



Best Practices for Healthcare Lighting

MRI Suites



CHRIS
President



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Regional Manager - Central



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Marketing Director

Kirlin's Key Focus Areas



A Legacy in Healthcare Lighting



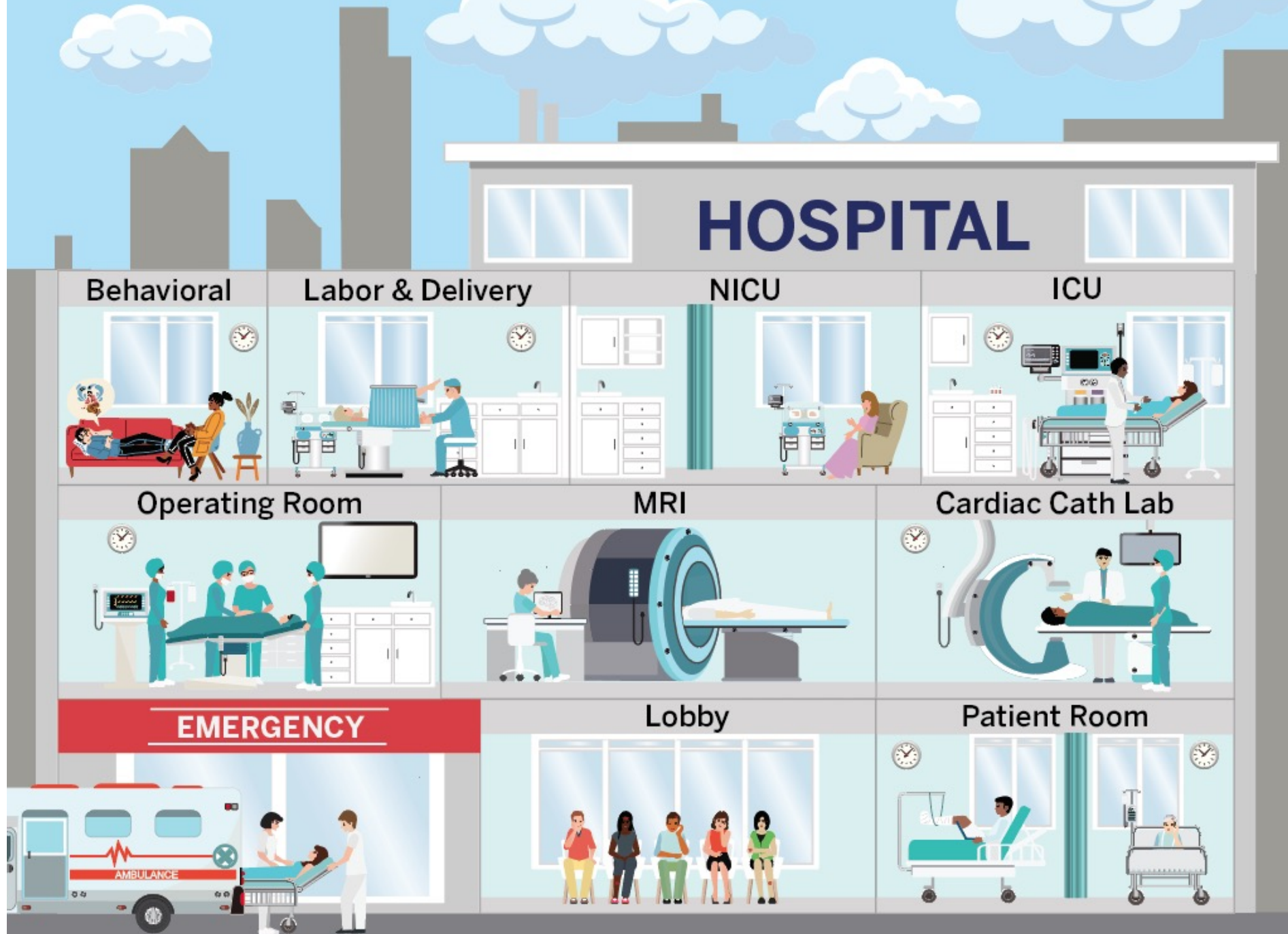
1970s

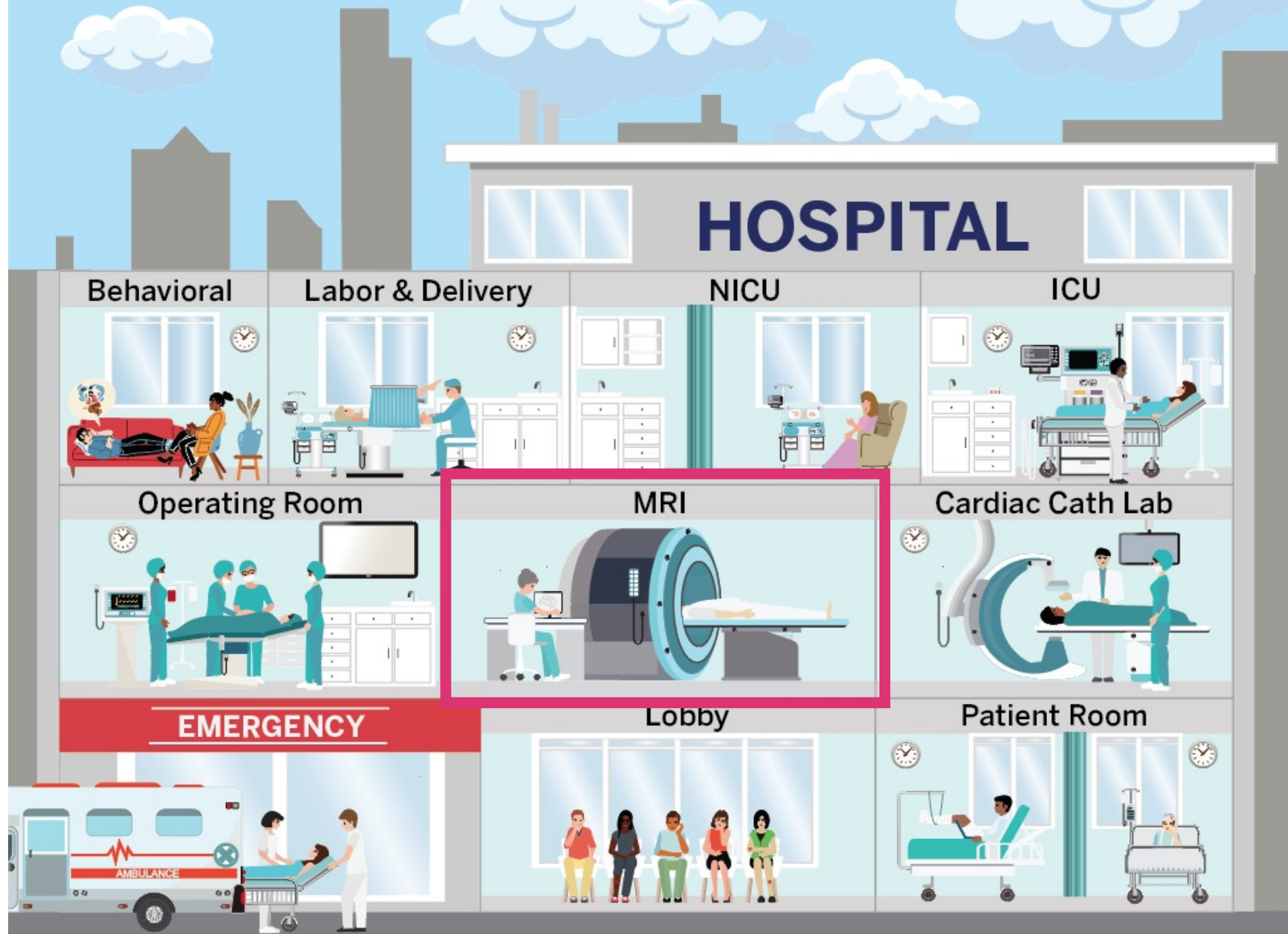
Kirlin developed the recessed motorized exam light with Dr. DeBakey



1980s

Kirlin provided non-ferromagnetic lighting for the world's first MRIs





Magnetic Resonance Imaging or MRI – What is it?

MRI scans provide
imaging of body's
soft tissue



Powerful machine that creates images of soft tissue

Can create both 2D and 3D pictures

Originally developed for brain imaging

Also used for detecting multiple sclerosis, tumors, cysts, tendonitis, torn ligaments, herniated discs and various infections to name a few

MRI Scanners – Where to find them?

