



Best Practices for Healthcare Lighting

MRI



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National Sales Manager



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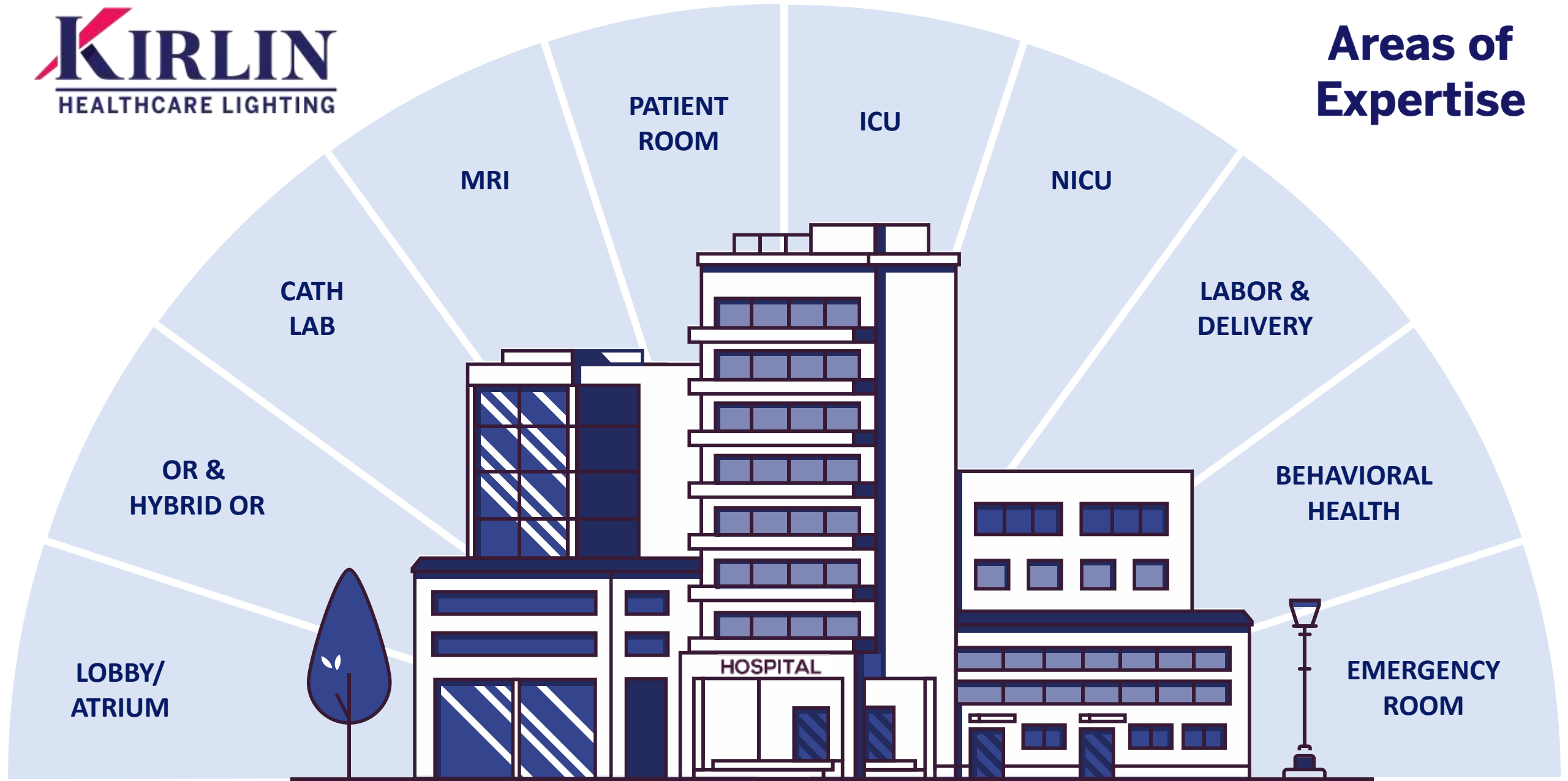
Regional Manager - Central



