Reimagining Medical Imaging:

Advancing Medical Imaging Workflows with Apple

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Executive Summary

The use of medical imaging has increased exponentially in healthcare. As advanced imaging modalities become more accessible and demand for noninvasive testing increases, more patients are likely to undergo diagnostic radiology testing as part of routine healthcare. Enterprise imaging adoption has also expanded, combining medical imaging sources from radiology, cardiology, surgery, pathology, dermatology, and ophthalmology under standardized workflows.

Since transitioning to fully digital solutions over 20 years ago, diagnostic radiologists have generally used the same hardware and software configuration to interpret medical images. Healthcare organizations typically use specialized Windows-based CPU/GPU systems paired with FDA-approved medical imaging displays — all at a high cost. While some organizations have adopted thin clients in an era of cloud computing, these setups come with their own challenges for maintenance, cost, feature parity with thick clients, and scalability.

As organizations increasingly adopt digital tools, new options have emerged for medical imaging workflows. Mac computers with Apple silicon now deliver CPU and GPU efficiencies equivalent to or better than traditional Windows workstations at a fraction of the cost and with industry-leading power efficiency. macOS-compatible apps cleared by the FDA for use in medical imaging interpretation — like Visage 7, MIM for macOS, OsiriX MD, and Falcon MD — deliver fast, efficient Digital Imaging and Communications in Medicine (DICOM) image viewing powered by Apple silicon. And integration with electronic health record (EHR) systems and radiology information systems (RIS), such as Epic Radiant for macOS, enables access to patient records and a completely integrated macOS medical imaging workflow.

The rise in cybersecurity events targeting healthcare organizations has led IT leadership to seek options to diversify deployments and strengthen resilience against future attacks. Integrating Apple hardware into healthcare IT ecosystems has become a priority for some organizations, especially after evaluating the total cost of ownership and compatibility with existing software.

This paper will demonstrate how organizations can use Apple hardware and software to streamline and improve traditional medical imaging workflows for diagnostic radiology. It highlights the wide range of available macOS medical imaging apps and how to integrate them into a broader healthcare deployment using Apple technology. Finally, it explores the impact of macOS on enterprise imaging and the growing ecosystem of medical imaging apps with visionOS.

Computer Hardware for Medical Imaging

Medical imaging has become essential to modern healthcare. Modalities such as magnetic resonance imaging (MRI) and fusion imaging, once experimental or difficult to access, are now standard of care across many clinical pathways.

These noninvasive imaging tests help clinicians detect disease early, monitor cancer, and track treatment progress, among other uses. Radiologists use specialized hardware and software to interpret these images and then generate text reports that provide clinical guidance. Advanced tools such as 3D visualization, once limited to dedicated, expensive workstations, are now commonly required in radiologists' real-time workflows.

Traditional Imaging Workstations

A traditional radiology workstation includes a few core hardware components:

- High-performance CPU to simultaneously support multiple integrated medical imaging apps
- Dedicated GPU to support multiple high-resolution monitors and run 3D visualization software locally
- Medical displays that require specialized hardware and medical calibration software for medical interpretation to view DICOM medical images; FDA clearance is required when used for diagnostic interpretation
- Nondiagnostic displays for apps such as dictation software and EHR systems
- Microphone for speech-to-text report dictation

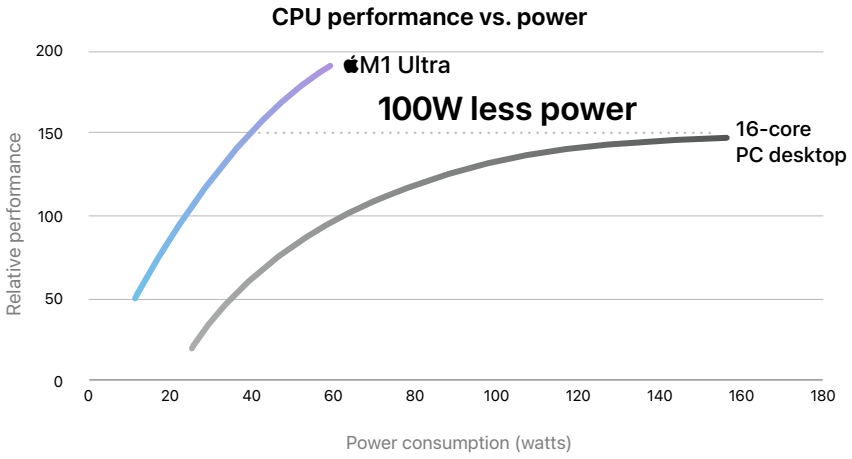
While computer hardware costs have generally decreased over time in the consumer space, radiology workstation hardware components have continued to increase in price, with limited options in the marketplace. An example of a standard on-premise workstation deployed at Emory University School of Medicine would cost over 15,000 USD (prices may vary based on the market and vendors):

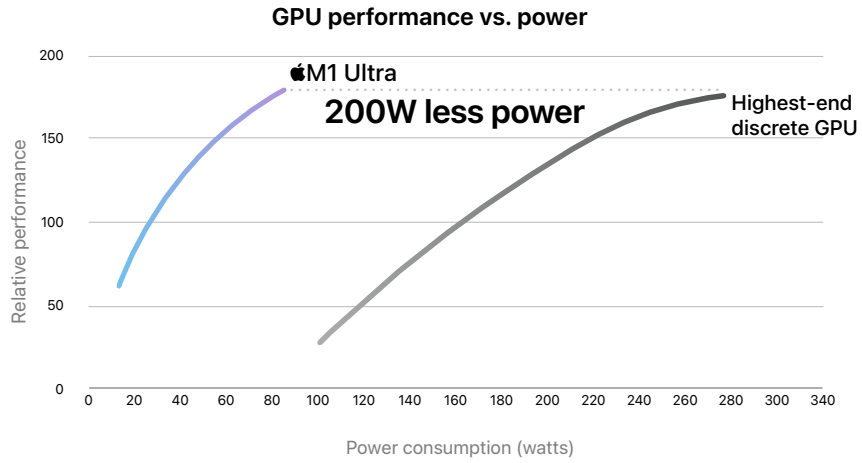
- Windows 11 desktop workstation
  - Intel Xeon 12-core 2GHz, 4.80GHz
  - 32GB DDR5 RAM
  - NVIDIA T400 GPU
  - 512GB SSD storage
- Color diagnostic medical imaging display, 6MP
- Barco MXRT-6700 display controller
- Two 24-inch WUXGA (1920 by 1200) nondiagnostic LED monitors
- Medical dictation device