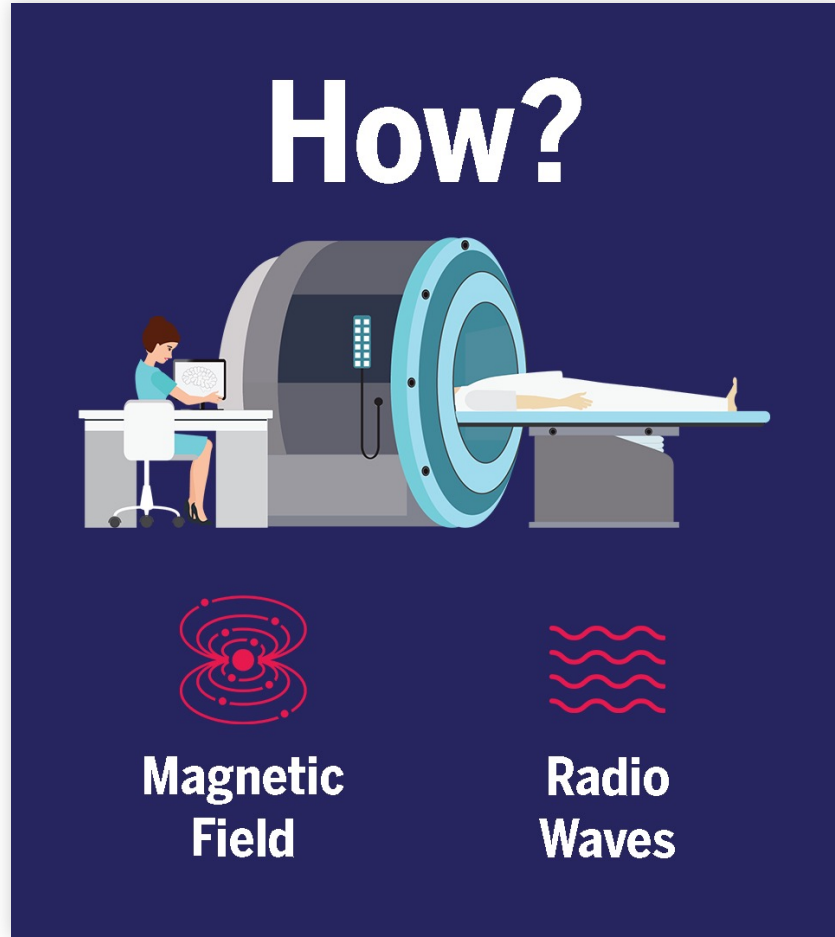


Dedicated MRI Suites



Hybrid Operating Rooms

MRI Scanners – How do they work?



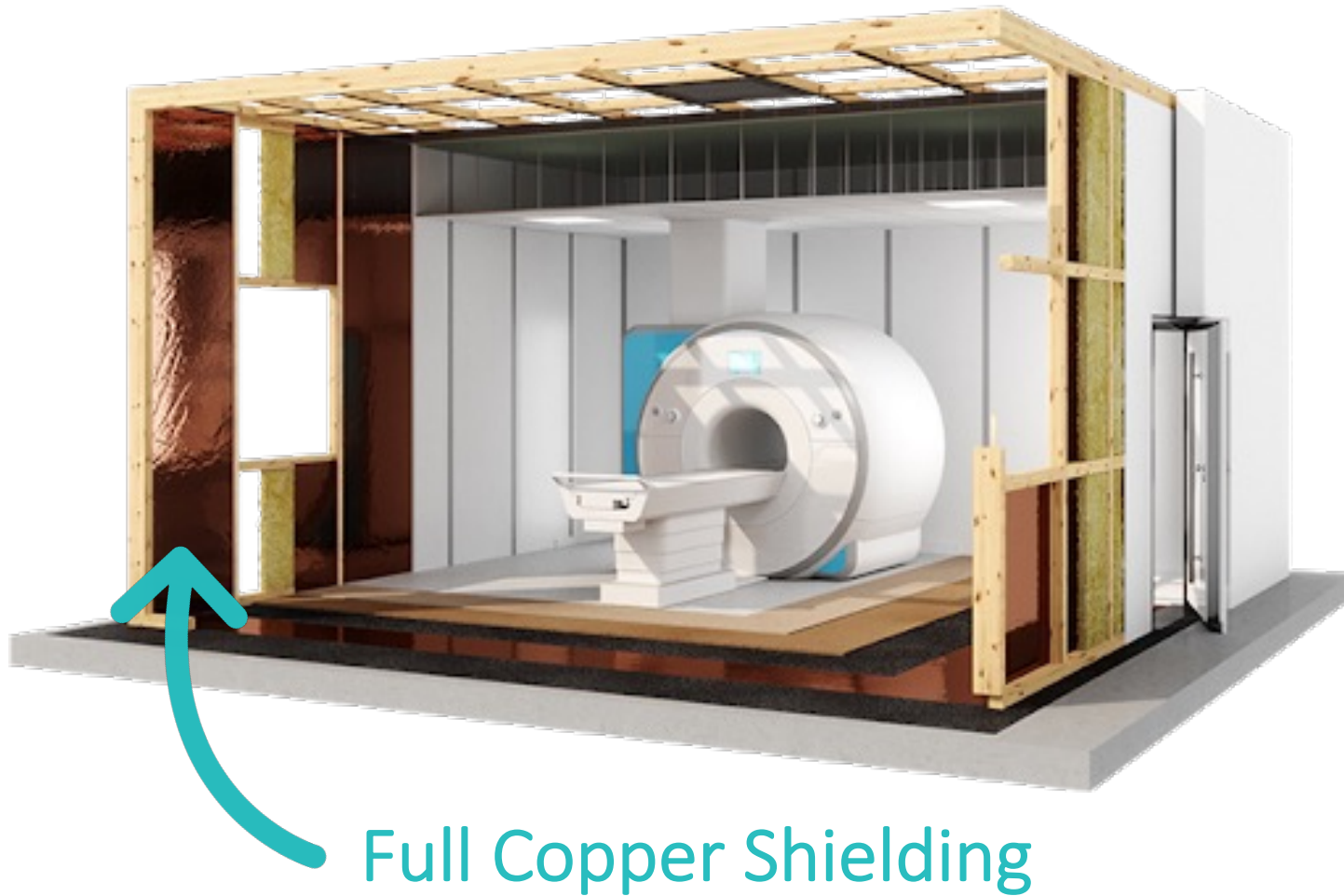
The very strong **magnetic field** causes protons in the body to become aligned.

Then, an MRI technician introduces a **radio-frequency "pulse"**.

The pulse disrupts the aligned protons, causing them to re-align in a new configuration.

When the pulse is turned off, the protons return to their original alignment, releasing **detectable energy**.

MRI Shielding: A Room within a Room



Why do we shield MRI suites?

