

The background of the slide features a close-up, slightly blurred image of a laser device. A label with the text 'Gas Control' is visible on the device. Below the label, there is a yellow triangular warning symbol with a black border and a black exclamation mark inside. The device is set against a background of numerous thin, parallel lines radiating from a central point, creating a sense of depth and light. The overall color palette is dominated by warm tones of yellow and orange.

# ***Rockwell Laser Industries Laser Incident Database***

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# Why have a Laser Incident Database ?

- **The Rockwell Laser Incident Database recurring message is that:**
  - “The case studies of typical laser exposure incidents reveal that the type of incidents are often repeated and the events are often predictable”
- **We may analyze incidents to understand why and under what conditions such accidents occur and how they can be prevented**
- **This will lead us to improve laser safety policies and procedures**

# What the Database Contains

- **Over 2,500 Laser Incidents Currently Entered**
  - Accident reports
  - Laser manufacturers
  - Industry/government/university contacts
  - Scientific literature
  - Newspaper/TV reports
  - Medical reports
  - FAA, FDA, Air Force, Army
  - Workman's compensation records
  - Other reports and research / Laser Safety Experts

# FAA Database

- ~4800 incidents – as of 7/16/2010
- Covers 2004-present
- Includes all aircraft laser encounters
  - ~3600 Laser sightings and aircraft illuminations
  - ~1200 Cockpit illuminations (Incidents)



## FAA Database

Of the 1200+ cockpit illuminations

- ~270 intentional illuminations  
(ie. multiple exposures or aircraft tracked)
- ~60 reported injuries (mostly eye injuries)



## What's New?

- Database entries increased from 2,000+ in 2009 to 2,500+ in 2010
- New cases submitted from FAA, DOD & Industry, but not FDA
- New Form has more fields for more information
- More recent entries to see current trends in laser accidents and incidents
- Updated webpage more user friendly, with improved searching and reviewing options

# New Web Page

## Accident Database

Case: 5315 Year: 1979 Country: USA	During alignment of laser on production line through an opening in the top. During adjustment, eyewear slid up as he leaned over. Reflection from test paper went into eye causing a bright afterimage lasting 20 minutes and faded into a central scotoma.
Case: 5316 Year: 1978 Country: USA	During work on a laser production line, person bent over to adjust beam when reflection from a Brewster's window went into right eye causing immediate visual blur and scotoma. Power into eye estimated at 25 mW.
Case: 5317 Year: 1979 Country: USA	During assembly of laser on production line person removed safety screen to align beam. Beam was directed on liquid stream. Reflection from stream went into eye causing scotoma. Testing revealed visual defect that remained at 16 months.
Case: 5318 Year: 1988 Country: USA	No eyewear used during alignment task. There were reportedly five individuals involved but only one with a possible retinal lesion.
Case: 5319 Year: 1992 Country: USA	Shell on foot peddle connector broke off. Nurse attempted to plug cable into receptacle w/o shell for alignment.
Case: 5320 Year: 1991 Country: USA	Individual exposed in right eye during alignment. No protective eyewear used. Partial loss of vision reported.
Case: 5321 Year: 1990 Country: USA	Technician inadvertently opened shutter to CO2 with beam focused onto hand. Reported massive swelling. Did not loose hand or fingers but still has loss of feeling in hand.

Case Summaries for Simplified Browsing

**Filter Results:**

From: 1964

To: Now

Country: Show All

State/Province: Show All

Laser Type: Show All

Classification: Show All

Protection: Show All

Failure: Show All

Submit

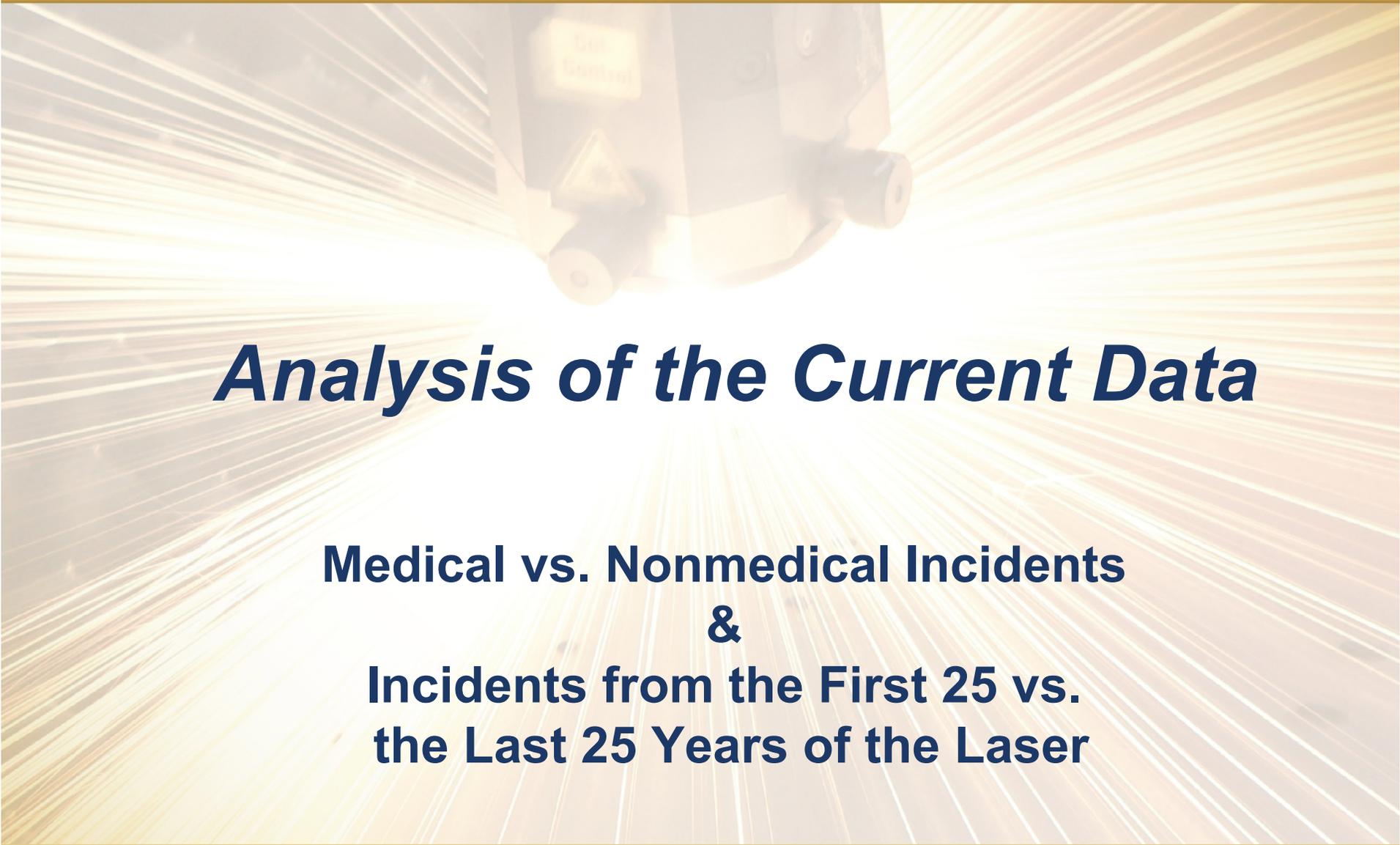
New Search Options

# New Incident Form

<b>Accident Detail</b>	
Case Nbr	6651
Accident Year	2005
Location	University
Country	USA
State	CO
City	Golden
Laser Type	YAG
WaveLength	750
Class	4
Divergence	
Exposure Time	
Output	.0000002 W
Pulse Rate	
Beam Diameter	
Subject	Other
Age	Unknown
Sex	M
Application	Research and Development
Protection	Available, Not Used
Eye Damage	Internal
Cause	Negligence
Description	<p>Government contractor at NREL but working at Colorado School of Mines exposed a sample to laser radiation and was struck in the eye while trying to remove the sample. The worker was not wearing available eye protection. Worker reported seeing floaters and a yellowish-orange spot in field of view. He received steroid injections to reduce inflammation and swelling. Follow-up exam showed showed a 500 um burn spot in top retinal layer and a 200 um burn area in second retinal layer. Worker returned to work with "no-laser" restriction. Vision is still 20-20 after recovery.</p>

