Rapidly progressing cataract after microwave exposure

Abstract
A young engineer developed bilateral cataract few days after exposure to high microwave energy while working on a radar platform. The cataract progressed rapidly and this was documented by anterior segment photos. The primary damage mechanism of microwave radiation is thermal, by dielectric heating. Non-thermal effects are less understood. Cataract formation after microwave exposure has been proven in experimental animal eyes and reported in isolate not well documented cases. The timeframe of cataract onset after exposure to the radar high microwave energy and the very unusual rapid progression of this cataract raise the odds of a causative relationship.

Keywords: microwave energy, cataract, thermal damage, rapid progression, anterior segment photography

Introduction
To report a case of rapidly progressing bilateral cataract days after exposure to high microwave energy

Case presentation: A 39-year-old male engineer was exposed to high microwave energy when the power of the military radar was switched on while he was doing maintenance work on its platform. He presented to me 3 days after this exposure complaining of difficulty in reading of acute onset. Exam was unremarkable including unaided vision of 1.0 in each eye for distance and clear lenses. Refraction showed emmetropia in both eyes (BE). He was prescribed +1.0 readers and reassured as a case of relatively early onset presbyopia. He returned 1 week later with unaided vision of 1.0 blurred in the right eye (RE) and 0.3 in the left eye (LE). Auto refraction revealed emmetropia RE and -18.00 in the LE. Exam revealed anterior and posterior subcapsular precipitates, peripheral in RE, but reaching the center in LE. On weekly successive visits his vision continued to drop LE more than RE and progression of his cataract could be clearly documented with anterior segment photography. Three weeks after his initial visit, vision dropped to 0.8RE and 0.05LE. Optical coherence tomography was performed and showed no macular pathology with foveal thickness RE 271 and LE 272um. He underwent phaco emulsification with intraocular lens implantation BE in his home country and returned to me to continue his follow-up. Uncorrected visual acuity was 1.0BE. Three months post-operatively he developed severe macular edema and his vision dropped to 0.3BE. His macular edema resolved with topical nepafenac 0.1% with unaided visual acuity of 1.0BE.

Discussion
The increasing applications of microwaves, mainly in mobile phones and radar, induce a higher rate of exposed people, sometimes cause of worry. In comparison with burns caused by ionizing radiation, where tissue damage is due to internal cell damage caused by free radicals, the primary damage mechanism of microwave radiation is thermal, by dielectric heating. Lower frequencies penetrate deeper into tissues, and as there are only few nerve endings in deeper tissues, the damage caused by the radio frequency waves may not be immediately noticeable. The lower frequencies at high power densities present a significant risk. The human body acts as a broadband antenna. The microwave absorption is directed by the dielectric constant of the tissue (Figures 1-3).
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Conflict of interest

The author declares no conflict of interest.

References