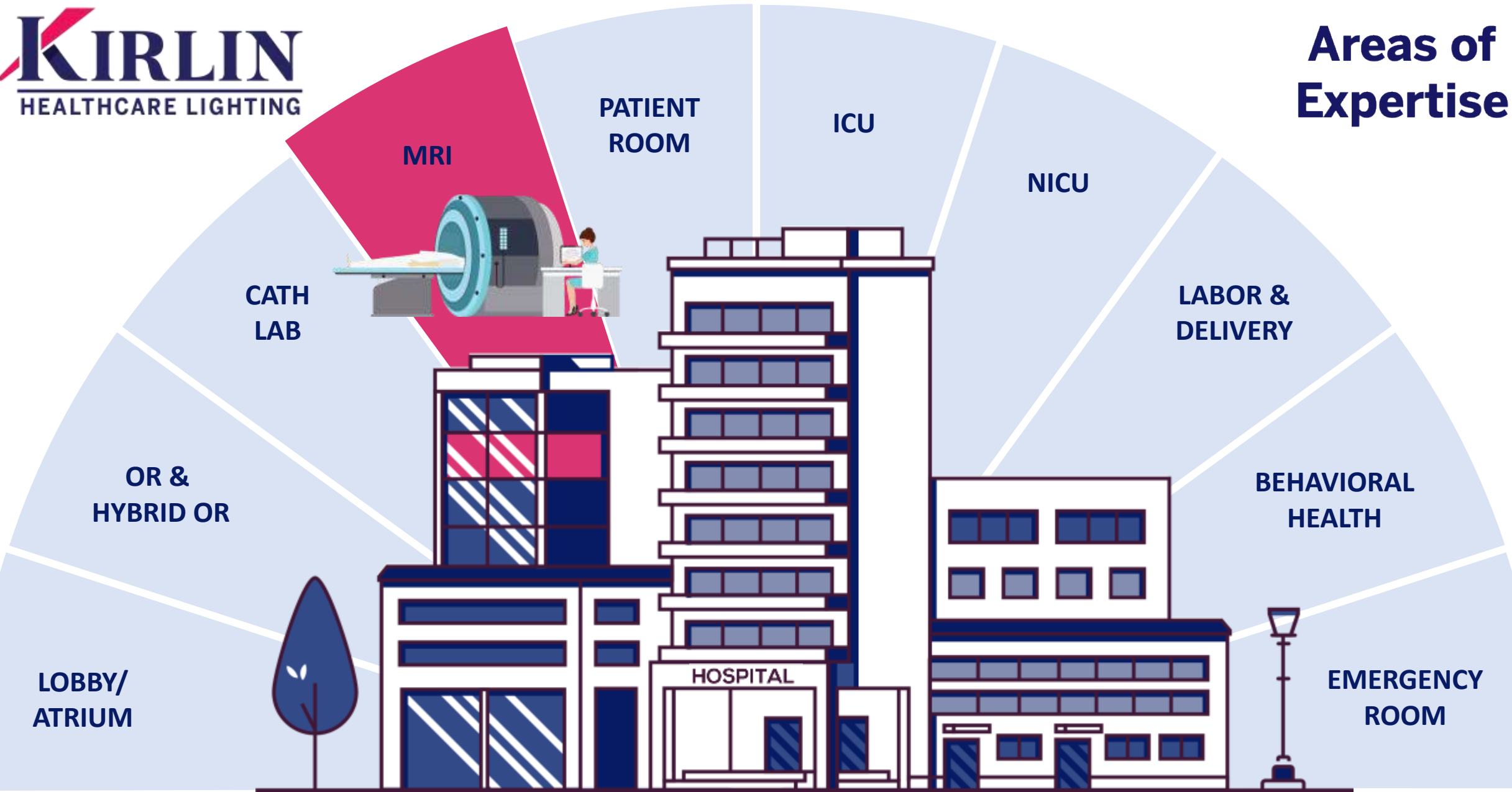
CHRIS

VP Sales & Marketing

Areas of Expertise



Areas of Expertise



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?