1. Prevent image artifacts due to RF/EM “noise”
2. Protect other medical equipment from the powerful magnet

Sizing up Today's MRI Suites

- **1 Tesla** = 30,000 X earth's magnetic field
- Current standard is **3 Tesla**,
- Cost for a new MRI Suite runs \$3-5 million for machine, suite and surrounding infrastructure
- Major revenue generator, tests can cost \$400 up to \$12,000 each



Newer Technology: **7.0 Tesla** MRI Scanners

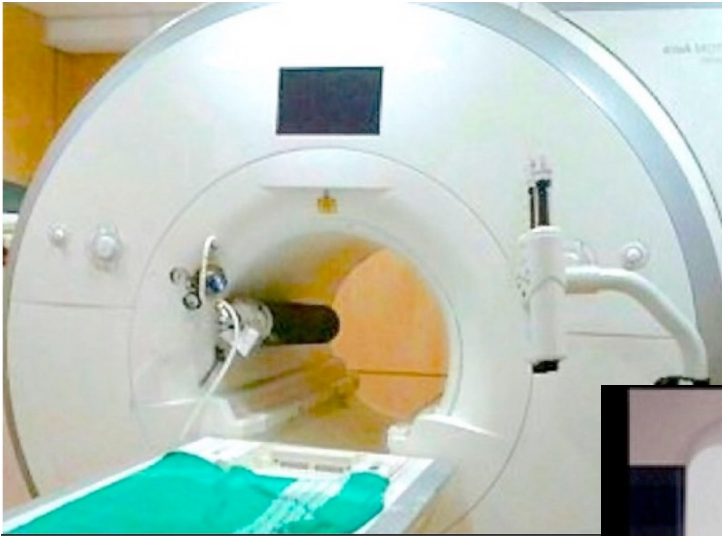
- 7.0 Tesla Scanners
- Much more powerful
- Much more sensitive
- Successfully installed and operated alongside Kirlin's **SmartLED™ MRI Lighting System**



Key Requirements for Lighting the MRI Suite

- 1 DC Power Only**
- 2 Non-Ferromagnetic Materials**
- 3 Space Must Be Shielded**
- 4 Proper Filtering of All Openings**

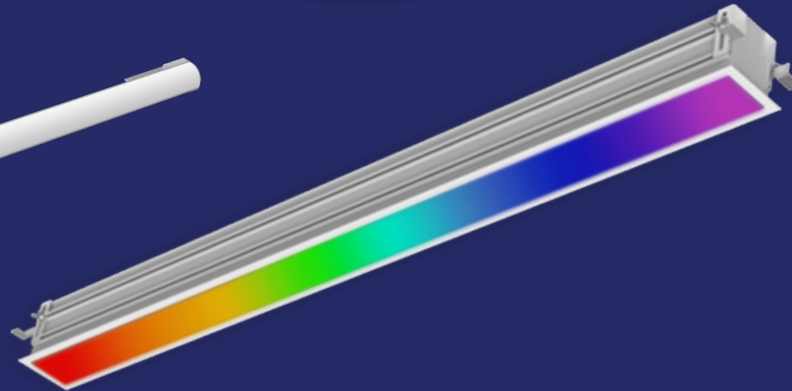
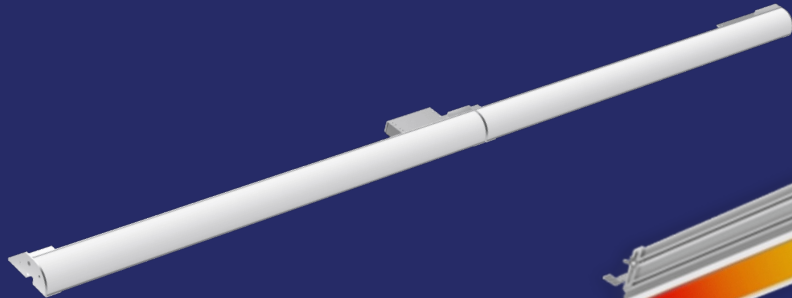
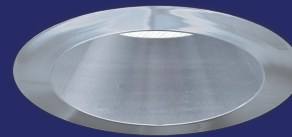
Why Non-Ferromagnetic?



