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Tumors and Pathology

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Retinal function in children with retinoblastoma

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Purpose: To evaluate retinal function by full-field electroretinographic recording (ERG) in children with retinoblastoma.

Methods: Sixteen children (9 girls and 7 boys) previously treated for retinoblastoma (mean age at diagnosis = 17.25 ± 9.76 mos.) were referred to ERG testing (mean age at test = 6.63 ± 2.45 years). Informed consent was obtained from each patient's parents or guardians before testing. Bilateral cases (N=8) were treated with enucleation of the most severely affected eye (N=7) and external beam irradiation and/or focal radioactive ⁶⁰Co plaque in the fellow eye. Unilateral cases (N=8) had their affected eyes enucleated and were also treated by systemic chemotherapy with carboplatin. Full-field ERGs were obtained in the remaining eye through a dilated pupil after 30 minutes of dark adaptation. ERGs were recorded with a Burian-Allen bipolar contact lens electrode from the anesthetized. The LKC UTAS E-3000 electrodiagnostic system was used for ERG data acquisition and analysis. The b-wave amplitude and implicit time values were compared to age norms.

Results: Bilateral cases treated with external beam irradiation and/or focal radioactive plaque showed severely reduced amplitudes for five ERG responses when compared to age norms: 87% of reduction for rod response; 80% for maximal response; 91% for oscillatory potentials; 80% for cone response and 84% for flicker. ERG responses were within the normal range in fellow eyes of unilateral cases that underwent systemic chemotherapy with carboplatin. Mean peak-to-peak amplitude was significantly smaller for scotopic rod response ($t=6.185; P \leq 0.001$), scotopic maximal response ($t=6.376; P \leq 0.001$), oscillatory potentials ($t=38.000; P \leq 0.001$), single-flash cone response ($t=5.995; P \leq 0.001$) and 30 Hz-flicker ($t=36.000; P \leq 0.001$) in remaining eyes from bilateral cases when compared to fellow eyes from unilateral ones. Mean visual acuity was significantly better in fellow eyes of unilateral cases who underwent systemic chemotherapy with carboplatin (0.25 logMAR – 20/25) when compared to remaining eyes of bilateral cases treated with irradiation (0.83 logMAR – 20/235).

Conclusion: Retinal function assessed by full-field ERG was severely reduced in eyes treated with external beam irradiation and/or focal radioactive ⁶⁰Co

plaque. These results were consistent with reduced visual acuity. The fellow eye of unilateral cases treated with systemic chemotherapy with carboplatin had ERGs within the normal range, showing no widespread retinotoxic effects in this small group of patients. ERG testing can be used to evaluate retinal function in these children and to help in determining the effects of different methods of treatment for this disease.