Some healthcare organizations have turned to thin-client workstations, deploying less powerful local hardware endpoints and opting for dynamically scaled virtualized and cloud computing solutions. When considering the total cost of ownership for these solutions, including energy consumption, egress fees, user licensing, and server maintenance, these deployments often end up being cost neutral and sometimes more expensive than traditional solutions. Additionally, thin-client configurations may not support features such as 3D volume rendering or advanced imaging reconstruction.

Apple Silicon Hardware Advancements

Apple began transitioning its Mac lineup from Intel processors to its own Apple silicon in late 2020, starting with the M1 chip, a unified system-on-chip (SoC) architecture that delivered strong performance and energy efficiency across CPU, GPU, and Neural Engine workloads. Subsequent generations, such as M4 and M5, continued to raise performance, efficiency, and media capabilities, with later chips enabling features like hardware-accelerated graphics and expanded display support.





Most recently, Apple introduced the M5 chip, built on third-generation 3-nanometer technology, which brings significant advances in artificial intelligence (AI) and graphics performance. It features a next-generation GPU architecture that embeds a Neural Accelerator in each core, a faster Neural Engine, higher unified memory bandwidth, and improved CPU multithreaded performance, delivering up to 4x peak GPU compute and substantially accelerating on-device AI tasks and pro workflows compared with prior silicon.

Apple silicon combines industry-leading performance per watt with hardware-verified security features such as the Secure Enclave. It's deployed across Mac desktop and laptop computers, enabling powerful computing experiences from portable MacBook computers to high-end workstations.

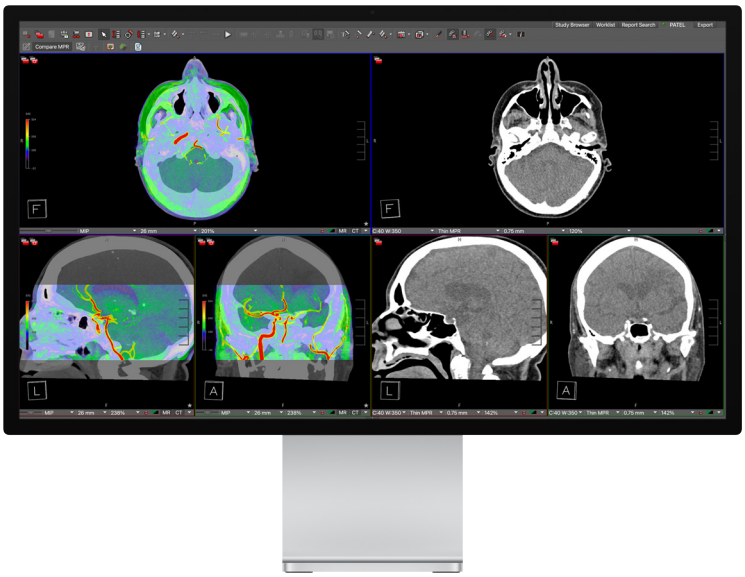
Apple's higher-tier chips offer even greater capabilities: M3 Ultra integrates two M3 Max dies through UltraFusion packaging, delivering massive CPU and GPU core counts, unparalleled unified memory capacity for pro workflows, and expanded connectivity, such as Thunderbolt 5. And M5 Pro and M5 Max feature a state-of-the-art Fusion Architecture that connects two dies into a single SoC, unlocking even more performance and power to drive on-device AI capabilities.

Across these generations, Apple silicon has maintained its industry-leading energy efficiency, enabling high performance in Mac desktop and laptop computers while keeping power consumption low. These advancements translate to improved efficiency across healthcare systems and medical imaging workflows.

Medical Imaging on Apple Displays

Apple has a long history of delivering industry-leading display quality and advanced features for professional users. All Apple displays undergo a state-of-the-art factory calibration process for accurate luminance, grayscale, and color reproduction. To support the unique requirements of color-critical workflows, the displays include a suite of features for configuring and adjusting settings. These include reference modes (or presets), which align the displays with the specific requirements of different media types by adjusting color primaries, white point, transfer function, luminance, and more to match industry standards precisely. Further, fine-tune and full calibration features help verify and maintain display accuracy over time.

Building on these capabilities, Studio Display XDR now supports medical imaging solutions. It includes two medical imaging presets that adjust its performance for radiology workflows — a first for Apple displays. The new FDA-cleared Medical Imaging Calibrator in macOS enables the display to be used for DICOM-compliant diagnostic interpretation by trained medical practitioners.[1] This calibration app and the new reference modes ensure that Studio Display XDR aligns with key medical imaging guidelines and meets the requirements for primary diagnostic radiology. Users can then switch the display back to a default preset for general use.