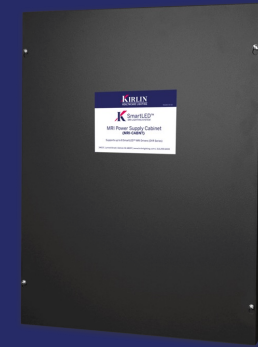
SmartLED™ MRI Lighting System



Non-Ferrous Luminaires



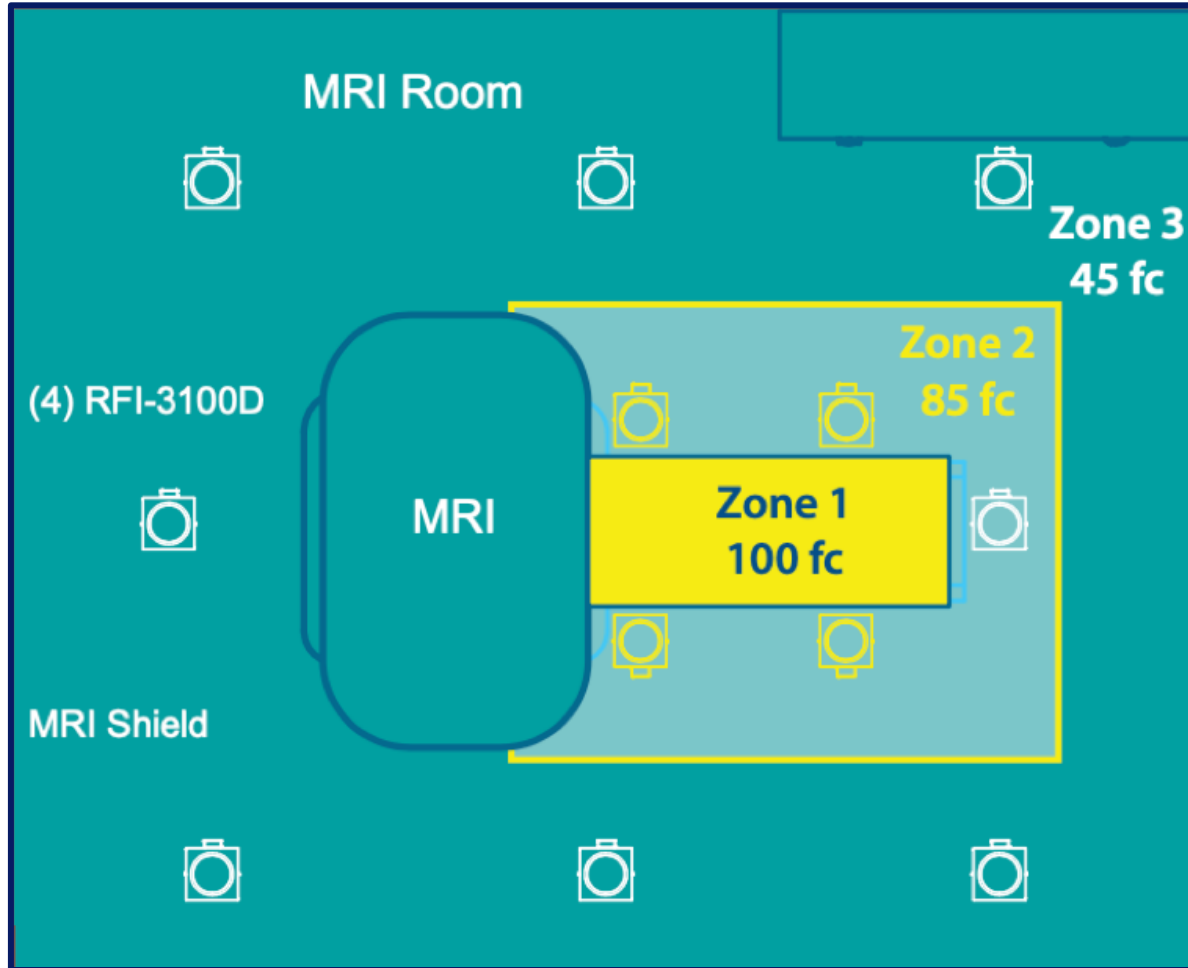
Remote Power Supply Cabinets



RFI/EMI Filters



Lighting the Ideal MRI Suite



Enhanced Visual Acuity

- Proper light levels ensure patient safety and proper cleaning



A Safer Environment

- Remotely mounted LED drivers and electromagnetic filters eliminate noise and artifacts from scans



Improved Patient Comfort

- Adjustable glare-free luminaires mounted along the sides of the patient table minimize visual discomfort

Improper Luminaire Selection for MRI Suite



Suspended or track fixtures



Downlight over patient's face

Proper Luminaire Selection for MRI Suite



Proper Luminaire Selection for MRI Suite

- **Dimmable** lighting for calming claustrophobic patients



Proper Luminaire Selection for MRI Suite

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- **2'x2' scenic panels** to create a faux skylight for visual interest



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- **Indirect** lighting feels larger and more open



Proper Luminaire Selection for MRI Suite

- **Dimmable** lighting for calming claustrophobic patients
- **2'x2' scenic panels** to create a faux skylight for visual interest
- **Indirect** lighting feels larger and more open
- **RGBW** skylight can distract during the test



Kirlin's SmartLED™ MRI-Safe Luminaires



Downlights in the MRI Suite



- Used for ambient lighting to meet required fc levels throughout the suite
- Use **adjustable downlights** along the side of the patient transfer table to eliminate discomfort
- Available with sealed IP65 trims for added infection control

