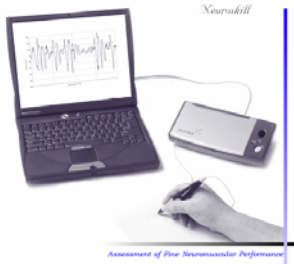


A New Biometric Instrument for Quantitative Assessment and Monitoring of Fine Motor Control in Patients with Parkinson's Disease and Related Disorders

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“Neuroskill” offers a new method of quantitative assessment of motor control through analysis of handwriting dynamics.

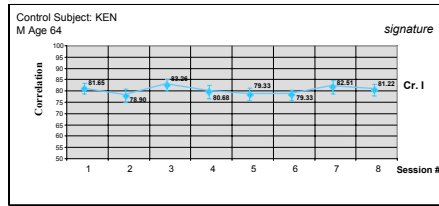
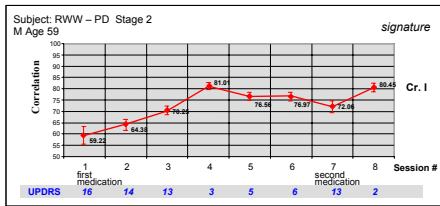
Quantitative assessments with the Neuroskill device are unique, not only in its technological approach, but also in the sense that handwriting is considered a complex motor and cognitive function, and consequently it assesses both motor control and cognitive components.



Cursive handwriting can be seen as a sequence of elementary movements, or strokes. Switching from stroke to stroke to create continuous smooth motion is a very demanding task of the motor control system. This switching function is seriously affected in Parkinson's disease patients, which results in distortions and instability of writing.

The delays in initialization and distortions in production of elementary strokes are what Neuroskill device measures with use of a special technique of Correlation Function Analysis of handwriting dynamic signals.

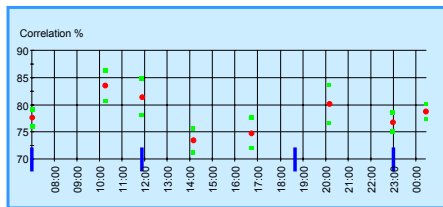
EIGHT-HOURS EXPERIMENT AT THE CNI MOVEMENT DISORDER CENTER



Correlation between Neuroskill and UPDRS-III is 0.93.

HOME SELF-MONITORING TEST

Patric D, M, Age: 49, PD Stage 2



Agenda:		Medication Table (appears on display by clicking on symbol)			
■	Crit. I ± σ	7:00 am	11:52am	18:40pm	23:00pm
■	Medication intake	1	1	1	1
		Sinemet 50/100			
		Permax 0.25 mg			
		Permax 1mg			

Conclusions:

The Neuroskill measures demonstrated impairment of fine motor control in all patients prior to dopaminergic medication. The statistical test showed that the measures were significantly correlated with Unified Parkinson's Disease Rating Scale (UPDRS-III) motor scores. For a group of 20 PD patients in stages I – IV, the Pearson correlation coefficient Δ UPDRS-III / Δ CR.I is equal to 0.69.

Quantitative measures of repeatability (stability), smoothness and synchronization are provided practically instantaneously for benefit of the current status evaluation, as well as for monitoring motor control fluctuations over time.

Neuroskill is a reliable, inexpensive technology that can be used in multiple applications, including monitoring and adjustment of the protocols for effectively teaching the handwriting skills, and quantitative assessment of the advanced generations of upper limb implants to navigate the motor and cognitive rehabilitation process.