Supplementary Online Content


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This supplementary material has been provided by the authors to give readers additional information about their work.
eAppendix. Sigmoid Regression Model Curve Analysis

- Sigmoid function equation:

\[ y = \frac{\gamma}{1 + e^{\alpha + \beta x}} = \frac{\gamma(e^{-\alpha - \beta x})}{1 + e^{-\alpha - \beta x}} \]

- Point of Inflection: point for which the second derivative = 0

\[
\frac{dy}{dx} = \frac{-\gamma \beta e^{\alpha + \beta x}}{[1 + e^{\alpha + \beta x}]^2}
\]

\[
\frac{d^2y}{dx^2} = \frac{-\gamma \beta^2 [1 + e^{\alpha + \beta x}][e^{\alpha + \beta x}] + 2\gamma \beta^2 [e^{\alpha + \beta x}]^2}{[1 + e^{\alpha + \beta x}]^3}
\]

\[
= \frac{-\gamma \beta^2 [e^{\alpha + \beta x}] + \gamma \beta^2 [e^{\alpha + \beta x}]^2}{[1 + e^{\alpha + \beta x}]^3}
\]

\[= 0 \]

\[\Rightarrow -1 + e^{\alpha + \beta x} = 0\]

\[\Rightarrow e^{\alpha + \beta x} = 1\]

\[\Rightarrow \alpha + \beta x = 0\]

\[\Rightarrow x = \frac{-\alpha}{\beta}\]
- Drop-off and level-off points: the second derivative is maximized or minimized, respectively, which is equivalent to setting the third derivative to 0.

\[
\frac{d^3y}{dx^3} = \gamma \beta^3 \left\{ - [e^{\alpha+\beta x}] + 4 [e^{\alpha+\beta x}]^2 - [e^{\alpha+\beta x}]^3 \right\} = 0
\]

\[\Rightarrow e^{\alpha+\beta x} = 0, \text{ i.e., } x = -\infty, \text{ or } [e^{\alpha+\beta x}]^2 - 4[e^{\alpha+\beta x}] + 1 = \]

\[e^{\alpha+\beta x} = \frac{4 \pm \sqrt{16 - 4}}{2} = 2 \pm \sqrt{3} = 0.268, 3.732\]

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\[e^{\alpha+\beta x} = \frac{4 \pm \sqrt{16 - 4}}{2} = 2 \pm \sqrt{3} = 0.268, 3.732\]

\[\Rightarrow \alpha + \beta x = -1.317, 1.317\]

\[\Rightarrow x = \frac{-1.317 - \alpha}{\beta}, x = \frac{1.317 - \alpha}{\beta}\]

\[\Rightarrow x = \text{inflection point} \pm \frac{1.317}{\beta}\]

- Rates of decay at specific time points were calculated using the first derivative of the sigmoid function equation, namely:

\[
\frac{dy}{dx} = \frac{-\gamma \beta e^{\alpha+\beta x}}{[1 + e^{\alpha+\beta x}]^2}
\]
eFigure. Fits of Linear, Exponential and Sigmoid Regression Models

All 36 visual field test locations that had an initial sensitivity value greater than 30 dB and a final sensitivity value less than 10 dB are included.
eTable. Estimated Drop-off and Inflection Points and Rates of Visual Field Decline at the Corresponding Points for Subsets With Final Visual Field Average Being <10 dB and Initial Visual Field Average Being >26 dB, >30 dB, and >22 dB

<table>
<thead>
<tr>
<th></th>
<th>Initial VF &gt; 26 dB</th>
<th>Initial VF &gt; 30 dB</th>
<th>Initial VF &gt; 22 dB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Drop-off point (year)</strong></td>
<td>4.5 (–9.7 to 12.1)</td>
<td>5.7 (–7.9 to 10.3)</td>
<td>4.4 (–14.3 to 12.1)</td>
</tr>
<tr>
<td>Median (min – max)</td>
<td>–6.1 dB/year</td>
<td>–7.8 dB/year</td>
<td>–5.6 dB/year</td>
</tr>
<tr>
<td><strong>Rate of VF decline at the drop-off point (dB/year)</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Inflection point (year)</strong></td>
<td>5.9 (–3.3 to 15.2)</td>
<td>6.5 (–3.3 to 10.7)</td>
<td>5.8 (–4.8 to 15.2)</td>
</tr>
<tr>
<td>Median (min – max)</td>
<td>–9.2 dB/year</td>
<td>–11.6 dB/year</td>
<td>–8.3 dB/year</td>
</tr>
<tr>
<td><strong>Rate of VF decline at the inflection point (dB/year)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

VF = Visual field