



Fast Transient VEP Parameter Identification Algorithm for Evaluating Glaucoma

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Purpose

Evaluate the efficacy of signal extraction and parameter identification method in detecting N75-P100-N135 complex of a fast transient VEP (ftVEP) in normal and glaucomatous eyes.

Methods

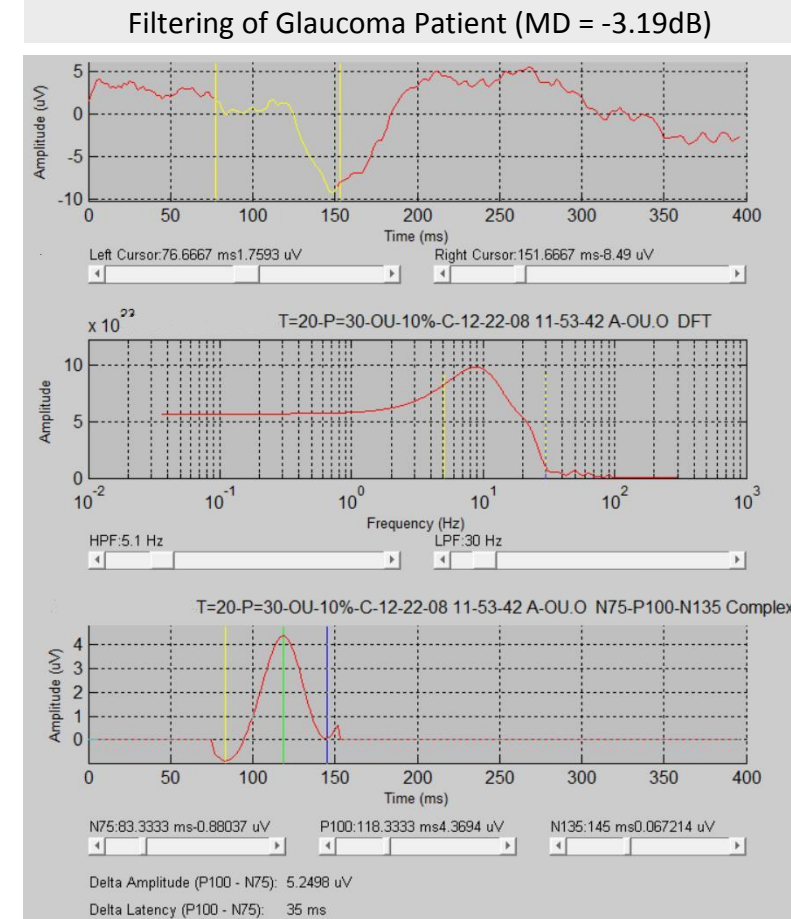
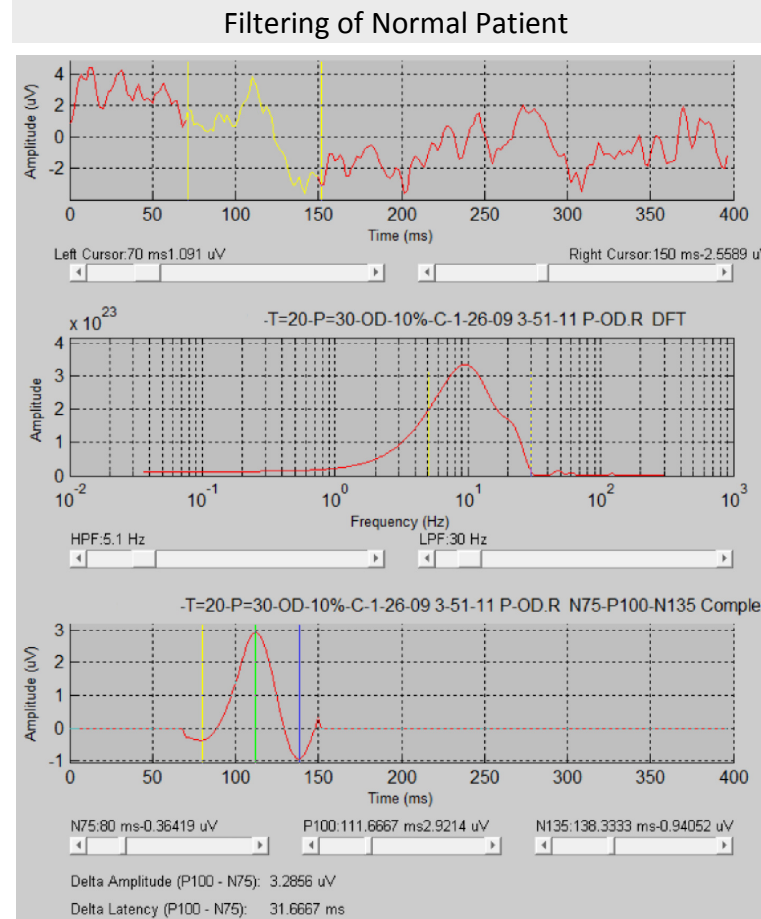
Data was collected from 60 normal and 84 glaucomatous eyes. Normal subjects had best corrected visual acuity of 20/20 and glaucomatous eyes had a mean MD = -8.85dB ± 8.15dB. Patients were tested with a modified Diopsys Enfant System using a LCD monitor optically adjusted to < 4% residual flicker. The patients were presented with 10% temporally reversing check patterns at a reversal rate of 2Hz (1Hz luminance fundamental) and subtending 41.39 minutes of arc. Each eye was tested for 20 seconds at each contrast level. The N75-P100-N135 complex was processed using a recursive signal padding bilateral filter. The N75-P100-N135 parameters (amplitude and latency) were objectively determined by using an N75-P100-N135 model optimization method based on Nedler-Mead Simplex. Receiver Operating Characteristic (ROC) curves for the processed and non-processed data were compared.