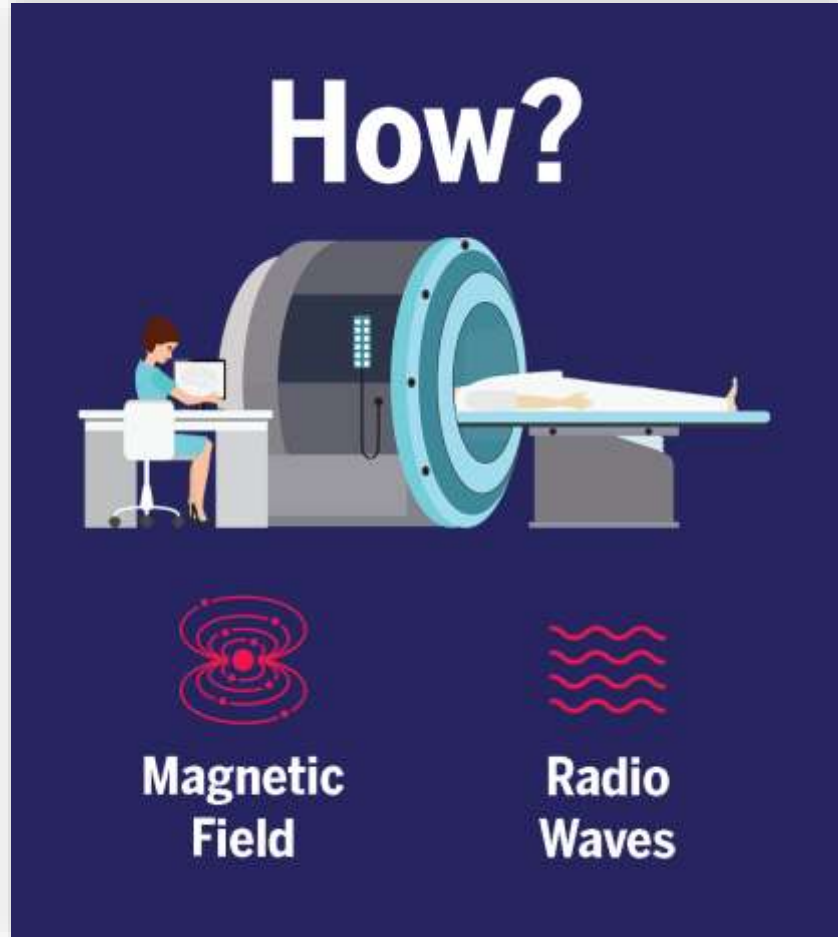


Dedicated MRI Suites



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



Full Copper Shielding

Why do we shield MRI suites?

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

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?

Missile Effect



Sizing up Today's MRI Suites

- **1 Tesla** = 30,000 X earth's magnetic field
- **1.5 Tesla** are most common in existing MRI's which cost \$1.5M
- Current standard is **3 Tesla**, these run about \$2.3 million
- Up to \$500,000 to construct the surrounding suite
- Major revenue generator, tests can cost \$400 up to \$3,500 each



Current average cost for a test: \$2,600

Emerging Trend: **7.0 Tesla** MRI Scanners

- Much more powerful
- Much more sensitive
- Siemens Magnetom Terra
- Successfully installed and operated alongside Kirlin's **SmartLED™ MRI Lighting System**



SmartLED™ MRI Lighting System



The #1 Turn-Key MRI lighting system engineered to ensure **accurate scans** throughout the life of the magnet:

- **27 Fixtures:** Downlights, Adjustables, Wall Washers, Sconces, Surface Mounts, Scenic Panels, 2x2 White Panels
- SmartLED™ **Remote Driver Cabinet**
- SmartLED™ **RFI/EMI Filter** (Two Models)
- Emergency Power

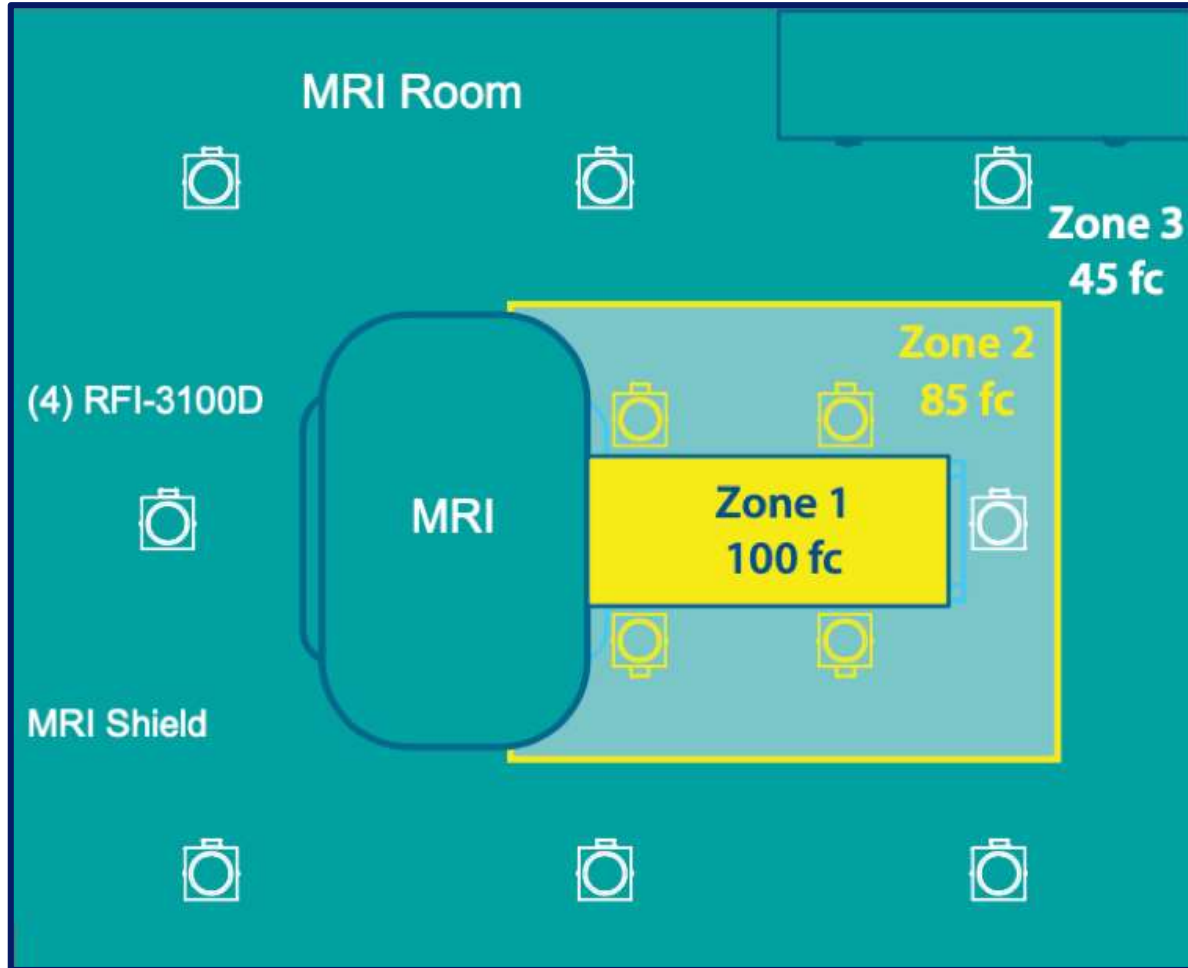
Trusted by:



