

정신분열병의 시각자극 사건유발전위 P300에 대한 연구*

오동훈** · 남정현**† · 안동현** · 김석현** · 최준호**

A Study of Visual Event-Related Potential P300 in Schizophrenia*

Dong-Hoon Oh, M.D.,** Jung-Hyun Nam, M.D., Ph.D.,**† Dong-Hyun Ahn, M.D., Ph.D.,**
Seok-Hyun Kim, M.D., Ph.D.,** Joon-Ho Choi, M.D.****ABSTRACT**

Objective : Event-related potentials(ERPs) are electrical changes recorded at the surface of the scalp in response to stimulus presentation, and their latency and amplitude change according to cognitive processes. Through past studies of the auditory ERP in schizophrenia, the P300 has been reported to be statistically smaller and delayed in schizophrenia than comparison groups. However, studies of the visual ERP have not been systematically examined. The present study was designed to investigate the visual P300 in patients with schizophrenia and normal controls and to compare the pattern of P300 between them.

Methods : The subjects were composed of patients(N=22) with schizophrenia by DSM-IV and normal controls(N=22). The visual ERPs were measured by the visual continuous performance test. P300 amplitude and latency measured on 5 scalp electrodes(Fz, Cz, Pz, T₇, T₈) were compared between patients and controls.

Results : The P300 latencies measured on Fz, Cz, Pz, and T₇ electrodes were significantly longer in patients than controls($p<0.05$). The P300 amplitudes in patients were smaller than controls. However, the difference between them was not statistically significant.

Conclusion : Analysis of the visual ERPs showed that the P300 latency is significantly delayed and the P300 amplitude is slightly smaller in patients than controls. These results are similar to established studies of the auditory P300 in schizophrenia.

KEY WORDS : Visual event-related potential · P300 · Schizophrenia.

서 론

가

Kreapelin, Bleuler

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Department of Neuropsychiatry, College of Medicine, Hanyang University and Mental Health Institute, Seoul, Korea

†교신저자 : , 133-792 17
) (02) 2290-8430,) (02) 2298-2055 E-mail) jhnama@hanyang.ac.kr

(latency)

1) P300 ,

(information processing)

2) P300 P300 가 10)

1965 (event - related potential : ERP) P300 Morstyn 11) P300 가

ERP가 3) P300 , Pfefferbaum 12) P300

Roth Cannon 4) P300 가

ERP P300(auditory P300 : P300) P300(vi-

ERP P300) P300) Pfefferbaum 12) Ford 13) P300

(functional magnetic resonance imaging) (positron emission tomography)

(visual discrimination task) P300 가 (neuroleptics) P300

(spatial resolution) 가 (Visual Continuous Performance Test : VisCPT) Pass 15)

millisecond (temporal resolution) 가 5) P300

P300 ERP 가 Hillyard Wood 6) P300 Knott

P300 250~500msec 가 17) VisCPT P300 Vianin 18) (visual recogni-

가 P300 tion task) P300

7) (amygdala), (inferior parietal lobe) (hippocampus) (parahippocampal area) P300

8) P300 (amplitude) , P300

VisCPT P300
 P300
 P300
 (topographic mapping of visual evoked potentials)

방 법

1. 연구대상
 ()
 DSM - 2
 22 ()
 13 , 9 , 31.2 ± 7.9)
 5.0 ± 6.5 , PA-
 NSS score 69.3 ± 17.3 ,
 (mean chlorpromazine equivalent) 664 ± 445mg/
 day MMSE score가 25
 ()
 22 (13 , 9 31.5 ±
 5.3) , ,

가

1가

24

2. P300의 측정

Neurosoft Neuroscan

VisCPT P300

1) 뇌파의 측정

Neurosoft SCAN 4.0 software
 ' 10/20 ' / (Ag/
 AgCl) 32 Quik - cap
 (Neurosoft, Inc.)
 가 (electrooculogram :
 EOG)
 (electroencephalogram : EEG)
 EOG SynAmps(Neurosoft, Inc.)
 (reference electrode) (mastoid
 process) 32
 10KOhms 가
 0.1~50Hz (band
 pass) gain
 1,000 , A/D rate 250

2) 실험자극

Neurosoft STIM
 . STIM (neuro-
 psychological test)
 , VisCPT
 1 1m ,

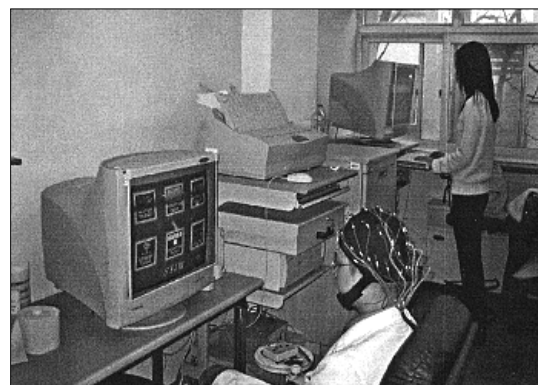


Fig. 1. Scene of test : visual event-related potentials.