Decorative Scenic Panels

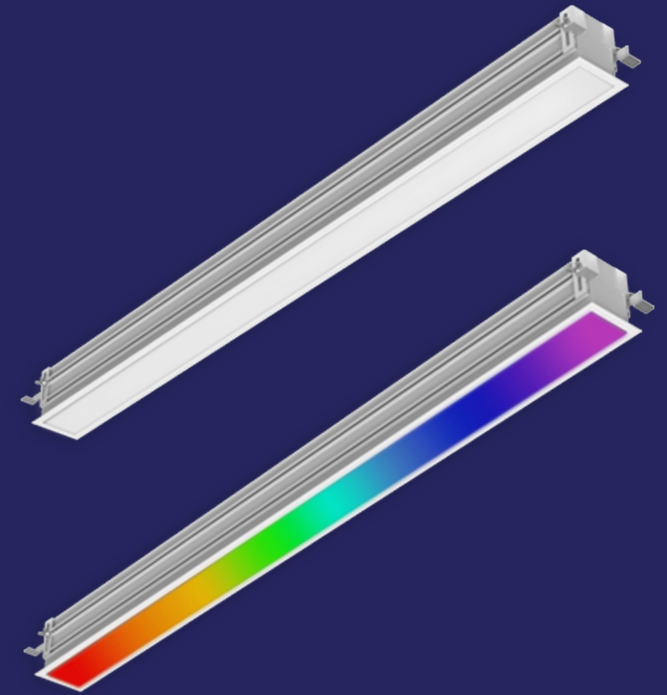


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Linears in the MRI Suite



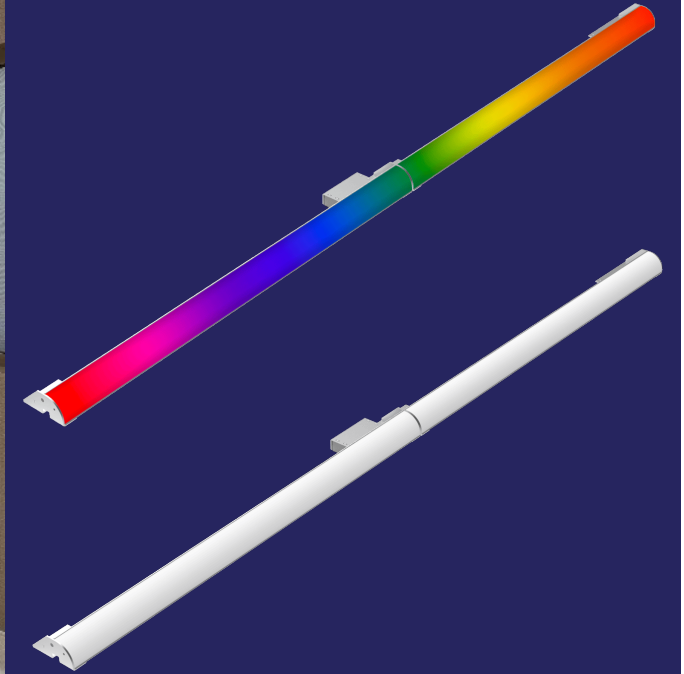
MRL-02 Linear



Coves in the MRI Suite



MCL Cove



Coves in the MRI Suite



MCL Cove



Task Lighting in the MRI Suite



MRI Undercabinet



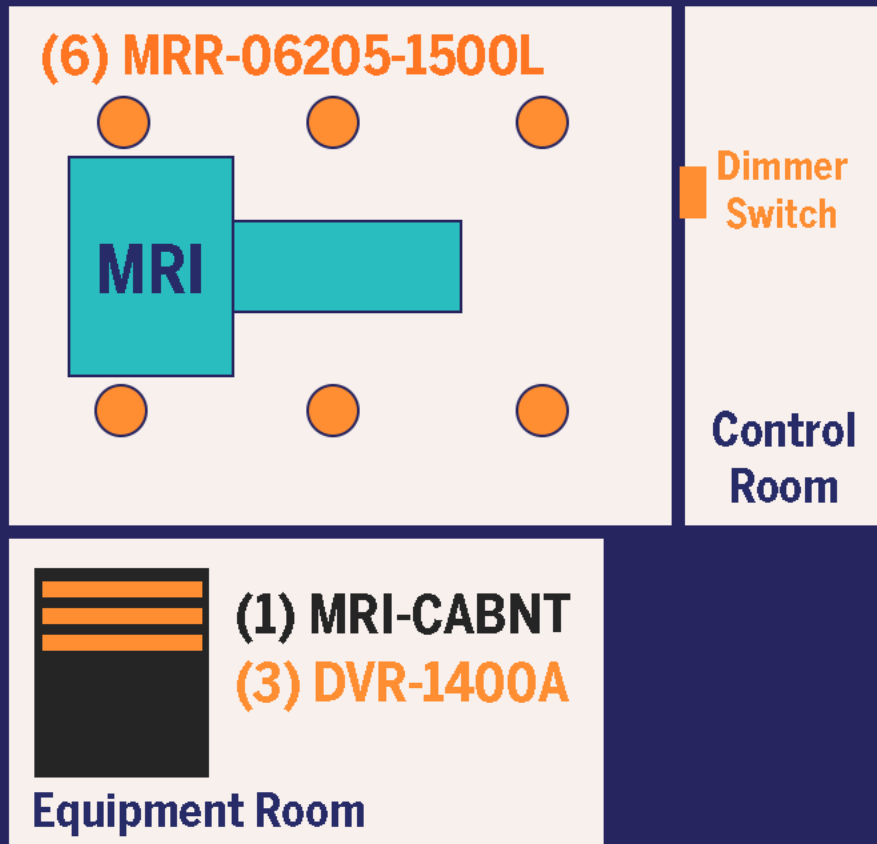
Power the Luminaires: Remote Driver Cabinet



