRI scanner within a newly built preclinical imaging facility.
- Conducted neuroimaging research using clinical ^{1}H-MRS and preclinical 9.4T structural MRI to identify biomarkers of psychiatric disease.
- In parallel, founded and ran a small company building RF coils for small-animal MRI.

Earlier Career: Software Engineer
MITRE | Goodrich

- About five years as a software engineer after the BSEE, earning the MSEE part-time.
- MITRE: embedded and real-time software in C and assembly.
- Goodrich: took over and updated embedded C code for an aircraft-mounted digital camera system; converted MATLAB algorithms to C.

EDUCATION

PhD, Biomedical Engineering Worcester Polytechnic Institute, Worcester, MA
Dissertation: “Osmotic- and Stroke-Induced Blood-Brain Barrier Disruption Detected by Manganese-Enhanced MRI.” Graduate teaching assistant in biomedical engineering.

MS, Electrical Engineering University of Massachusetts Lowell, Lowell, MA
Linear algebra, image processing, mathematics of signal processing, probability and random processes, real-time DSP (TMS320C30).

BS, Electrical Engineering, cum laude University of Massachusetts Lowell, Lowell, MA
Capstone: autonomous maze-solving robot on the MC68HC11, entered in the 1997 Micromouse competition. Peer tutor (UML Centers for Learning, 1994–1997) in algebra, engineering calculus I–III and engineering physics I–III.

Professional Development

- Certificate, Applied AI and Data Science, Massachusetts Institute of Technology (2026)
- EDG 705 Culturally Responsive Teaching, Salem State University (Fall 2025)

TEACHING & INVITED LECTURES

- MRI technologist board-exam tutor, online platform (October – December 2025)
- Invited lecturer, MRI physics, Dartmouth College, Hanover, NH (Spring 2013)

PUBLICATIONS

- Kumar S., Bhagwanani A., Hameed M., Rao N., Parry T., Rahman S., Bennett D., et al. Volumetric measurement of terminal ileal Crohn's disease by magnetic resonance enterography: a feasibility study. *European Radiology* 35(1):117–126 (2024).
- Ganapathy B., Polizzotti B., Bennett D., et al. Neuregulin-1 administration protocols sufficient for stimulating cardiac regeneration in young mice do not induce somatic, organ, or neoplastic growth. *PLOS ONE* 11(5):e0155456 (2016).
- Polizzotti B.D., Ganapathy B., Walsh S., Choudhury S., Ammanamanchi N., Bennett D.G., et al. Neuregulin stimulation of cardiomyocyte regeneration in mice and human myocardium reveals a therapeutic window. *Science Translational Medicine* 7:281ra45 (2015).
- Herter-Sprie G.S., Korideck H., Christensen C.L., et al. Image-guided radiotherapy platform using single nodule conditional lung cancer mouse models. *Nature Communications* 5:5870 (2014).
- Querol M., Bennett D.G., Sotak C.H., Bogdanov A.A. Jr. A paramagnetic contrast agent for detecting tyrosinase activity. *ChemBioChem* 8(14):1637–41 (2007).

Selected conference abstracts
Chandrasekaran et al., SCMR 2024; Bane, Bennett et al., ISMRM 2023; Kumar, Bennett et al., UEG 2023; Syed, Bennett et al., ACR/ARHP 2018; Bansal, Bennett et al., ISMRM 2015; Bennett, Henninger, Fisher, Sotak, ISMRM 2006.

TECHNICAL SKILLS

MRI techniques: MR elastography, phase-contrast MRI, MRI-PDFF, DWI, DCE-MRI, T1/T2 mapping, magnetization transfer, ^{1}H-MRS, manganese-enhanced MRI; clinical and preclinical systems up to 9.4T

Programming: MATLAB (extensive), C; Python (working knowledge); IDL; AI-assisted development with Claude Code; Git and GitHub

Embedded & hardware: MC68HC11, TMS320C30 DSP, PowerPC with real-time OS; MRI RF coils and gradient/RF systems integration

Clinical & regulatory: GCP, FDA briefing documents, imaging charters and acquisition guidelines, imaging CRO and core lab oversight; Spotfire

Teaching tools: Canvas, Blackboard, The Expert TA, Pivot Interactives

PROFESSIONAL AFFILIATIONS

ISMRM (2002–2014; 2020) | RSNA (2015–2018) | QIBA Diffusion and Perfusion MRI Task Force (2015–2018)