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Visual Cues in Essential Tremor

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- Abstract -

Purpose : The pathophysiology of essential tremor(ET) remains unknown. PET studies of ET showed some conflicting data. One study reported significant glucose hypermetabolism of the medulla and thalamus, but other studies reported abnormal bilateral overactivity of cerebellar and red nuclear connections. The previous experimental studies suggested that each PET finding reflects a part of neural circuit which is responsible for ET. So it can be imagined that olivocerebellar oscillation may be transmitted by the way of cerebellar projections to the thalamus in ET. It has been reported that the cerebellar dentate nucleus neurons are involved in the generation and/or guidance of movement based on visual cues. The purpose of this study is to clarify the role of dentato-thalamic tract in ET. **Methods** : Tremor amplitudes were recorded as each patient perform two kinds of task, one involving sensory-guided movement and the other involving memory-guided movement. Each patient was asked to move his/her index finger following a smoothly moving target. He/She also was asked to perform the same movements with his/her eyes closed ET. **Results** : The results showed that average amplitudes of tremor were significantly higher during visually guided task than during memory guided task in ET patients. **Conclusions** : Our results led us to conclude that dentato-thalamic tract might be related to the control of tremor in ET.

Key Words : Essential tremor, Visual cues, Dentatothalamic tract

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Labview
(olovocerebellar oscillation)가

1. PET
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10 7 , 3
10 7 , 3
(Fig. 1). 10

Table 1, 2
0.49±0.42 G
0.21±0.21 G
3.78±1.72 Hz
5.56±1.32 Hz
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Wilcoxon Signed Ranks test
p = 0.008 (p < 0.001)
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p = 0.037 (p < 0.05)
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10 (:5, :5, 65.7±4.8) 가