# Goals of New Database

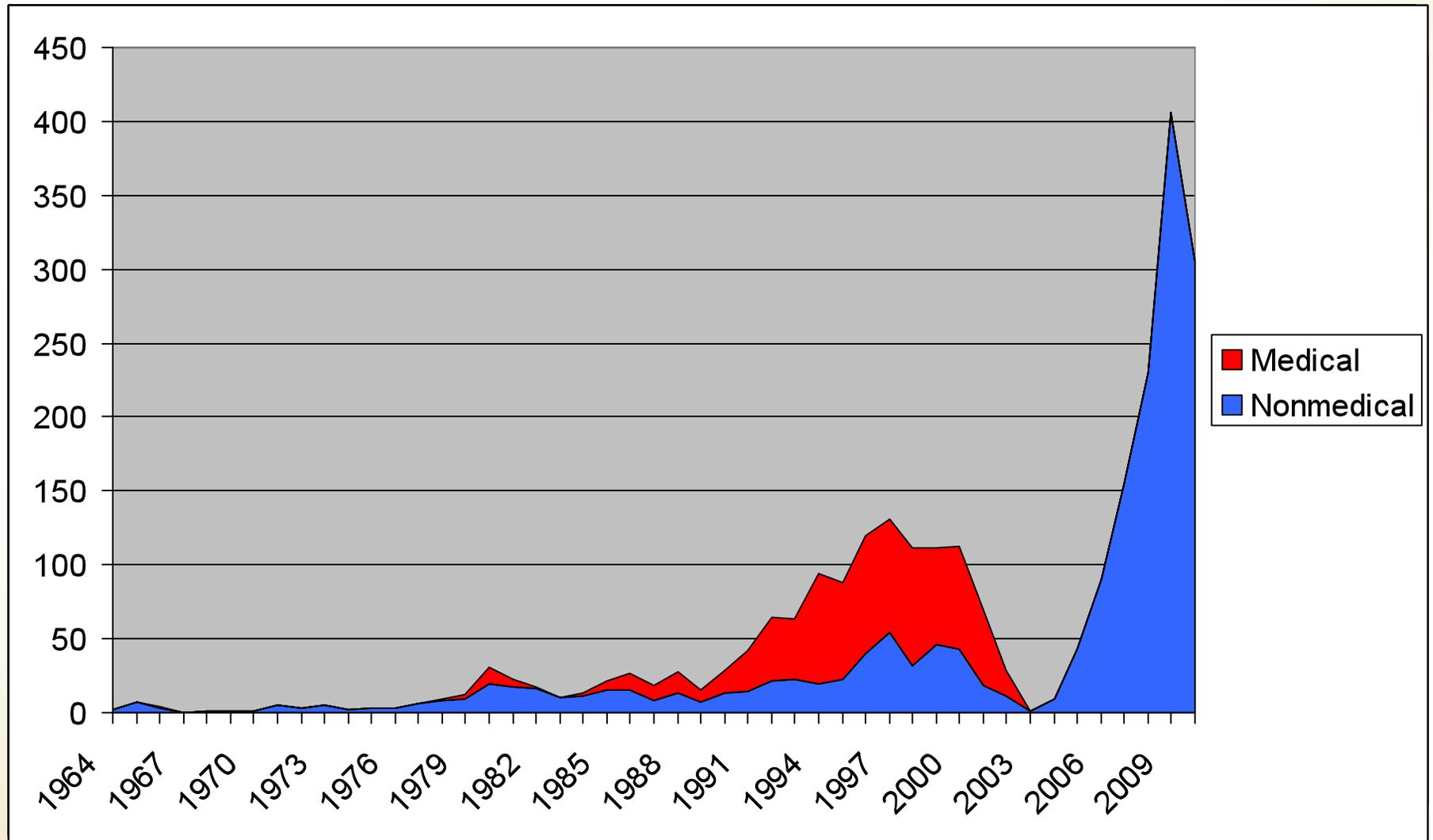
- 1. Use the collected data to improve laser safety practices and decrease the number of laser related accidents and incidents**
- 2. Create a standardized form and fields for reporting laser incidents so that information can be used by anyone**
  - Every database uses different fields
  - There are many discrepancies in coding between various databases
  - There needs to be a standard set so that information can be more easily shared and used
- 3. Go Global ...still in process**

The background of the slide is a close-up, slightly blurred image of a laser device. The device is metallic and has a yellow label that reads "Gas Control". It is emitting a bright, multi-colored laser beam that fills the background with a radial pattern of light rays. The colors of the beam transition from yellow and orange in the center to blue and purple towards the edges.