1 200msec
 (baseline EEG) 2~ (trial) 85 μ V
 VisCPT epoch Fz,
 (continuous EEG) Cz, Pz, T₇, T₈ 5 (unipolar)
 가 (2).
 150 20 epoch
 Oddball P300
 Oddball 250~500 msec 가

3. 통계

19)
 VisCPT
 0~9 (20 \times 25mm,
 50msec, 가)가
 2 가)가
 (p=0.2) 가 (pad)
 (p=0.8)가
 가
 1000Hz 100Hz
 (frequency) 0.5
 30
 0.5
 0.02
 3) 뇌파분석
 ctromyogram : EMG)
 (ele-
 , 40Hz low pass, 24dB
 (filtering) 200msec
 1,200 msec (epoch)

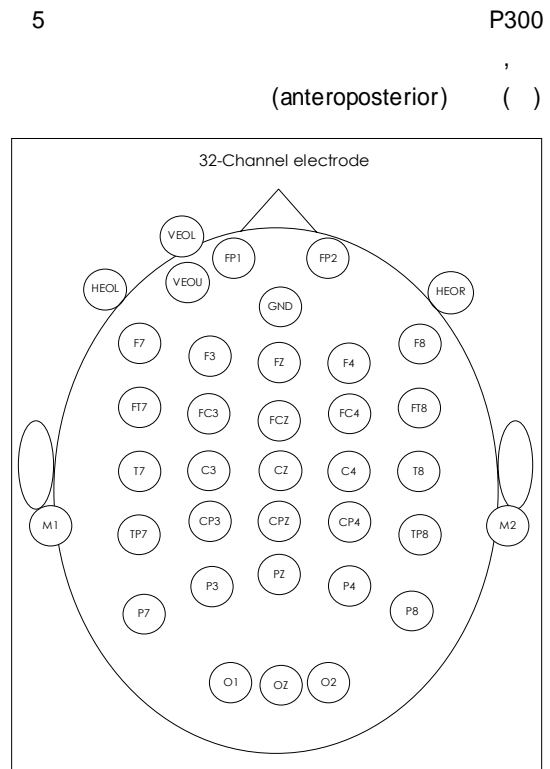


Fig. 2. Unipolar 32-channel electrode montage.

Table 1. P300 amplitude(μ V) & latency(ms) in schizophrenics and normal controls

| | | Fz | | Cz | | Pz | | T ₇ | | T ₈ | |
|--------------------|------|--------------|-----------|--------------|-----------|--------------|-----------|----------------|-----------|----------------|-----------|
| | | Latency | Amplitude | Latency | Amplitude | Latency | Amplitude | Latency | Amplitude | Latency | Amplitude |
| Patients (n=22) | mean | 412.38 | 14.98 | 410.47 | 13.91 | 390.94 | 12.1 | 406.18 | 8.39 | 419.36 | 9.37 |
| | 2SD | 103.4 | 11.43 | 91.61 | 10.57 | 115.31 | 5.47 | 116.8 | 6.9 | 114.72 | 8.42 |
| Controls (n=22) | mean | 362.36 | 16.25 | 358.71 | 14.56 | 358.36 | 14.59 | 362.9 | 9.05 | 389.82 | 10.47 |
| | 2SD | 88.83 | 15.56 | 77.57 | 16.13 | 68.58 | 9.58 | 110.24 | 6.9 | 92.7 | 9.48 |
| p-value | | 0.001 | 0.541 | 0.000 | 0.753 | 0.029 | 0.115 | 0.015 | 0.528 | 0.067 | 0.418 |

SD : standard deviation

Fz - Cz - Pz P300 (1, 3, 4).

() T₇ - Cz - T₈

2. 뇌의 전·후 방향(축)에서의 분석

Fz - Cz - Pz ()

P300

paired t - test (p>0.05).