MASSACHUSETTS
GENERAL HOSPITAL



Lighting the Ideal MRI Suite



Enhanced Visual Acuity

- Proper light levels ensure patient safety and proper cleaning

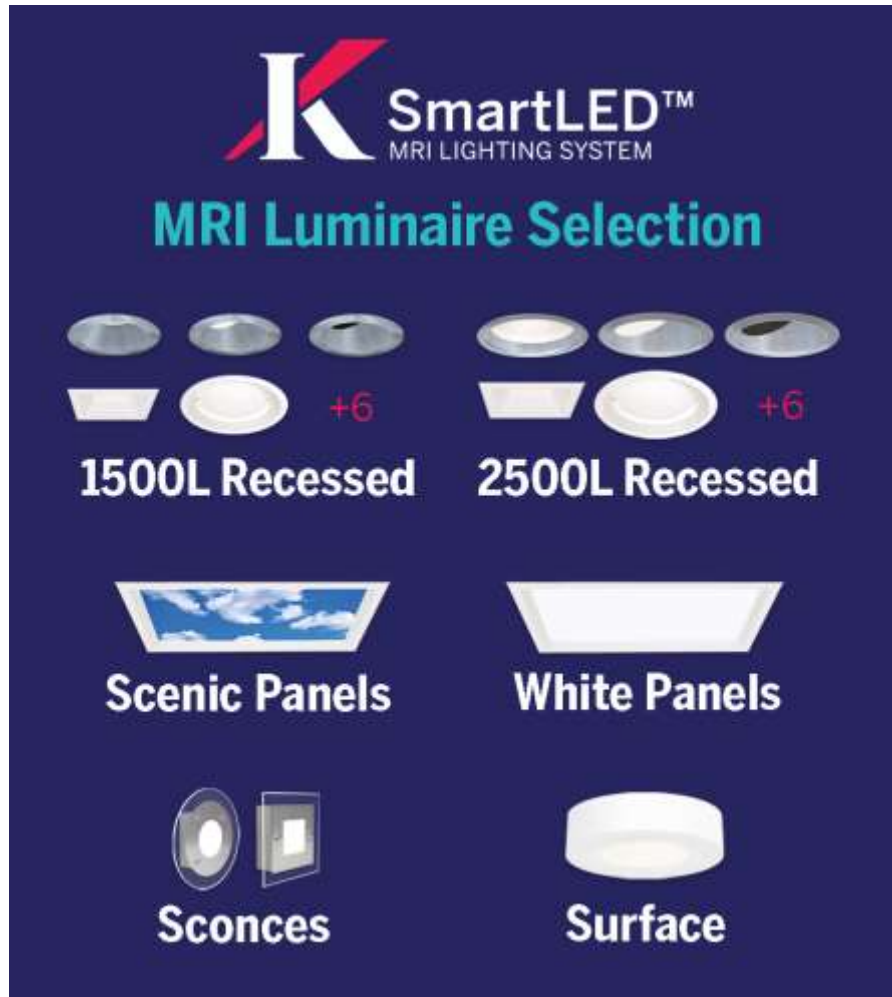
A Safer Environment

- 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

Kirlin's SmartLED™ MRI-Safe Luminaires



- The industry's greatest selection of MRI-safe luminaires
- 100% non-ferrous design with all-aluminum construction
- Low wattage, high efficacy LEDs
- Low glare, 'quiet' visual design
- Shallow designs for tight plenums
- 5-year full warranty

Downlights in the MRI Suite



- The “workhorse” of the MRI suite
- Used for ambient lighting to meet required fc levels throughout the suite
- Available with sealed IP65 trims for added infection control

Adjustable and Wall Wash

ADJUSTABLE



4" Round • 1500L or 2500L



6" Round • 1500L or 2500L

WALL WASH



4" Round • 1500L or 2500L



6" Round • 1500L or 2500L

- Use **adjustable downlights** along the side of the patient transfer table to eliminate discomfort
- **Wall wash** luminaires can create the appearance of an open, calming space in a potentially distressing environment.