Results

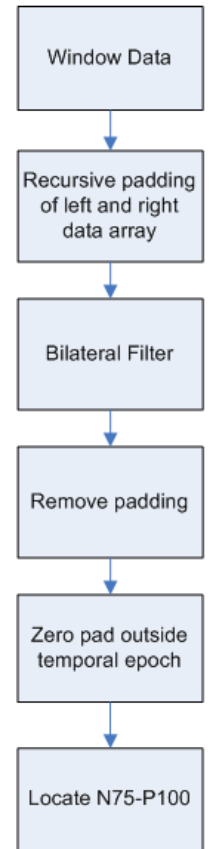
The N75-P100-N135 complex of ftVEP was identified in the glaucomatous eyes (MD -8.85 dB +/-8.15 dB of damage) and the normal eyes. Comparing the unprocessed and processed data ROC's "area under the curve" (AUC), the processed data showed improvement for all 6 N75-P100-N135 complex parameters. The N75 amplitude had a 51% improvement. The P100-N75 delta latency measurement improved by 27%. The remaining parameter improved by 10-14%. All improvements increased the AUC.

Conclusion

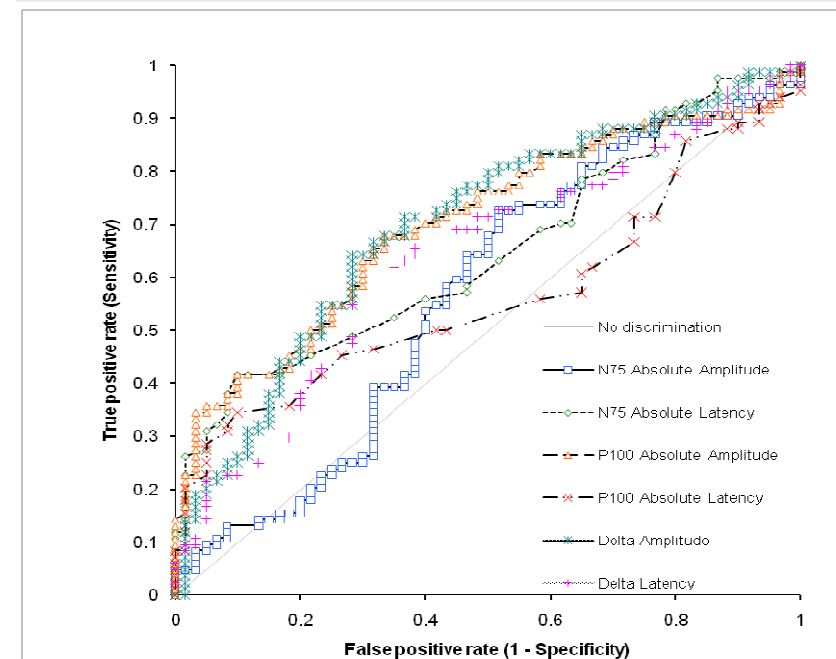
The proposed signal processing technique showed promise as a method to objectively identify the N75-P100-N135 parameters in normal and damaged eyes. The method's filtering technique did not induce ringing into the processed signal which would have corrupted the result.