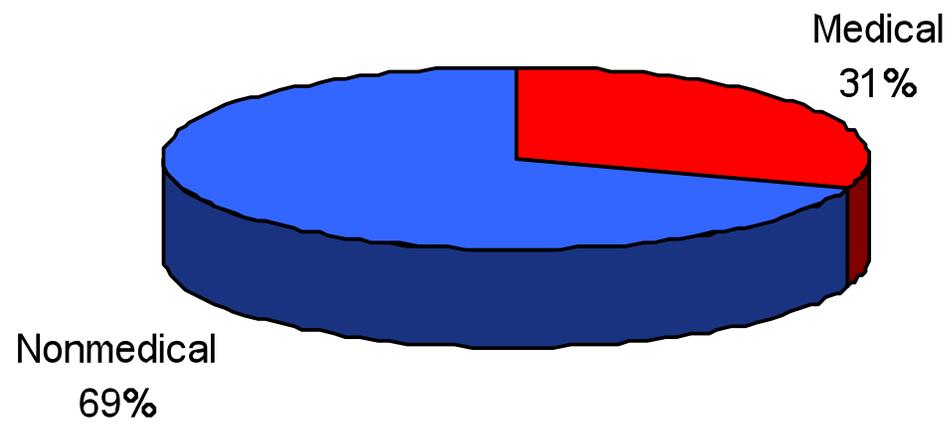
# ***Analysis of the Current Data***

**Medical vs. Nonmedical Incidents  
&  
Incidents from the First 25 vs.  
the Last 25 Years of the Laser**

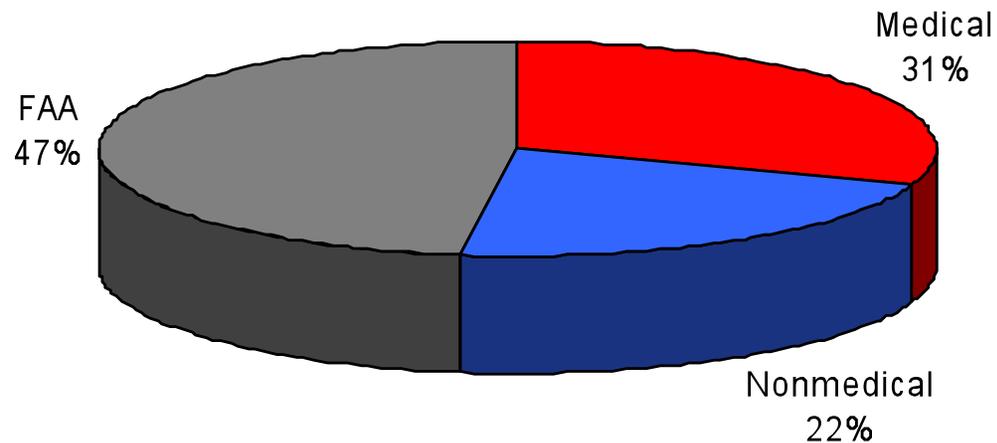
# Number of Incidents by Year Medical vs. Nonmedical



# Medical vs. Nonmedical Breakdown



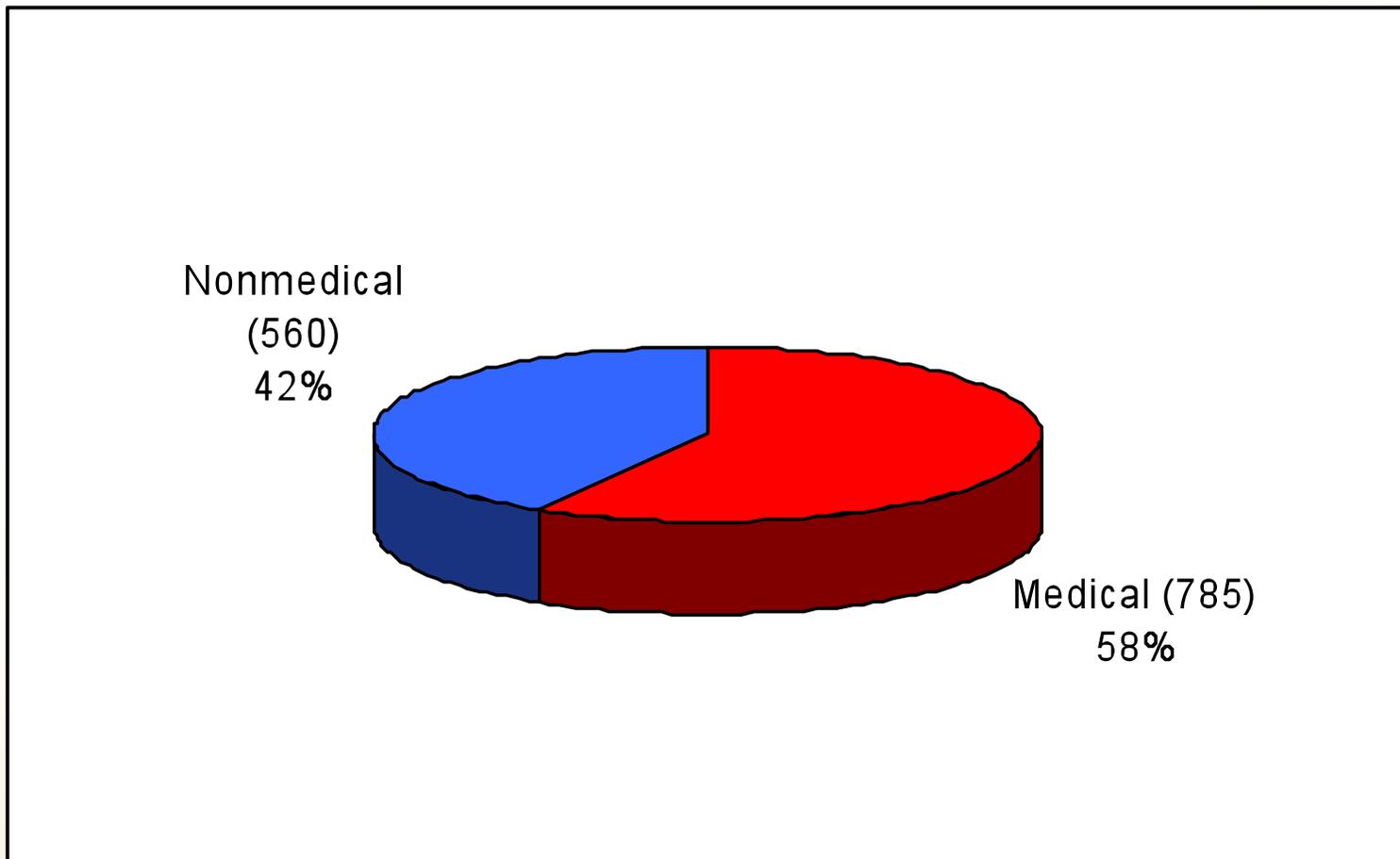
# Medical vs. Nonmedical vs. FAA Incidents



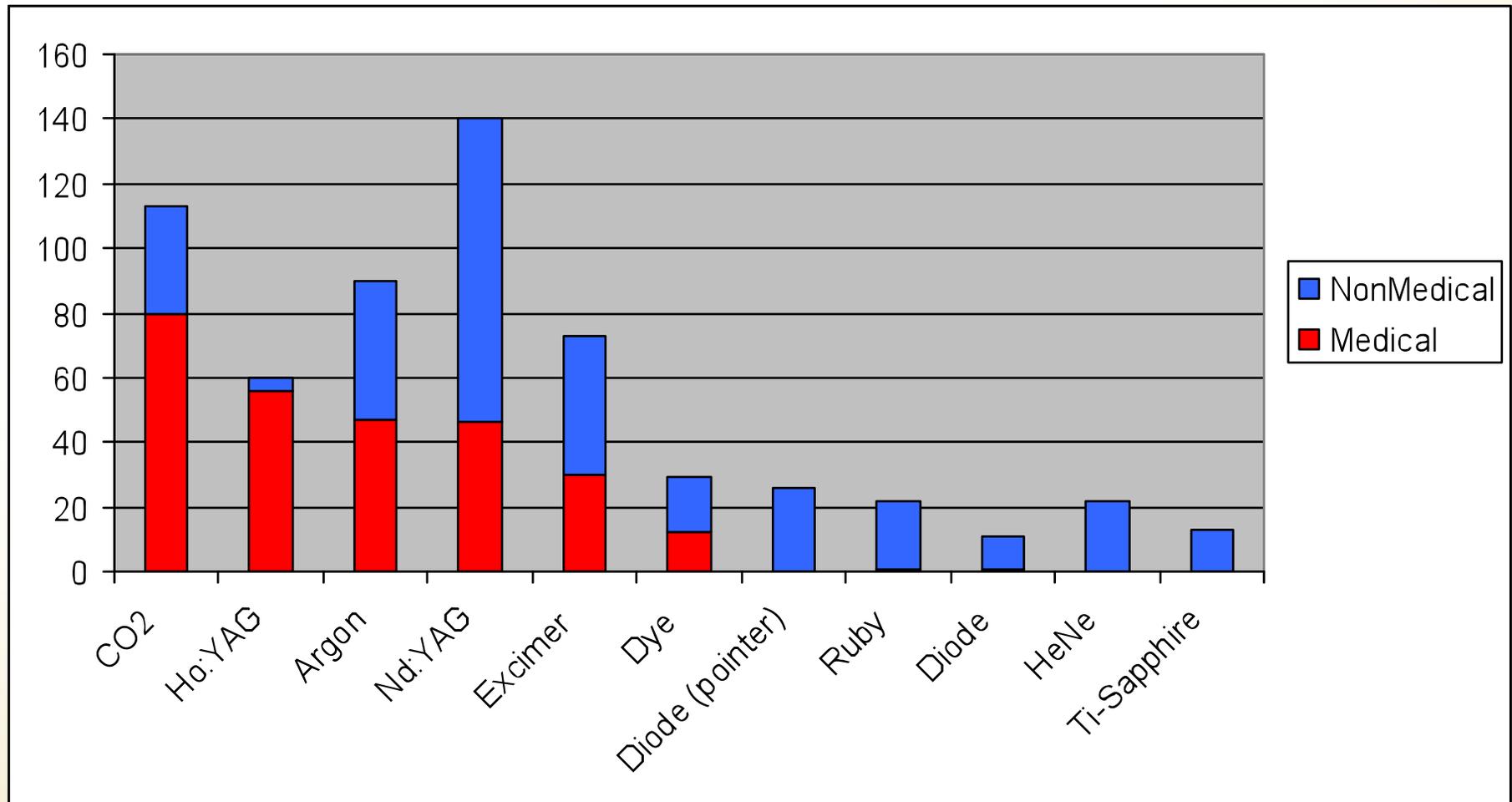
**Note: FAA Data is omitted in the following slides**

