Celeris Full-Field Stimulator Application Note



"The New Standard for Rapid and Repeatable Small Mammal testing"

Product Features

High speed ERG and VEP testing

- Objective measure of full Visual System
 Photoreceptors to visual cortex
- Patented Celeris[™] light guide electrodes
- Set up and test in seconds
- Test 20+ animals per hour
- Mice, rats, rabbits, guinea pigs, gerbils

Superior performance and repeatability

- Proven Diagnosys Espion[™] software and controls
- Infinitely adjustable filter settings
- 32-bit ultra low-noise amplifiers
- Built-in impedance testing
- Both eyes tested individually and automatically
- Custom protocols easily programmed

Broad range of testing protocols

- Full-field ERG
- Flash VEP
- Scotopic threshold response (STR) ERG
- C-wave ERG
- Luminance & frequency series

Applications

- Protocol development and validation
- Gene therapy development & research
- Stem cell research
- Drug discovery and screening
- Pre-clinical trials

Typical full-field ERG test results:



Celeris system





Portable



Light Guide electrodes



Oscillatory Potentials

Case study: test results in minutes

Celeris has been tested comparing its performance to peer-reviewed, published data¹ from the same breed of dark-adapted mice that were tested in 2015 using the Diagnosys ColorDome LabCradle. In each case the mice tested were C57BL/6J control mice from the research hospital's laboratory.

I. Frequency series

A flicker ERG frequency series (0.5 to 30 Hz) was performed at a luminance of 0.5 log $cd \cdot s/m^2$. The frequency range covers: a) the rod pathways (below 5 Hz), b) the cone On-pathway (5-15 Hz) and c) the cone Off-pathway (above 15 Hz). The Celeris test results closely match the published data from the prior Gold Standard system, yet greatly increases the speed and simplicity of testing.



II. Flash intensity series

Single-flash ERGs were completed under dark-adapted conditions ranging in luminance from -3 to 1 log $cd \cdot s/m^2$. Strong oscillatory potentials (amacrine cells) were clearly measured and near-saturated a-wave (photoreceptor function) amplitude at the maximum flash luminance utilized.



III. Repeatability study: insensitive to stimulator angle position

The repeatability of Celeris Light Guide Electrodes (LGE) was demonstrated on mice by positioning the LGE's in 3 positions (perpendicular to eye, maximum angle rotated up on eye, maximum angle rotated down on eye) and then recording ERG's in each case. The results of 2 tests are shown below, in each case with all three test results plotted together.

A. ERG series #1 – three LGE angle positions on mouse eye



Rapidly position the LGE on each eye:



B. ERG series #2 – three LGE angle positions on mouse eye



IV. Rodent testing at large scale: 1 operator, many systems

Three Celeris systems set up in minutes at a major Boston-based Research Hospital. The: 1) compact form factor, 2) focused light beams from the Light Guide Electrodes and 3) minimal operator touch time enable scaling to an unprecedented number of tests in one laboratory with one person running the tests in parallel across multiple systems.



V. Optic Nerve Crush example

Case example of a Celeris full-field ERG and VEP on a **Mouse** control eye and an eye with an optic nerve crush. As expected the ERG (photoreceptor and bipolar cells) and Oscillatory Potential (amacrine cells) responses are not affected in the ONC whilte the VEP (optic nerve function) is extinguished. Testing done at the University of Ottawa.



VI. Additional test results

Mouse PhNR

Mouse full-field ERG luminance series (demonstrates stimulator symmetry)



Rabbit ERG

Right Eye

Left Eye



VII. Scotopic Threshold Response (STR) test









VIII. C-Wave ERG



IX. Bleach Recovery Series



Notes:

- 1. Naoyuki Tanimoto, James Akula, Anne Fulton, Bernard Weber, Mathias Seeliger; "Differentiation of murine models of 'negative ERG' by single and repetitive light stimuli;" Doc Ophthalmol, 2016, 132:101-109.
- 2. Testing on Celeris completed by a customer at a major Boston-based research hospital in May/June 2016 using C57BL/6J mice.

Celeris is covered by one or more of the following US patents and their foreign counterparts: 10,820,824. Additional patents pending.

www.diagnosysllc.com

- US: Diagnosys LLC; 55 Technology Drive, Suite 100, Lowell, MA 01851; 978-458-1600; sales@diagnosysllc.com
 EU: Diagnosys Vision Ltd; Office 117, DOC Building, Balheary Road, Swords, Dublin, K67 E5A0, Ireland; +44 (0) 1223 520699; mail@diagnosysvision.com
 UK: Diagnosys UK Ltd; 5 Trust Court, Chivers Way, Vision Park Histon, Cambridge, CB24 9PW, UK; +44 (0) 1223 520699; mail@diagnosysuk.co.uk
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