

Supplementary Table 2: ERG system and Recording Protocol

Author, year	ERG System	Recording Protocol	Stimulus Characteristics	ERG parameters Assessed
Alzheimer's Disease and Mild cognitive impairment				
Ariello <i>et al.</i> , 2025	RETI-port system (Roland Consult)	10-min light adaptation; RETI-port system; ISCEV photopic standards	Full-field ERG: White flash stimuli (3.0cd·s/m ²) on a white background (25cd/m ²) at 0.2 Hz. PhNR: Red flash stimuli (3.0cd·s/m ²) at 1.099 Hz on a blue background (470 nm, 10cd/m ²).	a-wave, b-wave, and PhNR amplitudes (μV) and implicit times (ms)
Asanad <i>et al.</i> , 2021	Espion E3 + ColorDome Ganzfeld (Diagnosys)	ISCEV standards; DTL-Plus thread and gold cup electrodes; 20-min dark adaptation, 10-min light adaptation	PERG: Black and white alternating bars, 50 cd/m ² mean luminance, 99% contrast, 0.033 cycle/deg spatial frequency, and 1 Hz temporal frequency. PhNR: Red (640 nm) 4-ms flashes at 1 cd·s/m ² on a blue (470 nm) background at 10 cd/m ² .	a-wave, b-wave, PhNR, P50, and N95 amplitudes and implicit times
Sen <i>et al.</i> , 2020	Metrovision MonPack system	ISCEV standards; 61-hexagon display; scleral lens and skin electrodes	Mean luminance: 100 cd/m ² ; Contrast: >90%; Stimulus frequency: 17 Hz; Display monitor distance: 30 cm	mfERG first-order kernel: N1, P1, N2 amplitudes and implicit times across five retinal rings
Zhao <i>et al.</i> , 2021	LKC UTAS-E 3000 (Ganzfeld)	Ganzfeld scotopic ≥30 min, photopic 10 min; ERG-jet contact lens electrodes	FERG: Photopic stimuli included 100 Td-s flash (1Hz) and 85 Td-s flickering (28.3Hz). Scotopic stimuli ranged from 2.8 Td-s to 280 Td-s	Flash ERG: rod, rod–cone, cone, and 3.0 flicker amplitudes and latencies
Vidal <i>et al.</i> , 2022	Roland Consult RETIport (Q450SC)	DTL fiber electrode lower conjunctiva; gold cup reference/ground; 0.5% tropicamide; 1–300 Hz bandpass	Stimuli were generated in a Ganzfeld bowl using red and green LEDs modulated in counterphase around a mean luminance of 100 cd/m ² each. Temporal frequencies were 12 Hz (chromatic activity) and 36 Hz (luminance pathway)	Harmonic amplitudes and phases (12, 24, 36 Hz) derived from Fourier analysis
Trick <i>et al.</i> , 1989	Nicolet MED-80 computer	Monocular, DTL-microfiber electrodes; 80,000× amplification; 0.1–30 Hz; 250 averaged responses	High-contrast (76%) black and white checkerboard; space-averaged luminance of 40 cd/m ² ; 1.0-degree checks; temporal frequencies of 4.0 or 16.0 reversals per second (rps)	N1–P1 biphasic waveform amplitude
Sartucci <i>et al.</i> , 2010	VSG/2 graphics card + custom LabVIEW	Ag/AgCl skin cup electrodes; active inferior eyelid, reference	Equiluminant horizontal sinusoidal gratings; spatial frequency: 0.3 c/deg for PERG; 90% contrast; mean luminance	P1–N1 waveform amplitudes and peak latencies

