Chorio-retinal hazards in aphakia

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We are taught—though it is impossible to establish on what authority—that the human crystalline lens specifically protects the retina and choroid from thermal damage. To be more precise: if a glass blower has had a lens removed because of a radiation cataract he is advised not to return to his job. It seems, however, that, if his vision can be restored to enable him to resolve all the necessary detail, and suitable heat absorbing spectacles are prescribed and worn, this advice is ill-founded.

Other things being equal, the unaided aphakic but otherwise normal human eye produces an image with 1.24 linear magnification as compared with the normal phakic eye (Emsley, 1952). It is, therefore, more than 50 per cent. larger in area than is true of the corresponding phakic eye. Hence the radiation flux density on the retina of the aphakic eye is less than two-thirds of the normal, or, at the chorio-retinal level, the normal eye is exposed to a 50 per cent. larger hazard than exists for the aphakic case.

The volume absorption of the crystalline lens is replaced by that of the aqueous and vitreous humours and/or kindred aqueous fluids. In the infra-red part of the spectrum, which is associated with heat, the absorption of the phakic eye behaves as though the whole of the pre-retinal media were aqueous (Aschkinass, 1895; Lenoble and Le Grand, 1953).

Consequently such filtering protection as the crystalline lens affords is confined to the visible and ultra-violet parts of the spectrum. It is this absorption which has to be made up by a suitable yellow filter (Verriest, 1963; Said and Weale, 1959). In addition, the glass blower or furnace attendant, or any other person whose eyes are exposed to a nearby high-temperature source, must, of course, wear the protective shield or goggles issued to workers whose eyes are intact. There should be no significant drop in visual performance. In fine, given that the aphakic worker can see as well as is necessary for his job, and that he is provided both with light filters which compensate for the absorptivity of the crystalline lens in the visible and the ultra-violet parts of the spectrum and also with the normal light shield, there is no obvious reason why he should not return to his job as soon after an operation for a thermal cataract as is feasible.

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