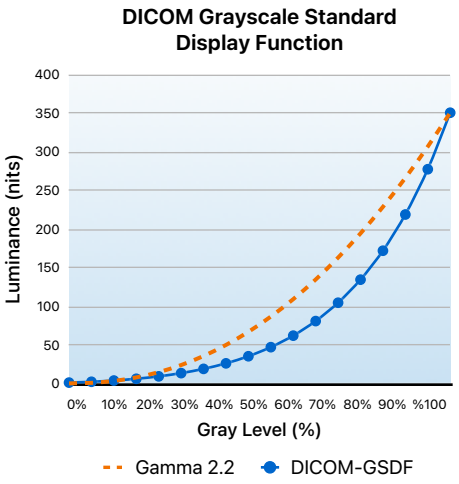


Studio Display XDR also provides flexible options for deployment, which is important for radiologists. Multiple displays can be daisy-chained together via a single Thunderbolt 5 cable, minimizing clutter and simplifying setup. The integrated tilt- and height-adjustable stand, coupled with an optional VESA mount adapter, allows easy positioning (including portrait orientation) and personalization so radiologists can achieve an optimal viewing angle. The VESA mount adapter options enable standardized deployment with existing desk mounts or arms.

[1]The medical imaging presets should not be used for diagnostic purposes unless the display has been calibrated using the Medical Imaging Calibrator and paired with a compatible DICOM viewer. The presets are available on Studio Display XDR and are intended for use by medical professionals. Not intended for use in mammography. The Medical Imaging Calibrator is available in the U.S.

Medical Imaging Display Features

The American Association of Physicists in Medicine (AAPM) TG18 display quality assurance and performance report provides clear guidance for medical imaging systems and has been broadly adopted by industry and FDA. The more forward-looking TG270 report provides updates to TG18 recommendations. Studio Display XDR meets relevant parts of these guidelines through its high spatial resolution, optical design, and rigorous factory calibration process. Medical imaging also requires a display transfer function not previously supported by Apple displays.



The DICOM Grayscale Standard Display Function (DICOM-GSDF)

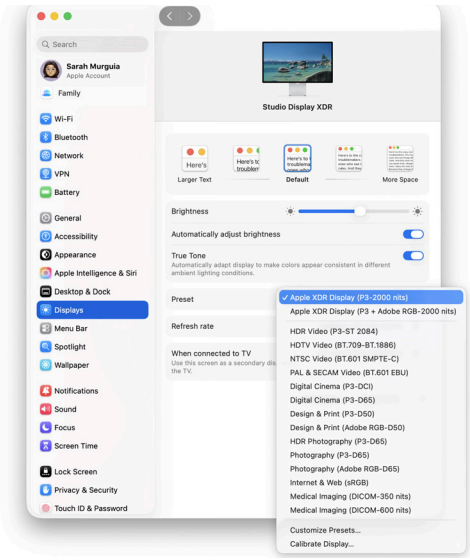
The DICOM-GSDF is a standardized display transfer function for medical imaging defined in DICOM PS3.14. It has unique characteristics that set it apart from traditional transfer functions like pure power gamma 2.2. For example:

- An elevated black level makes even the lowest pixel levels visible through ambient reflections of the display
- The ambient light reflecting off the display is a key component of the luminance response
- Perceptually linear luminance between gray levels

Each DICOM-GSDF transfer function is established using the following parameters:

L_{amb}	The ambient light expected to be reflected off the display, in nits
L_{min} and L_{max}	The luminance emitted by the display at the lowest and highest content code values, respectively, excluding ambient reflections
L'_{min} and L'_{max}	The total luminance the user experiences at the lowest and highest content code values, respectively; this includes the contribution of ambient reflections, L_{amb}
Luminance ratio	The effective maximum contrast of the display (L'_{max} / L'_{min})
Ambient ratio	The ratio of ambient light reflecting off the display to the amount of light emitted by the display at the lowest content code value (L_{amb} / L_{min})

The AAPM guidelines provide specific targets and ranges for these parameters to maintain grayscale accuracy in medical images.



Reference Modes for Medical Imaging

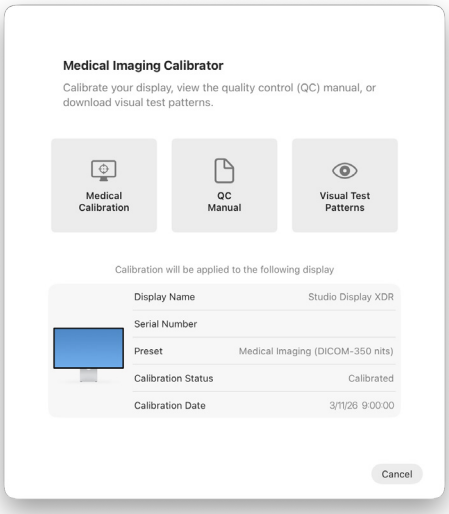
To support medical imaging workflows, Studio Display XDR introduces two new reference modes that prepare the display's performance to align with AAPM guidelines TG270 and TG18.

Medical Imaging (DICOM-350 nits)
Configures the display for use in medical imaging workflows, following AAPM TG270 recommendations for general radiology. This mode uses the DICOM-GSDF transfer function designed for a controlled 25 lux ambient viewing environment with a 350:1 luminance ratio and peak luminance of 350 nits.

This reference mode aligns with recommended display luminance levels from TG270 for non-mammography diagnostic displays: $L'_{min} \geq 1$ nit, a luminance ratio of 250–450, an L'_{max} of 350 nits, and an ambient ratio ≥ 0.25. An L'_{min} of 1 nit aligns directly with these guidelines and meets the ambient ratio requirement with significant margin.

Medical Imaging (DICOM-600 nits)
Configures the display for use in medical imaging workflows, following AAPM TG18 recommendations for general radiology. This mode uses the DICOM-GSDF transfer function designed for a controlled 25 lux ambient viewing environment with a 600:1 luminance ratio and peak luminance of 600 nits.

