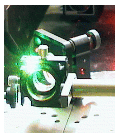
As a reminder of the consequences of careless actions, an accident report is reproduced below



The following text was printed in "Laser Focus", august 1977.

Accident victim's view

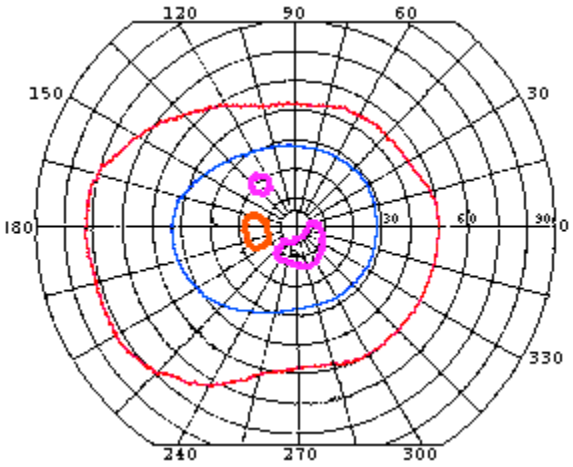
Because laser injuries to eyes are rare, workers tend to discount the importance of safety precautions. The following dramatic account by Dr. C. David Decker, a victim of such an accident earlier this year was prepared in the hope that his experience may increase vigilance among his collegues.

The necessity for safety precautions with highpower lasers was forcibly brought hme to me last January when I was partially blinded by a reflection from a relatively weak neodymium-yag laserbeam. Retinal damage resulted from a 6-millijoule, 10-nanosecond pulse of invisible 1,064-nanometer radiation. I was not wearing protective goggles at the time, although they were available in the laboratory. As any experienced laser researcher knows, goggles not only cause tunnel vision and become fogged, they become very uncomfortable after several hours in the laboratory.

When the beam struck my eye I heard a distinct popping sound, caused by a laser-induced explosion at the back of my eyeball. My vision was obscured almost immediately by streams of blood floationg in the vitreous humor, and by what appeared to be particulate matter suspended in the vitreous humor. It was like viewing the world through a round fishbowl full of glycerol into which a quart of blood and a handful of black pepper have been partially mixed. There was local pain within a few minutes of the accident, but it did not become excruciating. The most immediate response after such an accident is horror. As a Vietnam Veteran, I have seen several terrible scenes of human carnage, but none affected me more than viewing the world through my bloodfilled eyeball. In the aftermath of the accident I went into shock, as is typical in personal injury accidents.

As it turns out, my injury was severe but not nearly as bad as it might have been. I was not looking directly at the prism from which the beam had reflected, so the retinal damage is not in the fovea. The beam struck my retina between the fovea and the optic nerve, missing the optic nerve by about three millimeters. Had the

focused beam struck the fovea, I would have sustained a blind spot in the center of my field of vision. Had it struck the optic nerve, I probably would have lost the sight of that eye.



Eye damage caused by laserpulse is shown in this plot of field of view under high-intensity illumination (red line) and under low-intensity illumination (blue line). Outer circles show field of view; the two small regions inside the field (pink) of view are blind spots produced by laser damage. The blind spots are larger than the lesion and occupy a larger area under low illumination. The optic nerve blind spot is orange, close to the lesions.

The beam did not strike so close to the optic nerve, however, that it wevered nerve-fiber bundles radiating from the optic nerve. This has resulted in a cresentshaped blind spot many times the size of the lesion. The diagram is a Goldman-Fields scan of the damaged eye, indicating the sightless portions of my field of view four months after the accident. The small blind spot at the top exists for no discernible reason; the lateral blind spot is the optic nerve blind spot. The effect of the large blind area is much like having a finger placed over one's field of vision. Also I still have numerous floating objects in the field of view of my damaged eye, although the blood streamers have disappeared. These "floaters" are more a daily hinderance than the blind areas, because the brain tries to integrate out the blind area when the undamaged eye is open. There is also recurrent pain in the eye, especially when I have been reading too long or when I get tired.

The moral of all this is to be careful and to wear protective goggles when using highpower lasers. The temporary discomfort is far less than the permanent discomfort of eye damage. The type of reflected beam which injured me also is produced by the polarizers used in q switches, by intracavity diffraction gratings, and by all beamsplitters or polarizers used in optical chains.

C. DAVID DECKER

Back to Homepage