Kirlin Specialty Fixtures



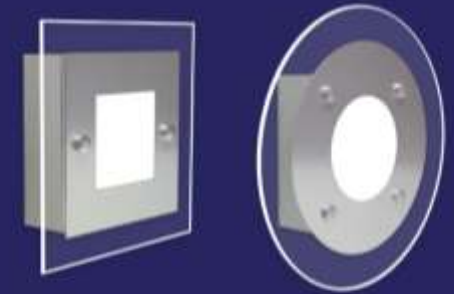
**Super Shallow
Surface Mount**

12" x 4" • 2500L



White Panel • 2'x2'

1500L or 2500L



Sconces

ADA Compliant

Custom Colors & Imagery Available

Decorative Scenic Panels



Scenic Panel • 2'x2'

**Field Changable Imagery
Standard or Custom Artwork**



Improper Luminaire Selection for MRI Suite



Suspended or track fixtures



Downlight over patient's face

Proper Luminaire Selection for MRI Suite

- 30 fc ambient – accomplished with perimeter LED **downlights**
- 100 fc on patient transfer table, using recessed LED **adjustables**
- Calming, distracting array of sixteen **2'x2' scenic panels** to create a faux skylight



Power the Luminaires: Remote Driver Cabinet



K SmartLED™
MRI LIGHTING SYSTEM

**Remote Power Supplies
(Drivers) with Cabinet**

MRI-CABNT
Supports up to 8 drivers

DVR-1400A
for Luminaires & Sconces


DVR-0700A
for Scenic/White Panels

- 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 dimming to 0.4%, with up to 8 dimming zones per cabinet
- 5 year warranty