This reference mode aligns with TG18 recommendations and provides a higher peak brightness and a larger luminance ratio preferred by some radiologists. It maintains the same 1-nit value for L'_{min} as the Medical Imaging (DICOM-350 nits) reference mode while increasing L'_{max} to 600 nits.



Calibration for Medical Imaging

The Medical Imaging Calibrator is a new built-in macOS app that helps trained medical professionals prepare the display for primary diagnostic reading following the requirements in the *Quality Control (QC) Manual*. It uses a compatible colorimeter to quickly measure, adjust, and validate the luminance response and white point of the selected reference mode. When complete, it provides a calibration report for review and record retention.

The Medical Imaging Calibrator validates the DICOM-GSDF, assuming the display is set up with the ambient conditions required by the reference mode. The validation includes white point accuracy, luminance accuracy, contrast accuracy, luminance ratio, and ambient ratio.

Note that running the Medical Imaging Calibrator and passing this validation is just one of the requirements outlined in the QC Manual before using the display for primary diagnostic reading. It must be performed only by a trained medical professional.

Lifetime Considerations

All displays experience a drop in luminance as they age. For medical imaging displays, the ability to correct for this drop directly impacts the longevity and total cost of ownership. When a display can no longer produce the minimum luminance required, it must be replaced. Studio Display XDR provides ample luminance headroom for the Medical Imaging Calibrator to maximize its lifetime.

Medical Imaging (DICOM-350 nits)	Up to 3x luminance boost available
Medical Imaging (DICOM-600 nits)	Up to 1.8x luminance boost available

Medical Imaging Software

Medical imaging systems incorporate various imaging modalities into a unified platform. They typically integrate with the following healthcare IT systems:

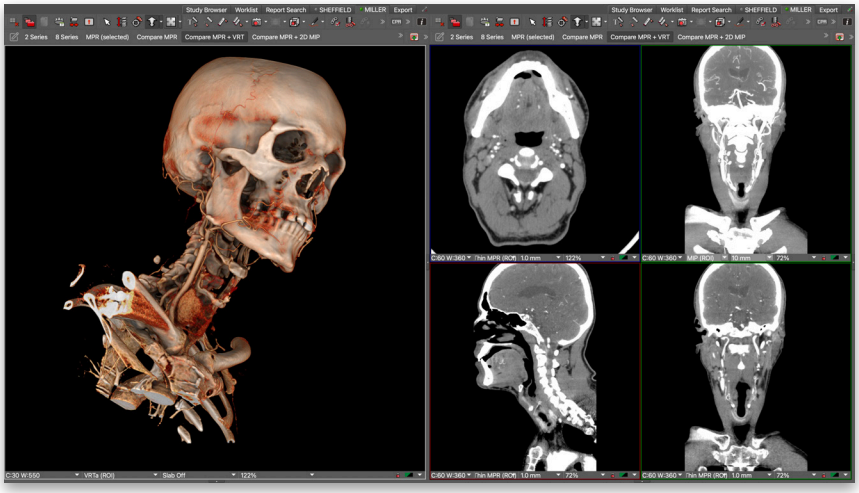
- **Picture Archiving and Communication Systems (PACS)** facilitate the storage, retrieval, and distribution of medical images. PACS manage large volumes of imaging data generated by multiple modalities.
- **Radiology Information Systems (RIS)** manage patient data and workflow in radiology departments. RIS support functions such as scheduling, reporting, and billing.
- **Electronic Health Records (EHR)** systems consolidate patient information, including medical images, into a single digital record accessible by authorized healthcare professionals.
- **Radiology Reporting Solutions** create, manage, and send medical imaging reports, typically using speech-to-text dictation functions.

Traditionally, these core software components have been developed only for Windows. But in recent years, many vendors have deployed macOS versions of their software. Radiologists can now perform critical tasks in the medical imaging workflow on Mac.

Medical Imaging Apps

Several medical imaging apps are available for macOS.

Visage 7
Visage Imaging is a leading radiology imaging software provider. It offers solutions for radiology imaging in the United States, including a solution that delivers functional parity between PC and macOS versions.



Visage 7 for Mac is available for radiology, cardiology, 3D/4D reconstructions, and other imaging-driven specialties, providing the same viewer for radiologists and other clinicians — such as surgeons and cardiologists. Radiologists get an interpretation workflow that supports every diagnostic modality, while surgeons and other clinicians can see exactly what the radiologist sees, with access to the tools and controls relevant to their clinical role. Visage 7 displays CT in multi-thousand slices and enables multimodality fusion of thin-slice cross-sectional images on the fly. It provides a fast, responsive, and efficient experience.

Mobile access to patient data and imaging has become just as important as desktop access. Visage Ease and Visage Ease Pro offer the same imaging experience on iOS and iPadOS as Visage 7 does on macOS. With iPhone, clinicians can quickly and securely review a patient's complete historical imaging studies at the bedside, in a conference room, or on the go. If a diagnostic workstation isn't available, radiologists can perform full diagnostic interpretation on iPad with Visage Ease Pro, which is FDA 510(k) cleared for all imaging modalities other than mammography. Beyond basic functionality, users can even perform multiplanar reconstruction on the fly.

Visage Ease VP for Apple Vision Pro brings spatial computing to medical imaging.[2] The app includes all the features of Visage Ease, in addition to a powerful cinematic rendering engine for immersive 3D and the infinite canvas of Apple Vision Pro. Physicians can use just their eyes and finger-tap gestures to quickly visualize complex anatomy. For radiologists, Visage Ease VP supports interactive 3D review of complex cases, including multimodality fusion for trauma and oncology, surgical planning using volumetric reconstructions, multidisciplinary tumor board presentations, and anatomy training for residents. It enables novel visualization of digital pathology for physicians and ergonomic visualization of live video feeds for surgeons. Visage Ease VP expands imaging access beyond the limitations of traditional workstations.