SPSS 11.0 0.05 Fz - Cz - Pz P300

결과 () P300

1. 환자군과 대조군의 P300 잠복기 및 진폭 비교 (p<0.05).

Fz, Cz, Pz, T₇ P300 가

3. 뇌의 좌·우 방향(축)에서의 분석 (p>0.05).

T₇ - Cz - T₈ P300 가

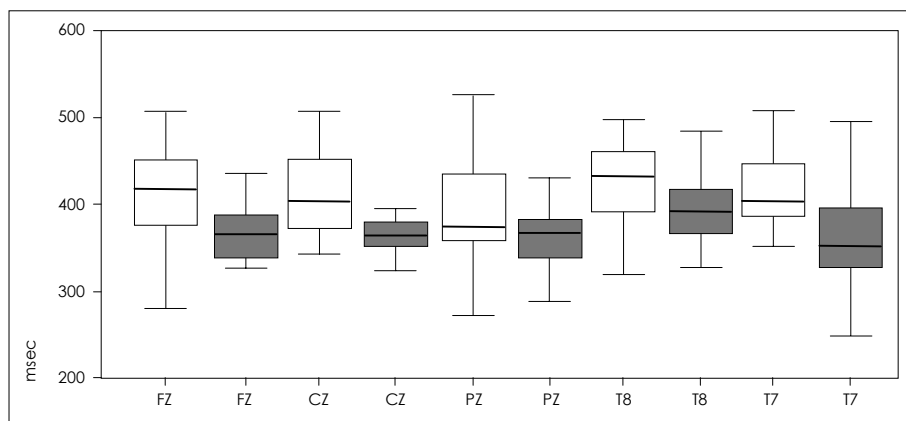


Fig. 3. P300 latency in schizophrenics and normal controls(light gray color : schizophrenia, dark gray color : normal controls).

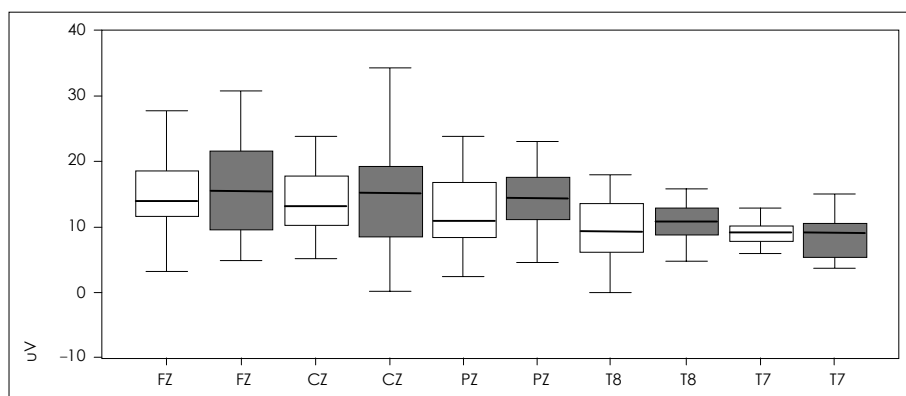


Fig. 4. P300 amplitude in schizophrenics and normal controls(light gray color : schizophrenia, dark gray color : normal controls).

