Welding arc maculopathy and fluphenazine

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Abstract
A 45-year-old male patient presented with a bilateral maculopathy following unprotected exposure of less than two minutes' duration to a manual metal arc welding unit. He had been receiving the drug fluphenazine for the previous 10 years for treatment of depression. We believe that the drug fluphenazine, which had accumulated in his retinal pigment epithelium, may have rendered him particularly susceptible to retinal photic damage.

The retina is susceptible to at least three different forms of light damage – thermal, mechanical, and photochemical. Thermal damage is produced when the retina is exposed to a temperature rise of 10° to 20°C. Photochemical damage most likely results from longer exposure to bright sources that produce a considerable amount of blue or near ultraviolet light. Light levels required to cause acute photoretinitis are encountered by exposure only to very bright light sources, such as the sun, welding arcs, arc lamps, and tungsten halogen lamp filaments. The type of retinal damage depends on wavelength, energy level, duration of exposure, and degree of pigmentation.

The radiation emitted from welding units covers a wide spectrum, from infrared to ultraviolet and beyond. Excessive exposure to ultraviolet radiation can result in photophthalma ('welder's flash') and may, under chronic exposure, result in UV cataract. Retinal injuries resulting from exposure to welding arc radiation have been reported but are not commonly seen. We report here a case of welding arc maculopathy in a patient who had been taking the phenothiazine drug fluphenazine.

Figure 1A Right eye. Figure 1B Left eye.

Figure 1A, B Fundus photographs showing yellow oedematous lesions at both foveas.
Typically, patients with arc maculopathy complain of a central scotoma and metamorphopsia. Bilateral yellow oedematous lesions at the fovea are characteristic. The lesions measure approximately 200 μm in diameter, even though the size of the arc image is only 20 μm. The 200 μm corresponds to the area about which a fixation point moves because of normal eye movements.14 The raised lesions, which represent acute retinal oedema, gradually subside over several weeks and are replaced by motting of the pigment epithelium or occasionally by a small lamellar hole. Most patients recover normal vision, though a few experience a permanent visual deficit.

One of the unusual features of this case is that though the patient was only welding for two minutes he developed a bilateral maculopathy without any evidence of a keratitis. The traditional welding rod, which was used by this patient, produces a relatively greater amount of radiation in the ultraviolet range than the newer metal-arc inert gas welding units.15 The fact that the patient did not develop a keratitis while exposed to this ultraviolet enriched radiation would seem to confirm the short duration of exposure as reported to us by both the patient and his instructor.

All phenothiazine drugs are deposited in the retinal pigment epithelium to some extent, and most are concentrated there at levels far higher than those found in other body tissues.16 Quite a number of the phenothiazines, including fluphenazine, have been associated with photosensitising rashes.17 These drugs may act as psoralens, and it has already been shown that photosensitisation cataractogenesis can be produced in rat lenses when they are incubated with the drug chlorpromazine and irradiated with ultraviolet light.18

We postulate that this patient sustained macular burns from welding because the drug which had accumulated in his retinal pigment epithelium over the years may have acted as a photosensitising agent, thereby rendering his retina particularly susceptible to photic damage. The potential role of fluphenazine in this case...
remains conjectural. However, we believe this is the reason why the patient developed the maculopathy after such a short period of welding.

All patients should take full precautions when welding to avoid inadvertent retinal damage. Patients taking phenothiazines may be at special risk and should be advised accordingly.

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