## Medical vs. Nonmedical Breakdown

- 1345 Total Incidents

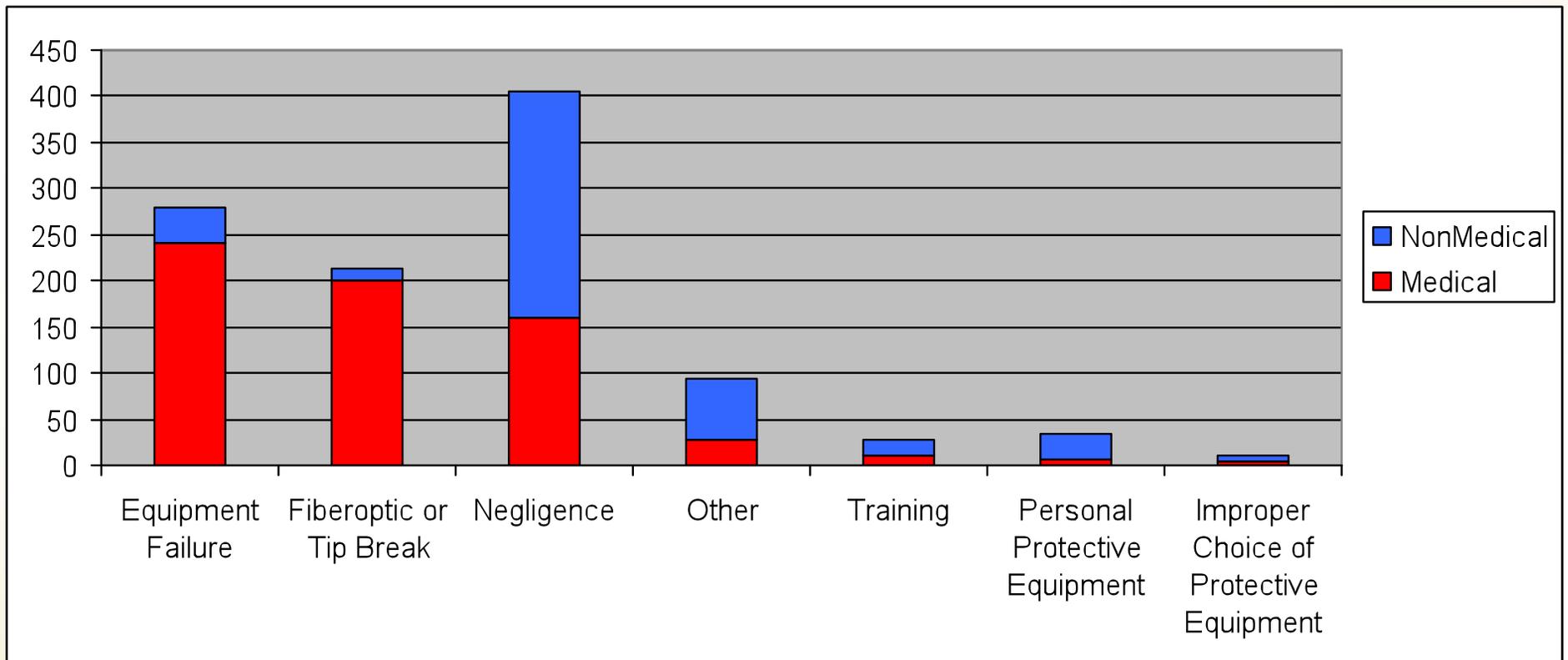


# Number of Incidents by Laser Type Medical vs. Nonmedical

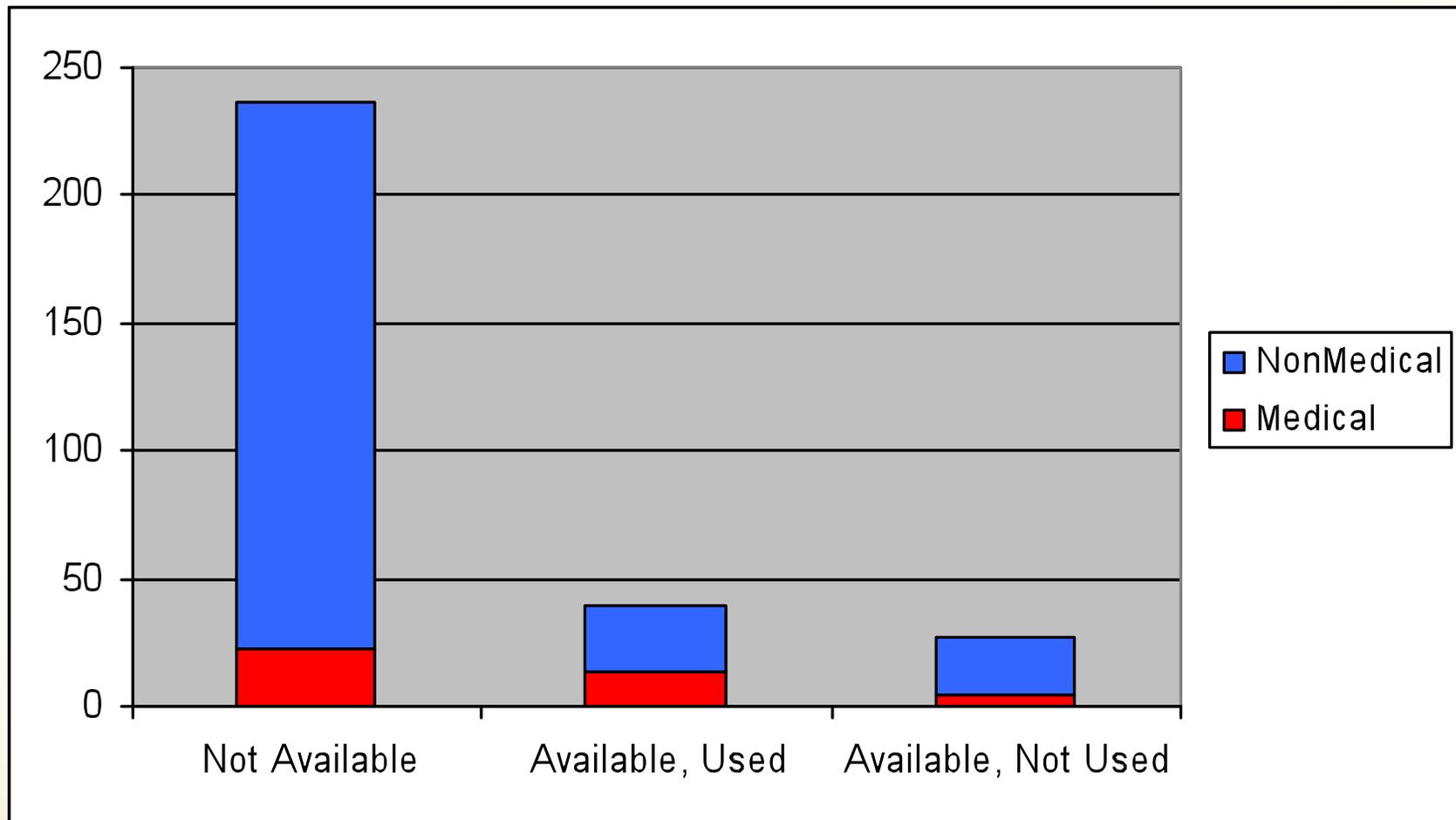


# Number of Incidents by Cause

## Medical vs. Nonmedical



# Number of Incidents by Eye Protection Medical vs. Nonmedical



# Laser Eyewear Available and Used

- **Case 5327**

- Technician received ocular exposure in right eye while repairing & aligning laser. Reportedly safety eyewear had gap between bridge of nose & goggles. No pain involved. Recovery after 6 months. Small blind spot and "floaters" remained.