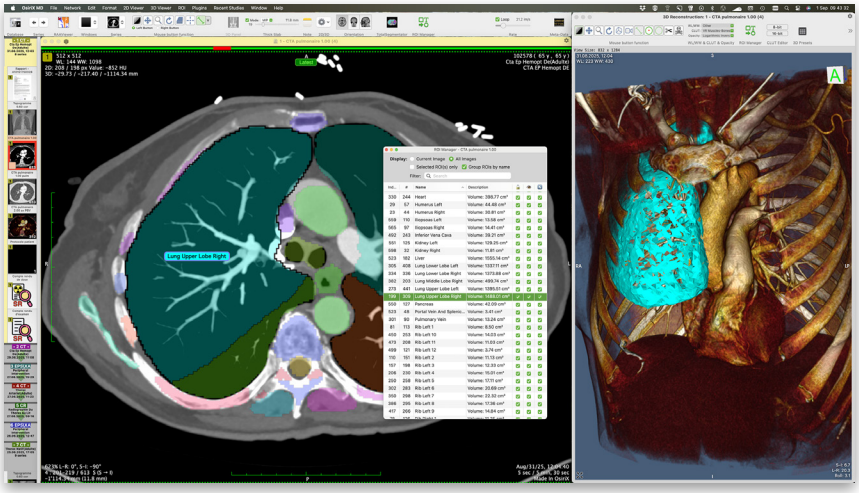
This kind of access isn't just convenient — it's life-changing. It enables clinicians to deliver, discuss, and act on clinical answers faster than ever. When patient imaging and results are available on all Apple devices, collaboration across the entire care team dramatically improves, overcoming time and location barriers.

OsiriX MD

OsiriX MD is certified for diagnostic use in radiology and provides advanced postprocessing techniques for 2D and 3D imaging. It also offers innovative techniques for 3D and 4D navigation, including support for PET-CT and SPECT-CT, and seamlessly integrates with any PACS.

[2]Visage Ease VP is not a medical device and must not be used for diagnosis.

The solution is a comprehensive imaging workstation designed specifically for radiology departments. It lets general practitioners and surgeons efficiently review all imaging modalities. The app supports Apple hardware advancements, including 64-bit computing and multithreading using Apple silicon architecture. OsiriX MD is a popular DICOM viewer for Mac, offering high performance and an intuitive user interface. OsiriX MD is indicated for medical use (FDA cleared and CE II labeled).



Falcon MD

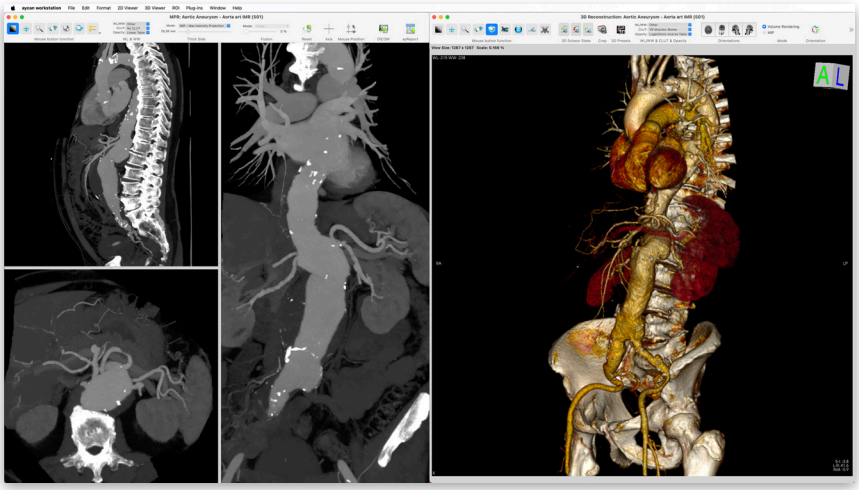
Falcon MD is an FDA-cleared DICOM viewer that allows healthcare professionals to securely view, process, and interpret CT, MR, CR, and US images on Mac, iPhone, and iPad. Built entirely using Apple's development tools and Metal and SceneKit frameworks, the app is optimized for Apple silicon and offers high-performance, photorealistic 3D volume rendering. SwiftUI provides a consistent, seamless experience across all devices, allowing clinicians to begin reviewing a study on one device and resume it on another, whether they're using an iPhone, iPad, Mac, or Apple Vision Pro.

Falcon MD connects to any DICOM-compliant PACS, supports customizable layouts, and includes a built-in reporting tool that supports Dictation on Mac. It's available on the App Store and through institutional B2B device deployment.

Falcon Vue on Apple Vision Pro is designed for nondiagnostic review, planning, and collaborative sessions. It works seamlessly alongside Falcon MD to support advanced workflows in immersive 3D — whether preparing a case in the OR, walking a patient through anatomy, or comparing timepoints.

aycan Medical Systems

aycan offers a high-performance, FDA-cleared, and CE-certified DICOM viewer for Mac, built specifically for radiologists and optimized for Apple silicon. The software provides an exceptionally smooth, responsive, and stable user experience for all types of medical imaging solutions, delivering fast image loading, fluid scrolling through large datasets, and real-time 3D rendering without lag.