- The SmartLED™ Driver Cabinet is a **modular system** for providing power to the luminaires
- Driver modules are mounted in Driver Cabinet, in a remote location outside the MRI room's shield
- Low end 0-10V or DMX dimming to 0.4%, with up to 8 dimming zones per cabinet
- 5 year warranty

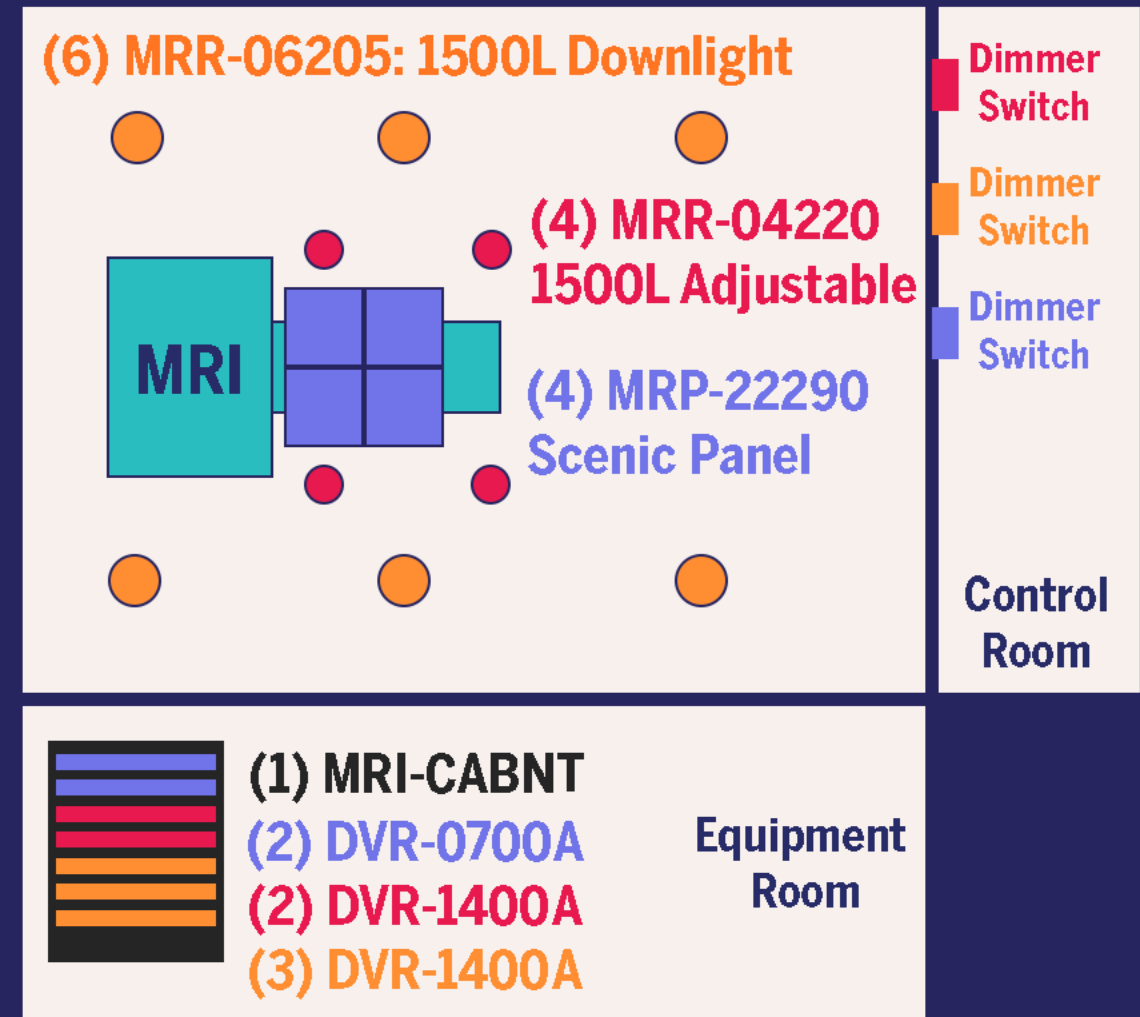
Example 1

Small Imaging Room or
Stand-Up MRI



Example 2

Full Sized MRI Suite

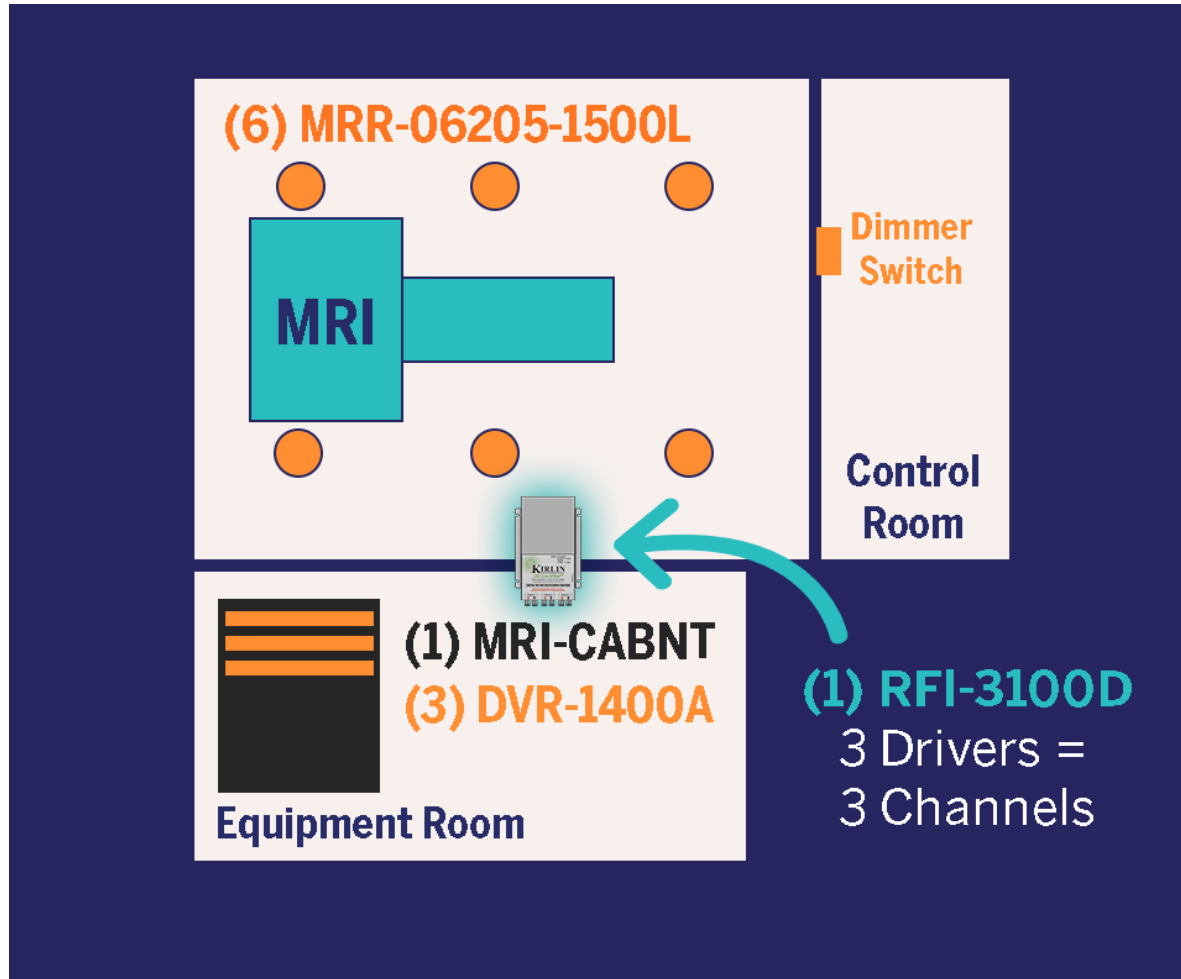


The Last Step: RFI/EMI Filters



- Mounted directly onto shield
- 3-channel and 4 channel options for static white and RGBW color changing systems
- 100 dB filtering **proven to eliminate artifacts in machines up to 7.0 Tesla**
- 5 year warranty

The Last Step: RFI/EMI Filters



- Kirlin's 3-channel and 4-channel designs require fewer openings in the shield (i.e. fewer "failure points" compared to single-channel filters)
- Pair the number of filter channels with the number of Driver Modules used for static white systems
- Pair a 4-channel filter with a single RGBW DMX driver for color changing systems

Emergency Power – Mission Critical



- Mini Inverters can provide 100% illumination for over 3 hours
- Very inexpensive, presenting a great, reliable, easy to install, great value option
- Very important in MRI
- Critical in Hybrid OR