- **Case 5596**

- Swim goggles lined with electrical tape were provided patient for eye protection. During procedure, each pulse produced excruciating eye pain.

- **Case 6099**

- Student was wearing eyewear for 1064nm wavelength, but used a Nd:YAG laser with doubling crystal (532nm). Student was looking down, trying to determine the polarity of the beam - beam passed through escape windows and was deflected toward his eyes.

Laser Safety in a Whole New Light

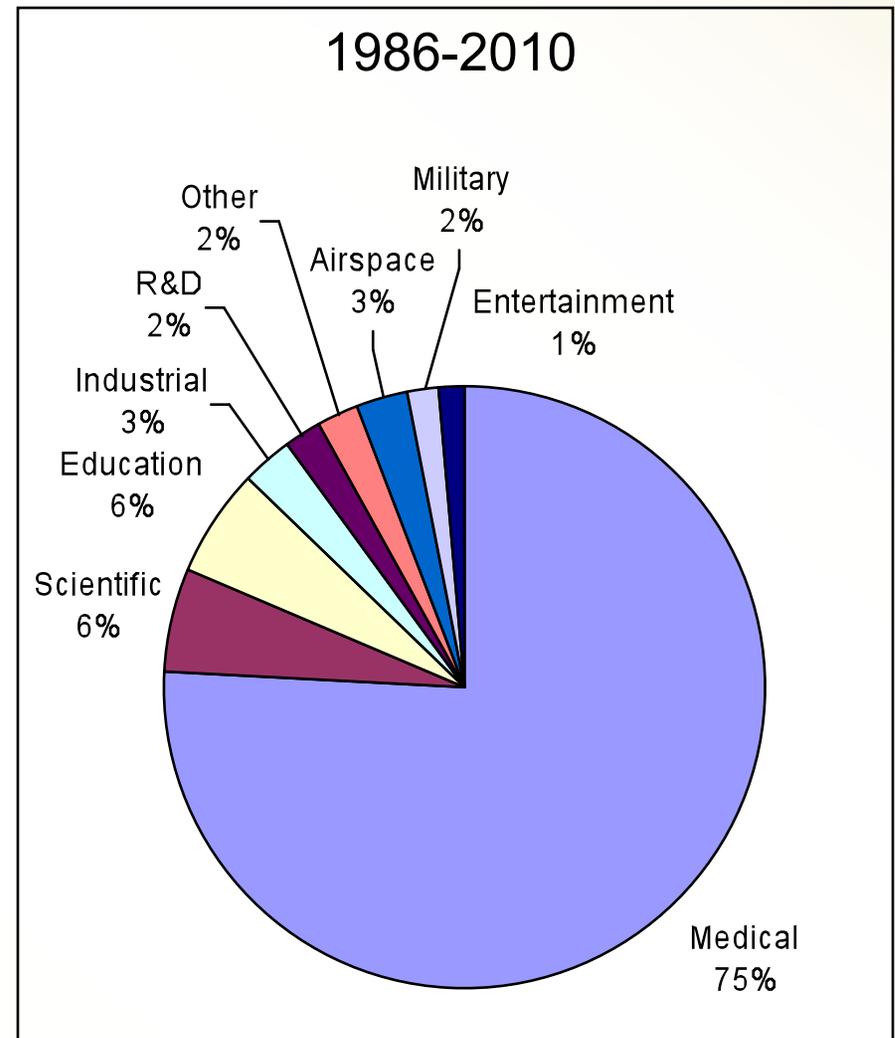
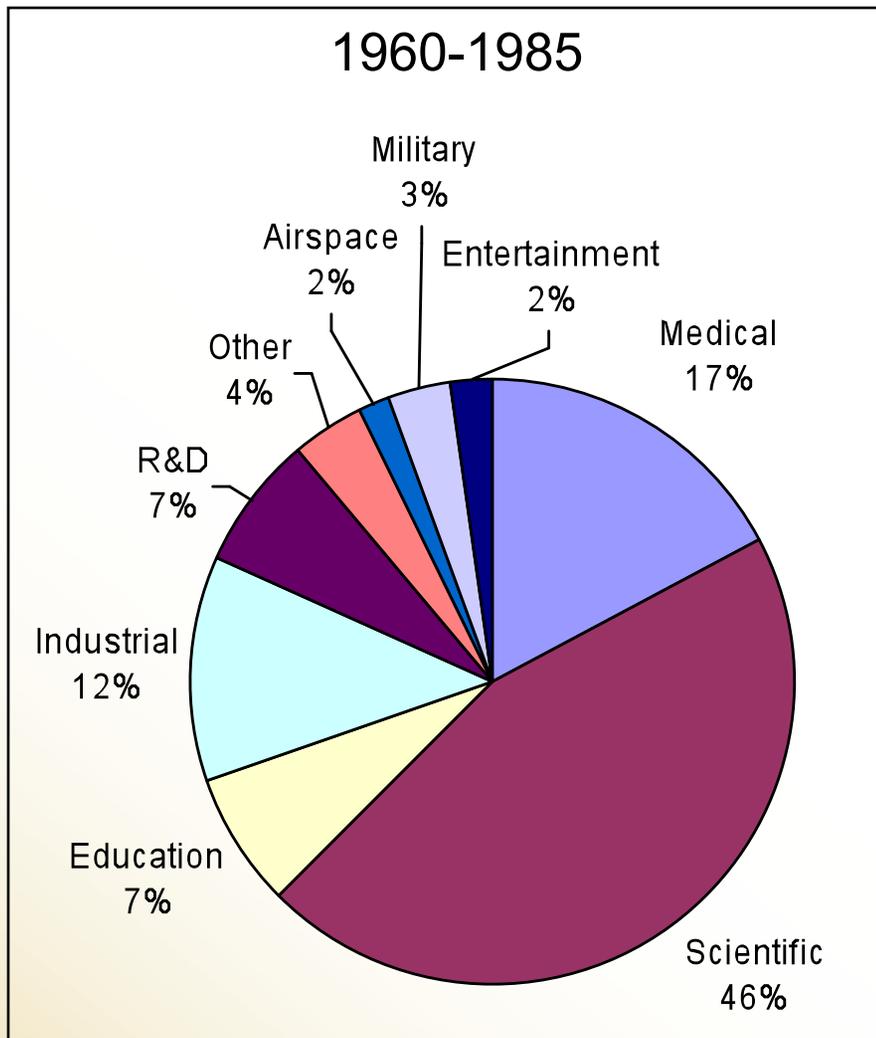
Rockwell Laser Industries