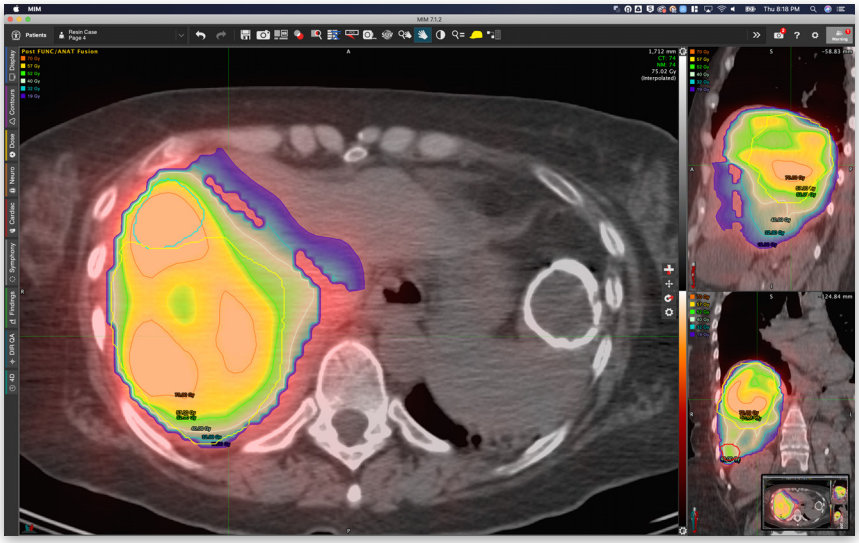


The aycan solution performs efficiently even under heavy workloads, such as high-resolution multimodality studies, complex reconstruction, and image comparison. Radiologists benefit from powerful performance across Mac desktops and laptops, combined with exceptional battery efficiency enabled by Apple silicon.

Combined with its intuitive design, strong support for DICOM standards, and seamless integration into PACS environments, the aycan solution is a scalable, high-end solution for demanding clinical and diagnostic tasks.

MIM Software

MIM Software, a GE HealthCare Company, develops vendor-neutral medical imaging software that standardizes workflow and simplifies complex clinical scenarios. Leading healthcare organizations use MIM™ to deliver precise, personalized care. Its imaging solutions and time-saving workflow automation help clinicians improve patient care. MIM for macOS is a specialized medical imaging PACS software for nuclear medicine and radiation oncology that integrates seamlessly within healthcare systems.

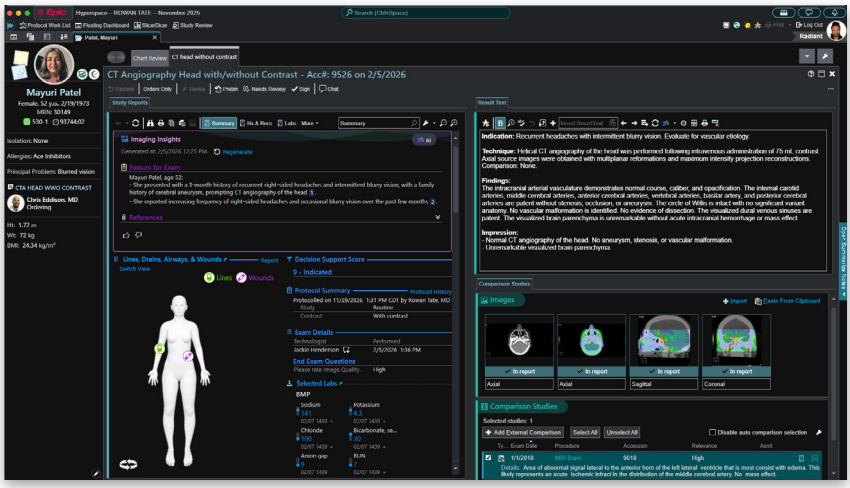


MIM offers these features:

- Radiation Therapy treatment plan visualization
- Radiology and Nuclear Medicine diagnostic viewing
- Customizable display and high-resolution multiscreen support

Epic Radiant

Epic Hyperspace for Mac represents a major milestone in delivering Epic workflows directly on macOS without virtualization or web access. The local endpoint installation allows Epic Hyperspace to take full advantage of Apple hardware, such as the Liquid Retina Display for viewing content and Touch ID for secure sign-on.



Epic Radiant is one of the most popular RIS platforms in U.S. academic radiology practices. Hyperspace for Mac enables complete radiology reporting workflows optimized for macOS.

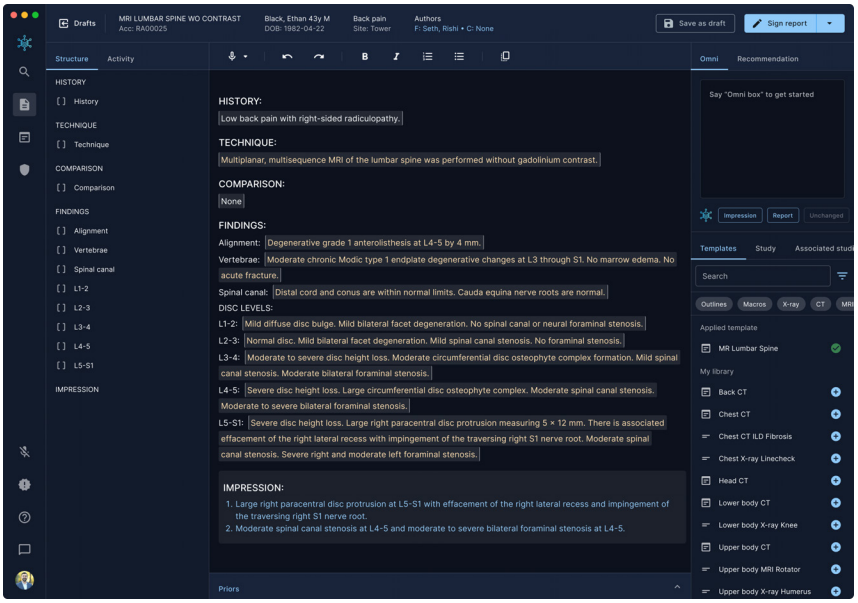
Many vendors have introduced web-based versions of their PACS platforms, allowing nonradiology providers to quickly access and view images without launching an ancillary app. Hyperspace for Mac enables web PACS integration, embedding hyperlinks in a patient record so that clinicians can open images in Safari with one click. Most modern PACS vendors that support HTTPS URL encryption can be integrated with the Epic Hyperspace web PACS link feature.

