Thesis Title REACTION TIME AND OVERALL SIGNAL SPEED IN NEURONAL CIRCUITS OF PATIENTS WITH BRAIN SPINAL CORD AND PERIPHERAL NERVE DAMAGE.

Name Rattiya Tiabteera

Degree Master of Science (Physiology)

Thesis Supervisory Committee

Thyon Chentanez, Ph.D.

Thirayudh Glinsukon, Sc.D.

Pipat Cherdrungsi, M.Sc.

Date of Graduation 13 July B.E. 2532 (1989)

ABSTRACT

Forty seven subjects of three age groups; 20-40, 41-50, 51-60 year old control subjects and 51-60 year old brain damaged patients, 42-50 year old spinal cord damaged patients and 21-38 year old peripheral nerve damaged patients were tested for warned simple visual reaction time (WSVRT), warned simple auditory reaction time (WSART), warned simple tactile reaction time (WSTRT), maximum tapping speed per 10 sec. (MTS) and hand grip strength (HGS). In the left hemiparesis patients (LHE) or the right brain damaged patients, there was an increase in the reaction time (RT), and a decrease in overall signal speed (OASS), which

was used for the analyses of the reaction neuronal circuits in terms of impulse speed, response by left index finger (LI) and left big toe (LBT) to all stimulations {EYES, EARS, midline at the level of C7, midline of the back at the level of umbilicus (T10), right third finger (RF3), left third finger (LF3), right heel (RH) and left heel (LH)}, particularly, the response to LF3 and LH stimulation, the responses to those organ stimulation were as follows : a twice increase in the RT, a twice decrease in the OASS response by LI and LBT and an increase in the RT or a decrease in OASS response by all effector organ{Right index (RI), left index (LI), right big toe (RBT) and left big toe (LBT)}. The changes of the responses in the right hemiparesis patients (RHE) or left brained damaged patient were rather homogenous since they showed an increase in the RT, decrease in the OASS response by the RI and RBT to all stimulation, particularly, the response to RF3 and RH stimulation, the responses to these two latter stimulations were a twice increase in the RT, twice decrease in the OASS response by the RI, RBT and an increase in the RT or decrease in the OASS response by all effector organs(EO). In paraparesis patients (PARA) or spinal cord damaged patients, the results show an increase in the RT, a decrease in the OASS response by RBT.and LBT to the RH and LH stimulation but it did not show difference in the RT or OASS response by RI and LI to EYES, EARS, C7, T10, RF3 and LF3 stimulation. In the right peripheral nerve damaged (RP) or left peripheral nerve damaged patients (LP), it showed a

major increase in the RT, a decrease in the OASS response by affected hand (RI in RP, LI in LP) to all stimulation, particularly, the response to affected hand stimulation (RF3 in RP, LF3 in LP), the results show the twice increase in the RT or decrease in the OASS response by affected hand. The MTS of the affected side (LI and LBT in LHE, RI and RBT in RHE, RBT and LBT in PARA, RI in RP and LI in LP) and HGS of the affected hand (right hand in RHE, RP and left hand in LHE, LP) of all patients were significantly decreased from those of the control subjects. These results could be confirmed by the visual reaction time ratio (RT ratio) which showed a decrease in the RT ratio of both RI/LI and RBT/LBT in the LHE, increase in the RT ratio of both RI/LI and RBT/LBT in the RHE, with a decrease in the RT ratio of only RBT/LBT in the PARA and it also shows an increase in the RI/LI RT ratio in RP but decrease in the RI/LI RT ratio in the LP were also observed. Moreover, it showed an increase in the RI/LI MTS ratio in LHE and LP, a decrease in RI/LI MTS ratio in RHE, RP and an increase in RBT/LBT MTS ratio in LHE but a decrease in RBT/LBT MTS ratio in RHE. It also showed an increase in right/left HGS ratio in LHE and LP but a decrease in the right/left HGS ratio in RHE and RP.

The measurement of reaction time or analyses of the reaction neuronal circuits in terms of impulse speed, MTS and HGS were suggested to be the possible measures that could be used in confirming the location of lesion in patients with neuronal circuits damage in brain, spinal cord or peripheral nerve.