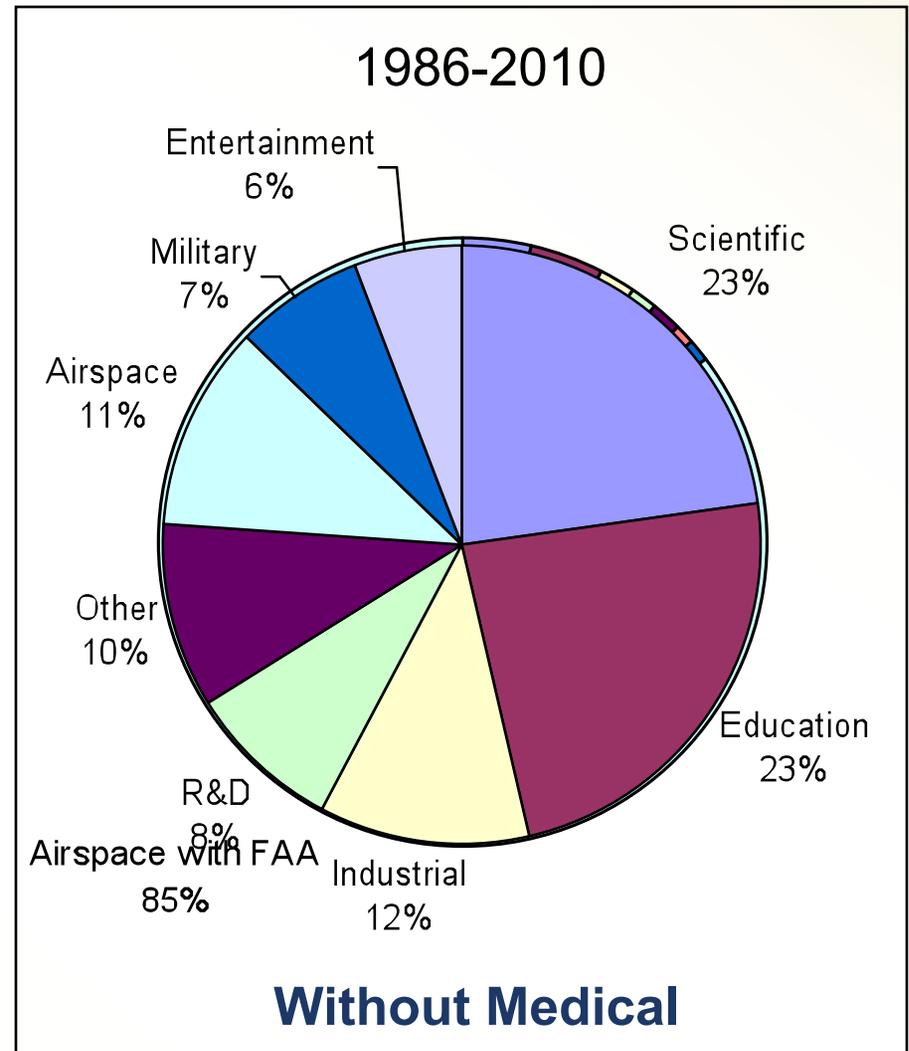
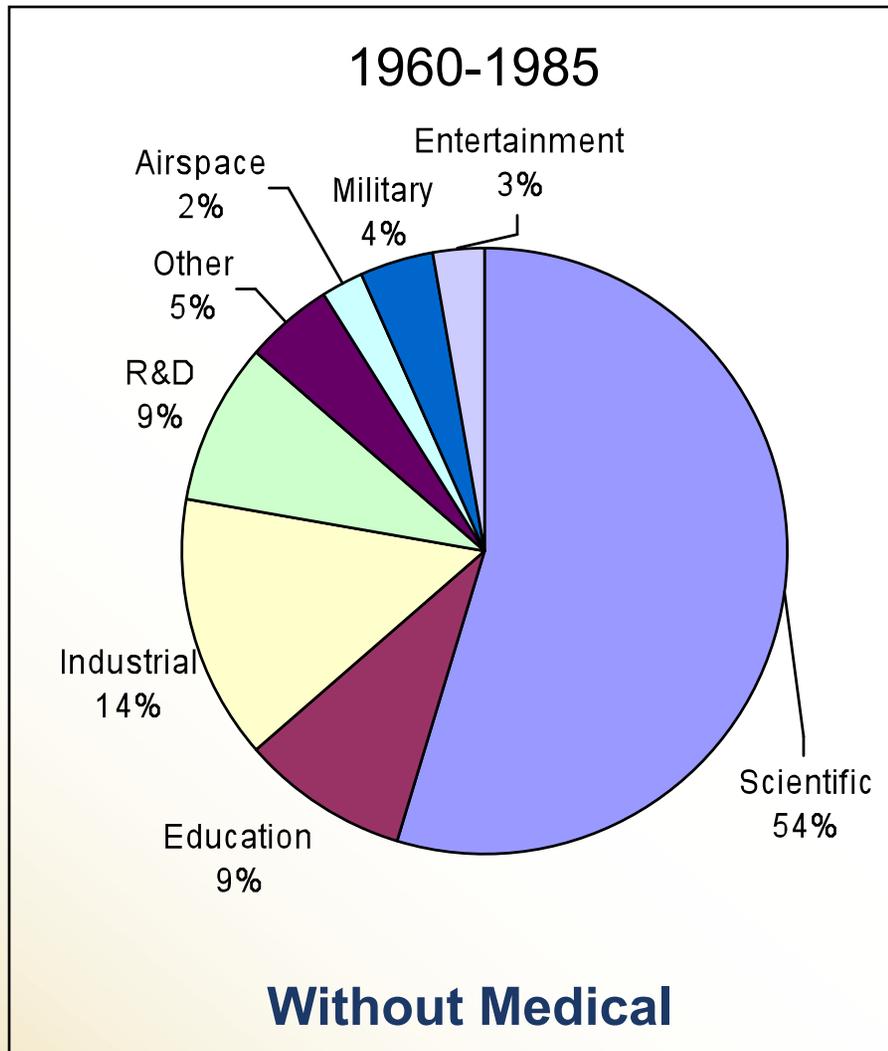
***In Honor of the  
50<sup>th</sup> Anniversary of the Laser***