Healthcare systems can also embed these web PACS links in a patient portal such as Epic MyChart so that patients can view their radiology images directly, helping them better understand their results. Imaging access also reduces work for providers, who receive fewer questions when patients view their images.

Dictation and Radiology Reporting

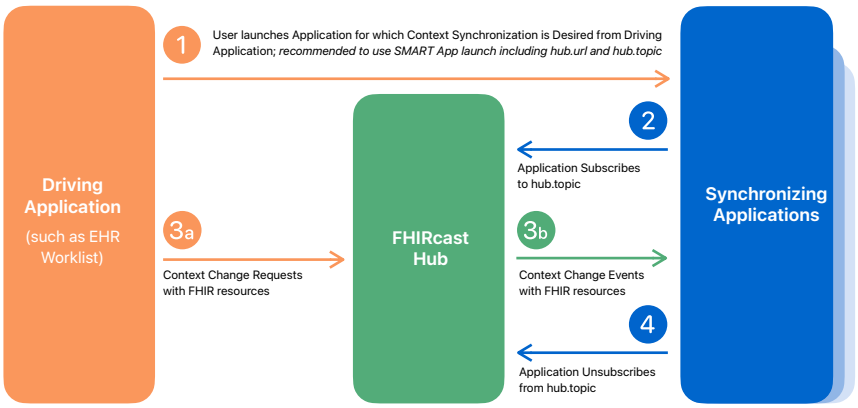
Few legacy radiology reporting systems support macOS without virtualization; however, some newer apps work directly with macOS or through web-based clients.

Rad AI: Generative Reporting Designed for Mac
Rad AI brings generative AI radiology reporting to Mac, providing a modern end-to-end reporting experience on macOS. Designed for Apple silicon, Rad AI transforms documentation into a background process, reducing cognitive load and enabling radiologists to focus on image interpretation and clinical decision-making.



Powered by the Neural Engine in Apple's M-series chips, Rad AI processes live dictation and clinical context in real time, producing structured impressions and follow-up recommendations while the radiologist reads. With on-device performance and low-latency processing, the experience is immediate and fluid, without disrupting workflows or requiring radiologists to context-switch between systems.

Rad AI integrates directly with Epic Radiant on macOS, bridging the gap between the EHR and the reporting environment. Radiologists manage worklists and studies within Epic Radiant while Rad AI operates in the background, continually generating personalized impressions and evidence-based recommendations aligned with enterprise clinical standards and continuity of care. And with FHIRcast support, EHR and PACS applications are always synchronized with Rad AI in real time.



The Mac experience extends beyond software. Rad AI on macOS integrates with standard radiology speech microphones, eliminating the need for virtualization layers, custom drivers, or workaround configurations. This enables high-fidelity dictation and voice interaction in a Mac-based reading room, making enterprise-grade, fully Mac-based radiology workflows practical for the first time.

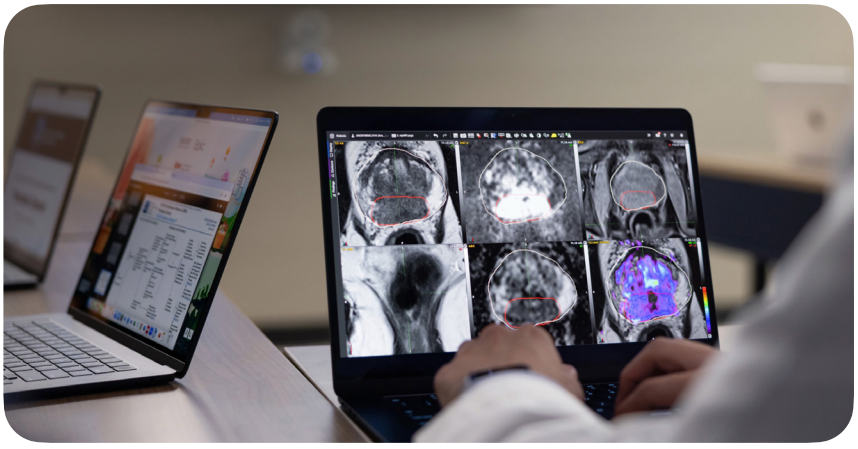
Together, Apple silicon, macOS, Epic Radiant, and Rad AI create a modern radiology solution that fits how radiologists work. The growing number of radiologists who already use Mac in their personal lives can now work in that same environment in clinical practice without compromise.

Advanced Image Manipulation Functions

Over the years, imaging workflows have expanded to include new functions beyond 2D planar views. Examples include image segmentation, multimodality image registration, and 3D visualization. Traditionally, these features required a dedicated single-purpose hardware workstation costing upwards of 50,000 USD and limited to a few locations.

The combination of hardware and software advancements described earlier has opened the door for radiologists to use these advanced imaging functions on standard medical imaging workstations as well as portable devices such as laptops and tablets. While radiologists may use these tools to support image interpretation, functions such as 3D visualization and volume rendering have become crucial to other healthcare providers, like surgeons planning procedures. Importantly, clinicians can access the tools locally on devices such as MacBook Air, allowing real-time manipulation and preparation.

Advanced anatomy segmentation with 3D volumes is routinely used for oncologic radiation therapy and treatment planning. A multidisciplinary team comprising radiology, oncology, radiation oncology, and medical physics collaborates to develop a personalized treatment strategy based on a patient's anatomy and disease involvement. This typically requires working in several high-end specialized software apps across multiple workstations, depending on the configurations. With apps optimized for macOS, these workflows and image manipulation tasks can be accomplished on a single device and in one app, saving the team time.