		contralateral eye; 10-min ambient adaptation	of 17 cd m ⁻² ; stimuli included Red-Green (R-G), Blue-Yellow (B-Y), and Yellow-Black (Y-Bk) luminance.	
Rizzo et al., 1992	Ganzfeld & stimulator-ophthalmoscope system	Dark-adaptation thresholds via Goldmann-Weekers; foveal 4° flicker with 12° surround; PERG with gold foil electrodes	Full-field: 0.5-Hz blue light flashes (rods), 0.5-Hz white light flashes (mixed), and 30-Hz white flicker (cones). Foveal: 42-Hz white stimulus. PERG: High-contrast 17-, 35-, and 70-minute checks reversing at 2 Hz	Peak-to-peak amplitudes and implicit times (full-field ERG, PERG P50, focal ERG)
Parisi et al., 2001	RETeval	Semi-dark, 15-min light adaptation; Ag/AgCl skin electrodes lower eyelid; Fpz ground; gain 50,000; 1–30 Hz; 200 averages	Stimuli were checkerboard patterns (contrast 90%, mean luminance 110 cd/m ²) generated on a TV monitor and reversed in contrast at a rate of two reversals per second. The check edges subtended 15 min of arc. The screen subtended 14 degrees	PERG N35, P50, N95 implicit times and peak-to-peak amplitudes
Mavilio et al., 2020	RETeval system	Skin electrodes 9 mm Ag/AgCl lower eyelid; 650 events (5 × 130); amplified 100,000×; bandpass 1–30 Hz	Horizontal bars at 1.7 cycles/degree; modulated in counter phase at 15 reversals/s; 90% contrast; 80 cd/m ² luminance; 24° x 24° field size	Mean amplitude and second harmonic phase variability (SDPh)
Krasodomska et al., 2010	Espion systems (E2/E3)	ISCEV standards; RetiPort system; undilated pupils; refractive correction	Black and white reversing checkerboard on a CRT monitor (75 fps); check size: 0.96°; luminance: 120 cd/m ² ; contrast: 97%; temporal frequency: 4.7 rev/s (2.35 Hz)	P50 and N95 amplitudes and implicit times
Prager et al., 1993	System not specified	X-Static/DTL corneal thread; no dilation; full spectacle correction; 200 stimulations; 1–100 Hz	A counterphasing, 98% contrast, black-and-white checkerboard array. Individual checks subtended a visual angle of 0.5 degree at 70 cm (Snellen equivalent ~20/100). The reversal rate was 8.3 Hz (16.6 check reversals per second)	Global ERG amplitude (μV); combined evoked potential waveform
Kergoat et al., 2002	O.T.E. 1266 + L.A.C.E. BPA1	DTL fiber electrode; Ag/AgCl reference lateral canthus; 1–30 Hz; 4 trials × 30 waveforms	Checkerboard pattern (26° subtense); Spatial frequencies: 95 minarc and 21 minarc; Temporal frequencies: 1 Hz (transient) and 8 Hz (steady state); Contrast: 50% and 98%; Luminance: 31 cd/m ²	P50 and N95 trough-to-peak amplitudes and latencies
Justino et al., 2001	Moniteur Ophtalmologique	DTL fiber conjunctival electrode; tropicamide	Stimuli consisted of blue (0.02 cd/m ² /sec), white (1.90 cd/m ² /sec), and red (1.11	a-wave, b-wave, and oscillatory potential

		1%; 30 min dark, 5 min light adaptation	cd/m ² /sec) flashes at 0.3 Hz presented within a Ganzfeld bowl. Photopic red flashes were presented on a 17.2 cd/m ² background	amplitudes and latencies
De Seze <i>et al.</i> , 1998	VERIS III mfERG	Photopic and scotopic; handheld photodiode; 1 Hz	Controlled flash stimulation at 250 lux	B1-wave amplitude and B/A ratio
Li <i>et al.</i> , 2021	RETeval system	ISCEV five-step protocol; 30 min dark adaptation in a dark environment	Stimuli consisted of 3.0 cd·s/m ² flashes (chromaticity 0.33, 0.33) delivered at 0.1 Hz on a 0 cd/m ² backlight; spatial frequency was not applicable.	a-wave amplitude (baseline to trough), b-wave amplitude (trough to b-wave peak)
Ngoo <i>et al.</i> , 2019	Madsen ERA 2250	No dilation (≤ 3 mm); Ag/AgCl skin electrodes lower eyelid; Fpz ground; gain 50,000; 1–30 Hz; 200 averages	Checkerboard stimuli with two sizes: large 8° (480 min of arc) and small 0.8° (48 min of arc); the smaller stimuli were utilized for this study	N35, P50, N95 peak latencies; N35–P50 and P50–N95 amplitudes
Katz <i>et al.</i> , 1989	Not reported	Gold foil lower fornix; cup electrode ipsilateral ear; vertex ground; 1–30 Hz; 100–400 sweeps; FERG dark ≥ 12 min; 1–1000 Hz	PERG: Black and white checkerboard; frequency of 2.1 reversals per second; checks subtending 30 minutes of visual arc; 98% contrast; mean luminance 112.5 cd/m ² . FERG: Flash stimulus (2.59 J/cm ² ; 100 microseconds) generated by a ganzfeld bowl at 0.9 Hz	a-wave (N1) latency, b-wave (P1) latency, and b-wave amplitude
Moschos <i>et al.</i> , 2012	MonPackOne (Metrovision)	VERIS III; tropicamide 0.5% + phenylephrine 5%; bipolar contact lens; 8 min (8 × 60 s)	A matrix of 61 hexagons was displayed on a CRT monitor (72Hz frame rate), independently alternating between black and white. The stimulus array subtended approximately 20° high and 25° wide	mfERG P1 response density (nV/deg ²) and implicit time across concentric rings
Nesher & Trick, 1991	NIC-1006 photostimulator + Nicolet MED-80	DTL electrode in lower fornix; Ag-AgCl reference; forehead ground; 80k amplification; 1–30 Hz; 250 repetitions	High-contrast (76%) black-and-white checkerboard; mean luminance 40 cd/m ² ; 60' check size; 10 by 12-degree array at 1-m distance; counter phasing at 4 and 16 rps	Transient ERG N1–P1 and P1–N2 amplitudes; steady-state trough-to-peak amplitudes; amplitude ratios
Cronin-Golomb <i>et al.</i> , 1991	VSG 2/3 board + Eizo monitor + Toennies EEG amp	ffERG (13 pts), foveal ERG (4 pts), PERG with PVEP; formal electrophysiology protocol	Full-field ERG stimuli included blue (0.5 Hz) and white (0.5 Hz and 30 Hz) light. PVEP recordings utilized pattern check sizes of 34 min and 17 min of arc. Foveal ERGs were recorded using a stimulator-ophthalmoscope	Full-field and focal ERG amplitudes and implicit times (normal ranges)