**Incidents from the First 25 vs.  
the Last 25 Years of the Laser**

# Number of Incidents by Environment First 25 Years vs. Last 25 Years



# Number of Incidents by Environment First 25 Years vs. Last 25 Years



# Educational Research Incidents

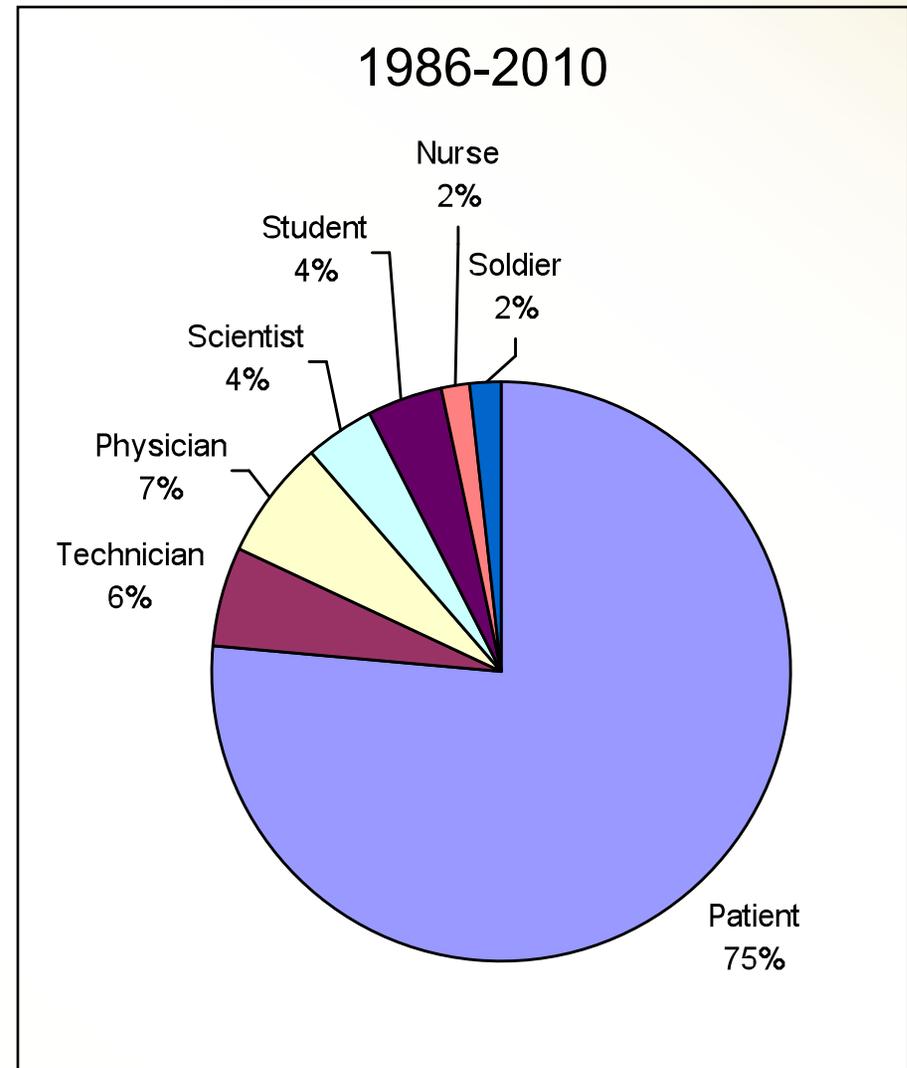
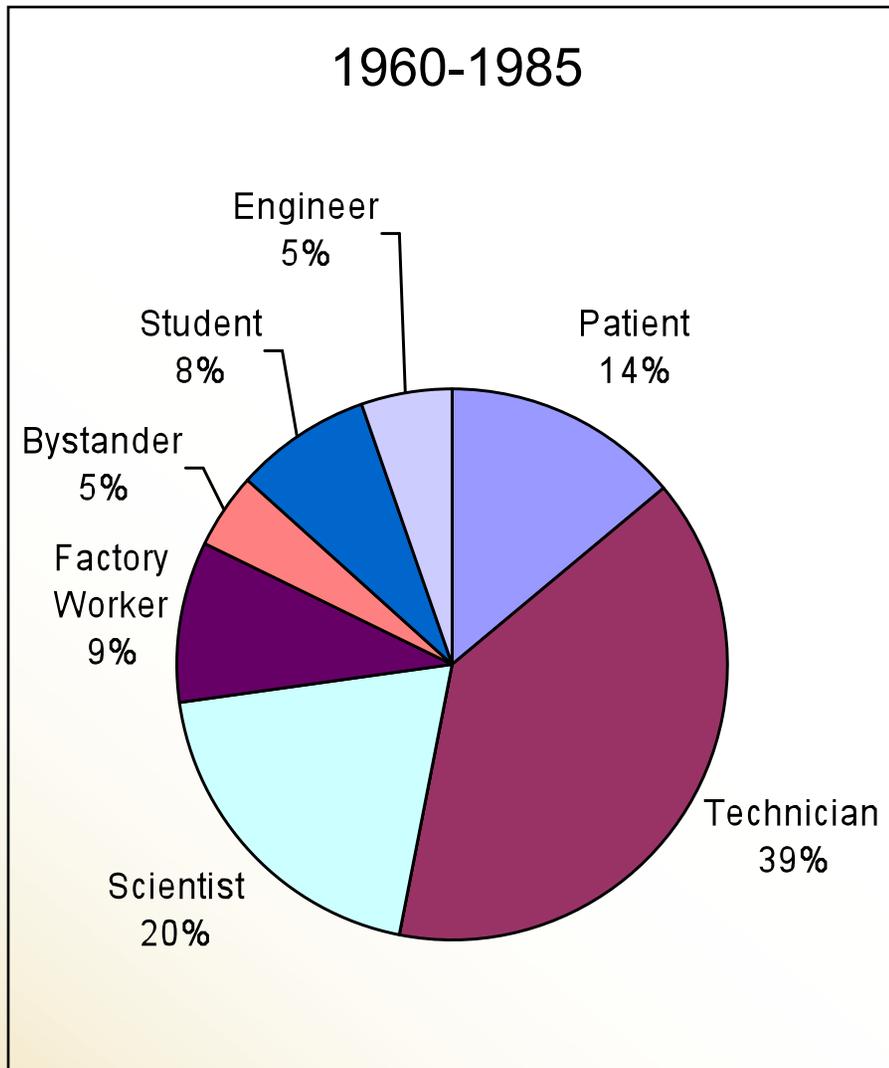
- **Case 5678**

- New grad student received ocular exposure. Was given "splash" goggles by "experienced" grad student while that student had proper eyewear. Procedure called for sighting beam off the target. Exposure caused 50% vision loss.