The Era of Enterprise Medical Imaging

Enterprise medical imaging is the integration, storage, and management of medical images across different departments and facilities within a healthcare organization. It encompasses a range of imaging modalities and medical specialties, including radiology, cardiology, pathology, ophthalmology, and dermatology. Enterprise medical imaging aims to streamline workflows, improve diagnostic accuracy, and enhance patient care by providing healthcare professionals with timely access to comprehensive imaging data.

Enterprise medical imaging offers several benefits:

- **Better diagnostic accuracy:** Comprehensive imaging data from different modalities enhances the accuracy of diagnoses.
- **Streamlined workflow:** Integrating imaging data into a single platform reduces redundancy and improves efficiency.
- **Enhanced collaboration:** Healthcare professionals can easily share and access imaging data across disciplines.
- **Improved patient outcomes:** Access to imaging data supports faster, more informed decision-making.

Enterprise medical imaging also faces several challenges:

- **Data security:** Safeguarding sensitive medical images and data is paramount. Organizations must implement robust security measures.
- **Interoperability:** Integrating imaging data from various modalities and systems can be complex.
- **Cost:** Healthcare organizations must weigh the cost of enterprise medical imaging systems against the benefits.

Several advancements are shaping the future of enterprise medical imaging:

- **AI:** AI algorithms are being developed to enhance image analysis, automate workflows, and support clinical decision-making.
- **Cloud computing:** Cloud-based solutions offer scalable storage and processing capabilities, streamlining imaging data integration across multiple locations.
- **Telemedicine:** Enterprise imaging systems support remote consultations and access to imaging data.

Enterprise medical imaging is transforming healthcare, offering many benefits by integrating and managing imaging data. By overcoming challenges such as data security and interoperability, healthcare organizations can harness the full potential of these systems to improve diagnostic accuracy, streamline workflows, and enhance patient care.

Education and Research

While primarily used in patient care, enterprise medical imaging is also used in education and research worldwide.

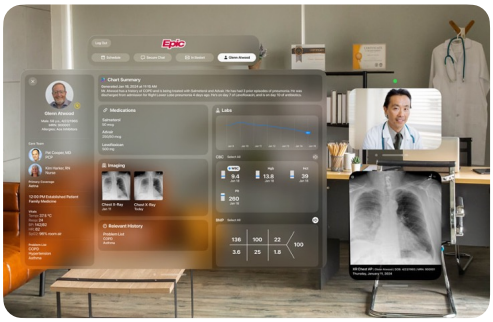
Curricula for physicians, nurses, dentists, and advanced practice providers in training all include medical imaging. These students often access online libraries with curated anonymized DICOM case files for review of anatomy, pathology, and diagnoses. Mac is the platform of choice for students, and they complete most of their medical imaging education using macOS apps or web-based DICOM viewers.

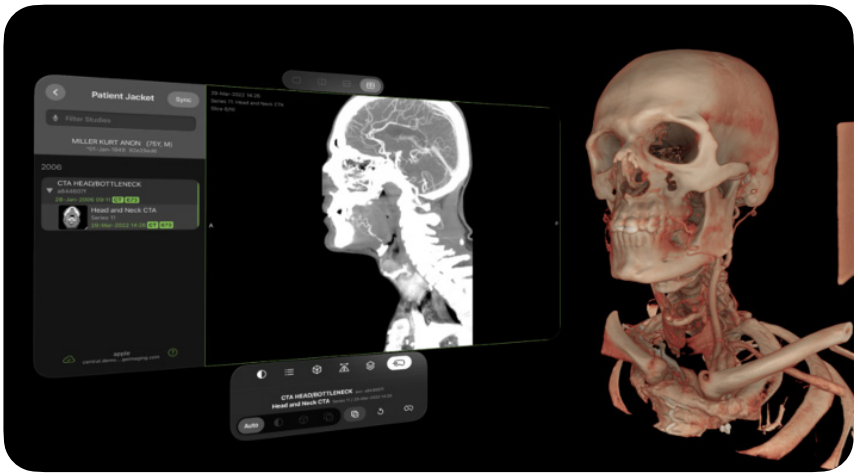
In research, medical imaging is routinely performed in human and animal studies. These results support many applications, including pharmaceutical development, cancer treatment innovations, and AI algorithm training. With macOS and Apple silicon, advanced research apps can process medical imaging data locally without requiring cloud computing.

Seeing the Future of Medical Imaging

Over the past decade, significant hardware advancements have brought augmented reality (AR) and virtual reality (VR) devices into mainstream use. AR/VR devices, once used only by enthusiasts, now support more widespread applications and use cases.

A few experiences with AR/VR workflows have been described and published, particularly in healthcare and medical imaging. But most of these studies are narrow in scope and cite several limitations, including poor ergonomics, limited display fidelity, unintuitive workflow, and lack of support for security and privacy standards required for healthcare data compliance.





In February 2024, Apple launched Apple Vision Pro with visionOS. The device features the M2 processor built on Apple silicon with performance equivalent to desktop-class radiology workstation hardware. It also includes two micro-OLED displays with 23 million pixels, a 7.5-micron pixel pitch, and a 3D display configuration with 92% DCI-P3 color space support. On-board sensors allow dedicated eye-tracking, and high-resolution main cameras allow seamless pass-through of the physical environment to the user. In October 2025, Apple updated Apple Vision Pro to include the M5 processor built on Apple silicon and the Dual Knit Band.

Advanced hardware combined with visionOS enables new, innovative workflows and healthcare applications. Multiple DICOM viewing apps specifically for medical imaging are available, including Visage Ease VP and Falcon MD. Dedicated 3D visualization software is available from established medical imaging vendors, such as Siemens Healthineers. And surgical apps from Stryker and Storz include medical imaging alongside laparoscopic feeds for real-time intraoperative reference of patient imaging data.

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