- Mission Critical in Intra-Operative

MRI Vignettes



Spotlight: CareMount

- Scenic panels with regressed mullions are used to distract patients
- Dimmable downlights around the perimeter for ambient and task lighting



Spotlight: OGH

- Scenic panels coordinate with artwork in the room
- White panels next to the transfer table for patient prep
- Dimmable downlights around the perimeter for ambient



Spotlight: NY Presbyterian

- Cove lighting adds dimension and highlights the warm ceiling material
- Adjustable downlights on either side of the transfer table



Why Choose Kirlin in the MRI Suite?



- Turn-Key System
- Unparalleled Value
- Broad Selection
- Experience



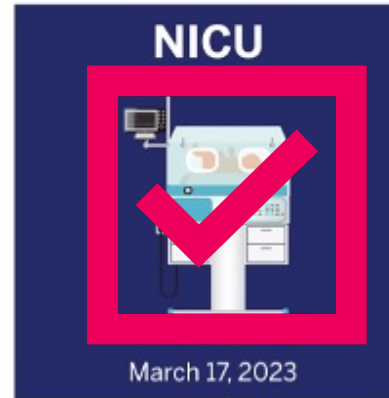
A Legacy in Healthcare Lighting



Trusted by the Best

Kirlin lighting is trusted by ALL of the U.S. News's Top 20 Honor Roll hospitals

Join Us Every Month, or On Demand!



A photograph of a modern building's interior, featuring multiple levels with curved balconies and glass railings. The space is illuminated by recessed ceiling lights, and the overall color palette is dominated by blues and greys, with some warmer tones from the railings and floor. The word "Questions?" is overlaid in a large, white, sans-serif font in the center of the image.

Questions?