Findley
Koller(1994)
가

2 PET
가
가
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PET

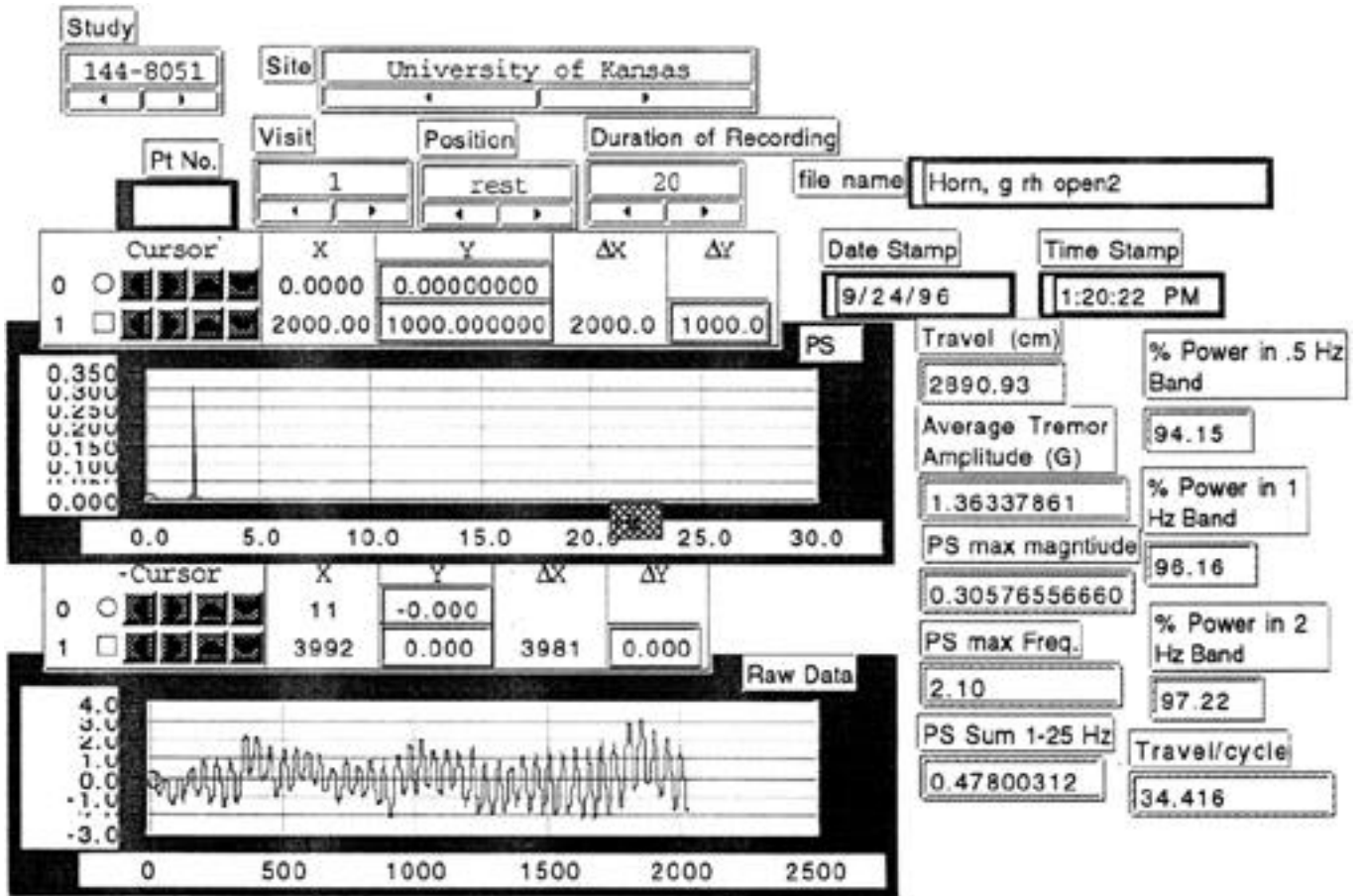


Figure 1. The sample of frequency spectra and strip chart of tremor in ET. Tremor amplitudes were recorded as each patient perform two kinds of task, one involving sensory-guided movement and the other involving memory-guided movement. Each patient was asked to move his/her index finger following a smoothly moving target. He/She also was asked to perform the same movements with his/her eyes closed. ET : essential tremor.

Table 1. Average amplitudes of tremor in 10 essential tremor cases both in eye open state and in eye close state(unit: G).

	1	2	3	4	5	6	7	8	9	10
eye open	0.25	1.45	0.17	0.62	0.10	0.46	0.33	0.72	0.71	0.04
eye close	0.13	0.44	0.04	0.23	0.23	0.24	0.05	0.70	0.03	0.04

Table 2. Most frequent tremor frequencies in 10 essential tremor cases both in eye open state and in eye close state(unit: Hz).

	1	2	3	4	5	6	7	8	9	10
eye open	1.30	4.20	3.60	1.80	6.60	4.60	4.70	4.60	1.50	4.90
eye close	7.00	4.60	4.50	5.30	6.30	4.70	4.90	5.20	8.50	4.60

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(Fig. 2).

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 Golgi II (hilus)
 (4, 6)
 (rubrospinal tract)
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 가 5, 6, 7, 8, 9, 10
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(superior cerebellar (olivocerebellar peduncle) fibers)가
 12. 가
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 (dentatothalamic tract) 가
 가 Mushiake Peter¹³
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 (4, 6) 가
 가
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 sialidosis

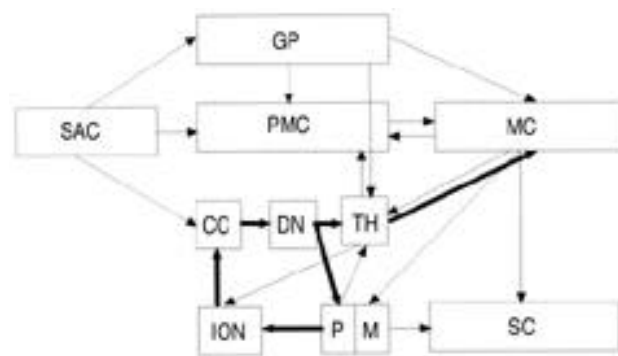


Figure 2. Schematic diagram of suspected neural control circuitries in essential tremor. It has been suggested that two main neural circuits, dentatothalamic tract and olivocerebellar tract, are responsible for essential tremor. Dentatothalamic tract acts as an efferent pathway of cerebellum for the control of motor cortex. Dentato-thalamic tract might be related to the control of tremor in ET. Abbreviation. GP: Globus Pallidum, SAC: Sensory Associated Cortex, PMC: Premotor Cortex, MC: Motor Cortex, CC: Cerebrocerebellum, DN: Dentate Nucleus, TH: Thalamus, ION: Inferior Olivary Nucleus, P: Parvocellular Division of Red Nucleus, M: Magnocellular Division of Red Nucleus, SC: Spinal Cord.

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Mitoma¹⁴
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(Fig. 2).
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