Remote Driver Cabinet – Fixture Capacity

DVR-1400A
for Luminaires & Sconces


1500L Series



8 x 2 = 16 Fixtures

DVR-1400A
for Luminaires & Sconces

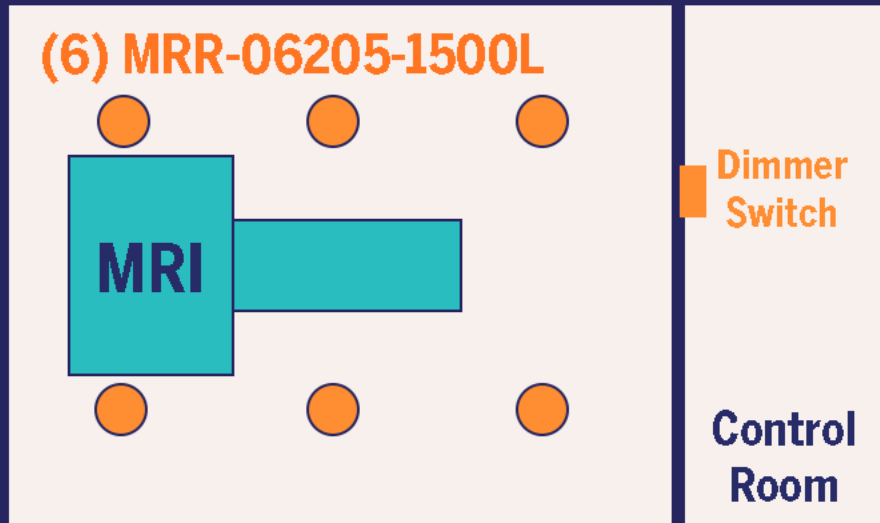
2500L Series



8 x 1 = 8 Fixtures

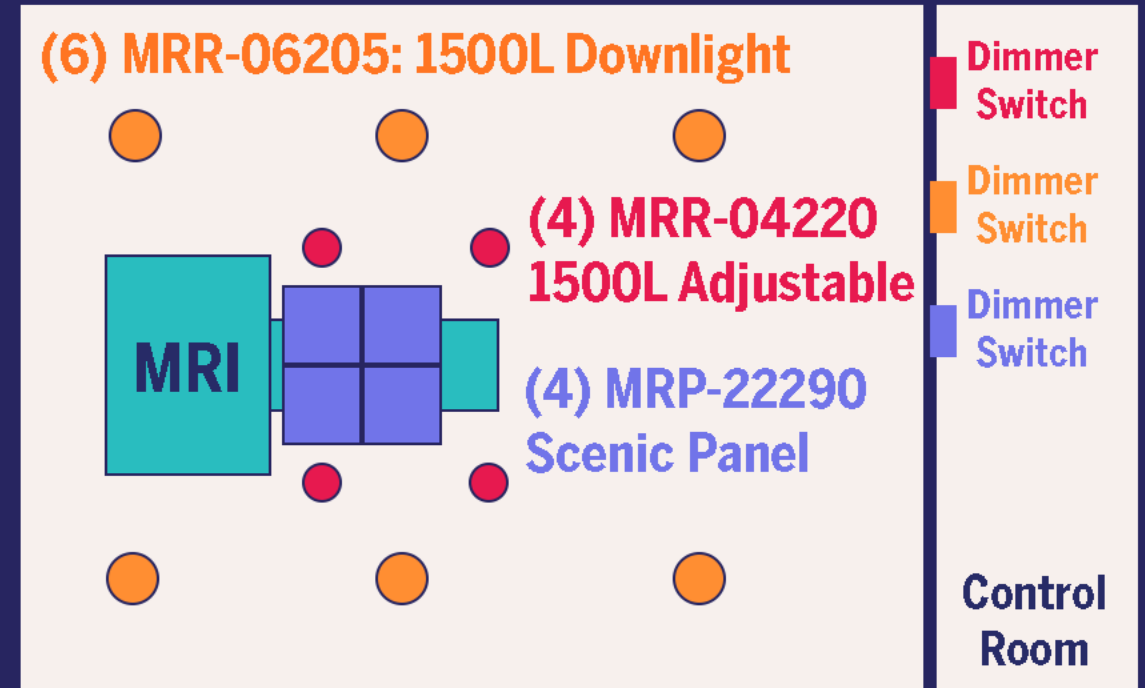
Example 1

Small Imaging Room or
Stand-Up MRI



Example 2

Full Sized MRI Suite

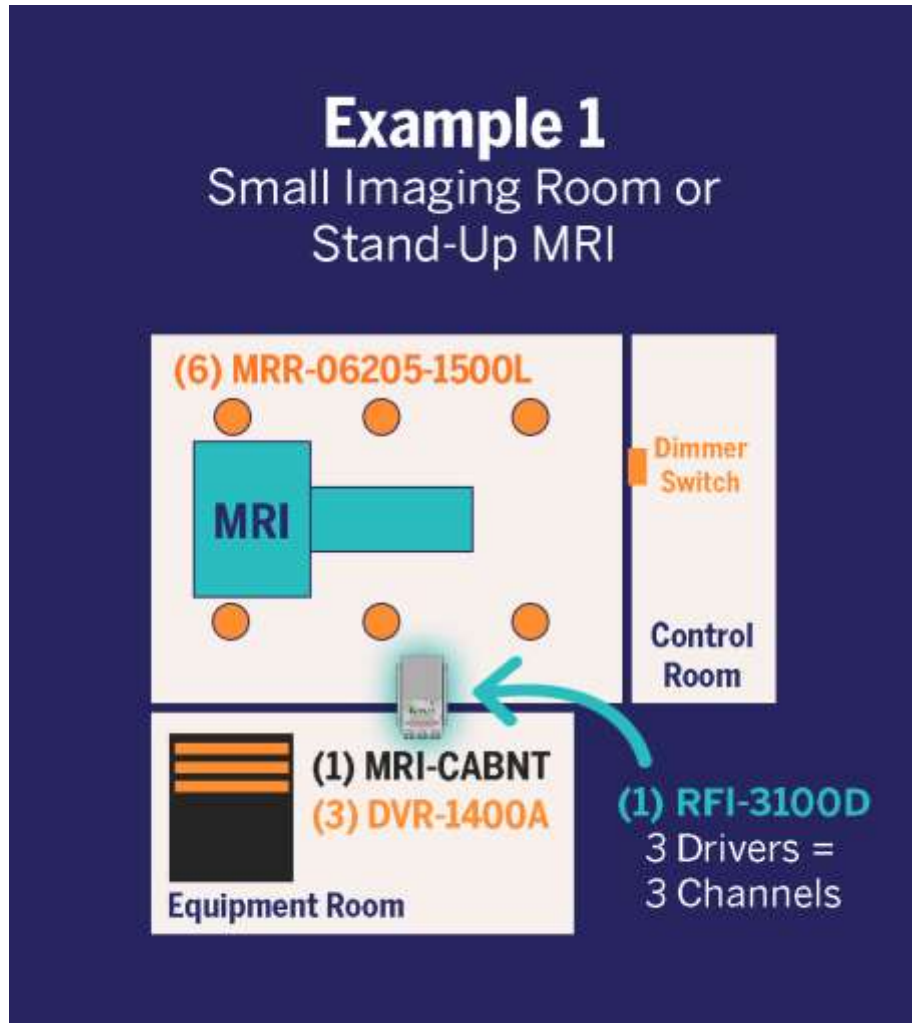


The Last Step: RFI/EMI Filters



- Mounted directly onto shield
- 100 dB filtering **proven to eliminate artifacts in machines up to 7.0 Tesla**
- 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
- 5 year warranty

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Emergency Power – Mission Critical

- Every hospital has a generator, right?
- Often load is at a premium
- LED is BUILT for battery back up
- 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



EMI-21220



EMI-03120

Why Choose Kirlin in the MRI Suite?



- **Turn-Key System**

Luminaires, Drivers, Filters, Emergency Power

- **Unparalleled Value**

Modular: We Only Give You What You Need

- **Broad Selection**