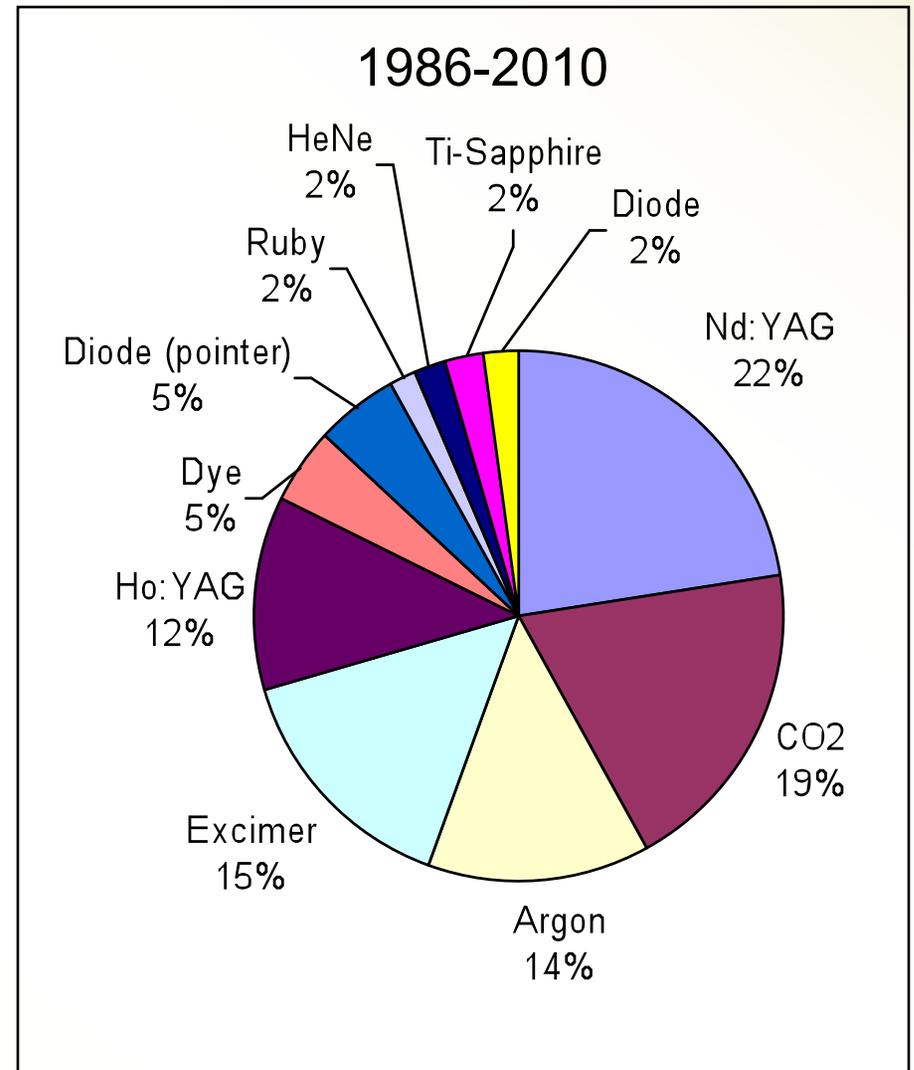
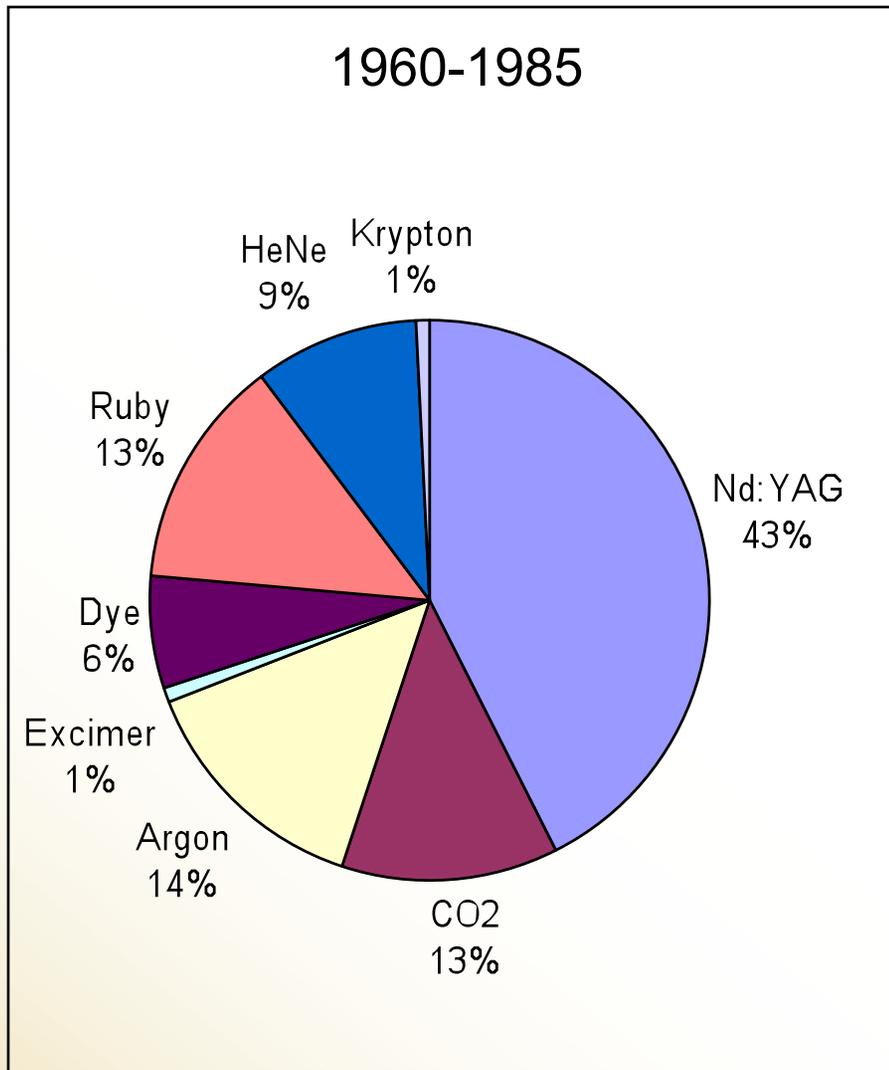
- **Case 5892**

- While doing experiment that called for sighting the beam, the student did not wear available laser eyewear. Exposure caused permanent loss of vision in right eye.

# Number of Incidents by Top 7 Subjects First 25 Years vs. Last 25 Years



# Number of Incidents by Laser Type First 25 Years vs. Last 25 Years



## Parting Thoughts...

- Some things never change
- Indifference, lack of training and unauthorized personnel in the environment are three of Safety's biggest obstacles
- Failure to follow SOP and to use available PPE is often cited

# Reporting Incidents

- We are continuously working to collect as much information from as many sources as possible to get the best representation of laser accidents and incidents
- We appreciate any information on laser incidents
- We welcome you to analyze the data
- [www.rli.com](http://www.rli.com) or [accidents@rli.com](mailto:accidents@rli.com)

# ***Aircraft Laser Illumination***

***Awareness for the Aviation Community***



***NORTHROP GRUMMAN***

DEFINING THE FUTURE

***Register with the***



***Rockwell Laser Industries***

***Laser Incident Database***