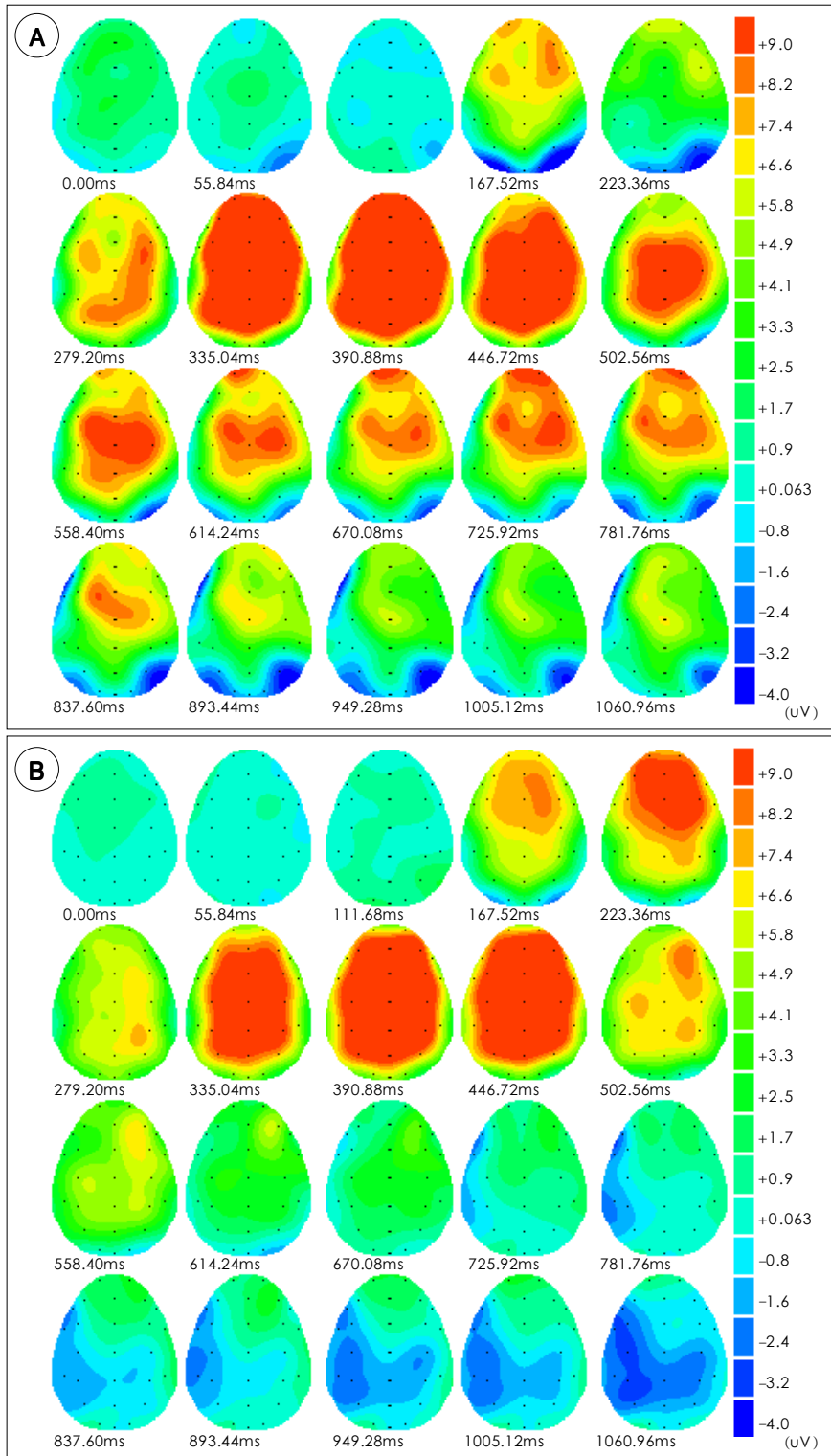


Fig. 5. Tophographic mapping of visual evoked potentials in normal controls(A) and schizophrenics(B). See the differences in circled areas between(A) and (B).

T₈ () . P300
 P300 , Dun-
 (p>0.05). chan - Johnson Kopell²³⁾ P300 가

4. 시각자극유발전위 영상(Tophographic mapping of visual evoked potentials)

가 가 P300 , P300 가 가
 , 160msec 가 가 P300 가 가
 , 500msec (vertex) 가 P300 가 가
 . 700msec 가 , P300 가
 가
 (5).

고 찰

visual P300 (working mental model)
 .⁵⁾ Donchin ²⁵⁾
 (working memory) P300 가
 . P300 가
 P300
¹⁵⁾ VisCPT 가 .¹¹⁾¹²⁾ Pass P300 가
 P300 가
 . Knott (1999) ¹⁷⁾ VisCPT P300 가
 ,
 . Wagner ¹⁶⁾ CPT 가
 P300 가
 가 P300 가
 가
 , P300 (scr-
 eening) MMSE score > 26
 . Polich²⁶⁾²⁷⁾ , ,
 가 P300 P300
 가 P300
 ,
 P300 가
 ,
 P300 가
 (22 ,

22) 가 , P300
 , (subtype)
 가
 P300 가
 가
 P300
 thixol 4 .²⁸⁾ Rosler ²⁹⁾ flupen-
 P300
 , Duncan
 P300
³⁰⁾ Umbricht ³¹⁾
 가
 P300 가
²⁸⁾
 P300
 가
 가 P300
 P300 (state)
 (trait) 가
 가
 결론
 P300 P300
 가 P300
 P300 가
 ()

중심 단어 : P300

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