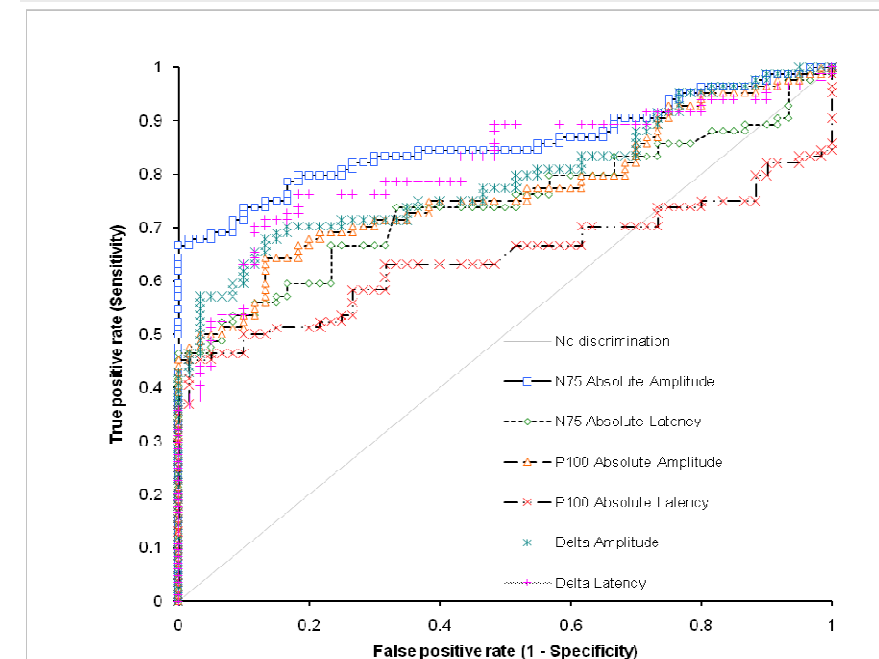
Filtering Process



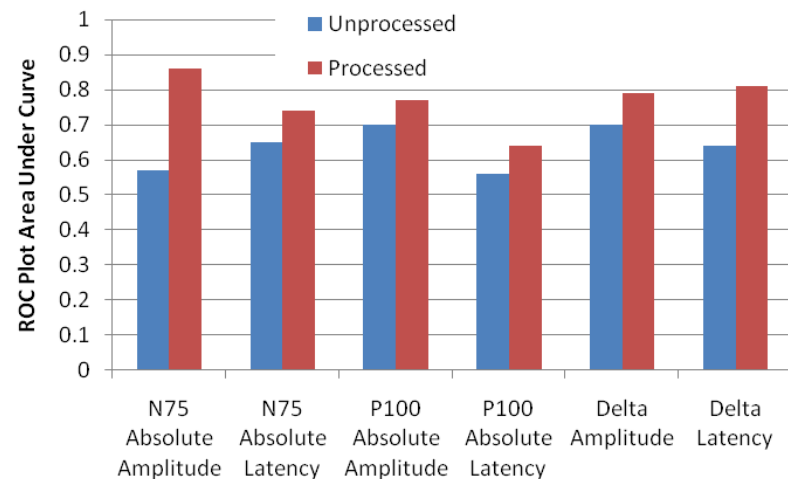
ROC Curve for Unprocessed Data (10% Contrast)



ROC Curve for Processed Data (10% Contrast)



Sensitivity ROC plots were created for each parameters and their areas compared



References

Derr, P. H. "Extraction and modeling of the Oscillatory Potential: signal conditioning to obtain minimally corrupted Oscillatory Potentials." *Doc Ophthalmol* 104 (2002): 37-55.
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 Yates, J. T. "Parallel pathways, noise masking and glaucoma detection: behavioral and electrophysiological measures." *Documenta Ophthalmologica* 95 (1998): 283-99.

Disclosures

P.H. Derr, Diopsys, Inc., E; C. Tello, Diopsys, Inc., R; C.G.V. De Moraes, None; J. Patel, Diopsys, E; T.S. Prata, None; J. Siegfried, Diopsys, Inc., R; J.M. Liebmann, Diopsys, Inc., R; R. Ritch, Diopsys, Inc., R.