27 Recessed, Surface, and Specialty MRI-Compatible Fixtures

- **Experience**

Over 1,000 MRI Installations



A Legacy in Healthcare Lighting



Trusted by the Best

Kirlin lighting is trusted by 19 of the U.S. News's Top 20 Honor Roll hospitals

A photograph of an MRI room with a SmartLED lighting system. The ceiling features a grid of square panels, some of which are illuminated with a blue sky and clouds pattern. The room contains an MRI scanner, a patient table, and a control console. The text "Project Examples" is overlaid in large white font.

Project Examples

See the SmartLED™ System in Action



CareMount Medical
Poughkeepsie, NY



MRP-22290
6' x 6' Array
Scenic Panel



MRR-06205
Qty: 10
1500L Downlight



NYP David Koch Center

New York, NY



MRR-06420

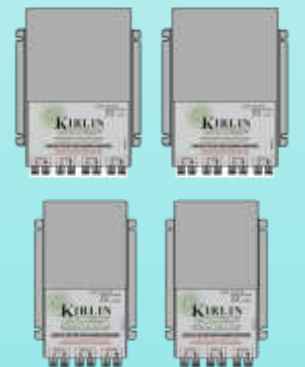
Qty: 14

2500L Downlight

SofTex™ Semi-Specular Finish



(2) Cabinets
(14) DVR Modules



(2) RFI-4100D
(2) RFI-3100D



**VCU Neuro, Orthopedic,
and Wellness Center**
Henrico, VA



MRR-04200
Qty: 6
1500L Downlight



MSR-14250
Qty: 6
Round Sconce w/ Edge Glow

Questions?