Cabrera DeBuc <i>et al.</i> , 2018	Espion E2/E3	RETeval system; ISCEV 6-step protocol; light-adapted first, then dark-adapted (rod, maximal, cone)	Luminance: Stimulus strength of 3.0 cd·s/m ² for flicker response. Contrast/Frequency: 28.3 Hz flicker response	Amplitude and implicit time; reduced amplitudes and delayed peaks in cognitive impairment
Fun <i>et al.</i> , 2016	VENUS mod. 1010	RetiPort/Scan21; DTL thread; ISCEV; no dilation; spectacle correction	Black and white reversing checkerboard; Luminance: 80 cd/m ² ; Contrast: 97%; Stimulus frequency: 2.00 Hz (4 rev/s); presented via a 19" CRT monitor	P50 and N95 amplitudes and implicit times
Normal Aging				
Justino <i>et al.</i> , 2001	TV monitor (PERG) + Ganzfeld (Flash ERG)	Simultaneous; amplification, bandpass 1–30 Hz; 30 averages ×4 trials; DTL electrode	Checkerboard pattern; 31 cd/m ² space-averaged luminance; contrast at 98% or 50%; spatial frequency at 21 minarc or 95 minarc; temporal frequency at 1 Hz (low) or 8 Hz (high).	PERG P50 and N95 amplitudes and latencies
Freund <i>et al.</i> 2011	Espion E2 system	Bilateral fERG over 1.5 h with 6.4 mm pupils (1% tropicamide) using DTL active, gold reference (lateral orbit), and gold ground (forehead) electrodes, following ISCEV standards plus research tests.	White (6,500 K, 10 μs) and red (635 nm) flashes; photopic: –1.63 to 2.86 log cd·s/m ² on 30 cd/m ² background; dark-adapted: –5.22 to 1.37 log cd·s/m ² ; double-flash: 1.37 log cd·s/m ² with 200 ms–8 s ISI.	a- and b-wave amplitudes and implicit times; B/A ratios when >10 μV; photopic hill effect via b-wave nadir/apex ratio; dark adaptation: time to 10 μV and 20 min recovery; recovery dynamics: second flash amplitude as % of first.

Candela per square meter (cd/m²) = luminance (brightness of a surface); Troland (Td) = retinal illuminance, defined as: $Td = \text{luminance (cd/m}^2) \times \text{pupil area (mm}^2)$; ISCEV: International Society for Clinical Electrophysiology of Vision; DTL: Dawson-Trick-Litzkow electrode; OP: Oscillatory Potentials; CRT: Cathode Ray Tube; LED: Light-Emitting Diode; ICC: Intraclass Correlation Coefficient; SD: Standard Deviation; CV: Coefficient of Variation; Td: Troland; Td·s: Troland-seconds; cd/m²: Candela per Square Meter; cd·s/m²: Candela-seconds per Square Meter; Hz: Hertz; ms: Milliseconds; μV: Microvolts; nV: Nanovolts; cpd: Cycles per Degree; c/deg: Cycles per Degree; rps: Reversals per Second; LRF: Luminance-Response Function; Vmax: Maximum Response Amplitude; SDPh: Standard Deviation of Phase; DFT: Discrete Fourier Transform; RGCs: Retinal Ganglion Cells.