

## 안구운동 민감 소실 및 재처리 요법(Eye Movement Desensitization and Reprocessing) 치료 후 국소 뇌 혈류 변화 : 두 증례의 SPECT 연구\*

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### Changes in the Regional Cerebral Perfusion after Eye Movement Desensitization and Reprocessing : A SPECT Study of Two Cases\*

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#### ABSTRACT

Over the last decade, EMDR(Eye Movement Desensitization and Reprocessing) has emerged as a promising new treatment for trauma and other anxiety - based disorders. However, neurobiological mechanism of EMDR has not been well understood. Authors report SPECT findings of two patients of PTSD before and after EMDR.

Brain 99mTc - ECD - SPECT was performed before and after EMDR treatment. To evaluate the significance of changes in the regional cerebral perfusion, t - test was conducted on the resulting images using SPM99 . In addition, clinical scales(CAPS, CGI, STAI) were employed to assess the changes in the clinical symptoms of the patients. After EMDR treatment, each showed significant improvement in clinical symptoms. The cerebral perfusion increased in bilateral dorsolateral prefrontal cortex, and decreased in the temporal association cortex. The differences in the cerebral perfusion between patients after treatment and normal controls decreased. These changes appeared mainly in the limbic area and the prefrontal cortex.

These results suggest that EMDR may show the therapeutic effect through 1) improvement in the emotional control by increased activity in the prefrontal cortex, 2) inhibited hyperstimuli on amygdala by deactivation of the association cortex, 3) inhibition on past trauma related memory, and 4) keeping the functional balance between the limbic area and the prefrontal cortex. This case report needs further replication from studies with larger sample.

KEY WORDS : EMDR · SPECT · SPM.

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서 론

가 anterior cingulate gyrus prefrontal cortex 가 EMDR 가 EMDR (eye movement desensitization and reprocessing : EMDR) 가 EMDR 1990 Shapiro 가 EMDR EMDR 가 PTSD EMDR 가 EMDR SPECT (information - processing model) EMDR Shapiro EMDR (bilateral activation)<sup>11)</sup> 가 가 EMDR 가 PTSD (post traumatic stress disorder, PTSD) 2003 10 12 EMDR SP- 가 ECT 10 PTSD 가 PTSD가 (magnetic resonance imaging, MRI) EMDR EMDR 2 1. 환자병력 1) 환자 A 52 , PTSD EMDR 2001 anterior cingulate gyrus left frontal lobe 가 가 EMDR 가 (limbic lobe) 가

DSM - PTSD  
 2002 6  
 2003 10  
 EMDR ( paroxetine 40mg, risperidone 4mg, quetiapine 500mg)  
 6 6 EMDR

2) 환자 B  
 34  
 10

가  
 DSM - PTSD  
 (dissociative disorder)  
 2003 11 4  
 ( risperidone 2mg) EMDR  
 6

2. EMDR 시행 및 증상 평가

EMDR EMDR institute level I  
 EMDR 8<sup>12)</sup>  
 1 (session) 1  
 4 (DSM - )<sup>13)</sup>  
 , Clinical Global Impression(CGI)<sup>14)</sup> Clinical - Administered PTSD for DSM - ( CAPS)<sup>15)</sup>  
 (state - trait anxiety scale, STAI)

3. SPECT 촬영

SPECT

(perfusion imaging agent) Technetium 99m ethyl cysteinate dimer( 99m - Tc - ECD) , 5  
 128 frame 30 acquisition time  
 (count)가 (axial) 1.67mm  
 , 360 3 128 (projection)  
 128 x 128 x 64 (matrix)  
 (filtered back projection)

4. SPM(statistical parametric mapping) 분석

SPECT Analyze (ver7.5 Biomedical Imaging Resource Mayo foundation)  
 , Matlab 5.2(Mathworks Inc., USA)  
 SPM99 (Institute of Neurology, University College of London, UK. SPM99)  
 SPECT (spatial normalization)

20mm FWHM (full width at half maximum) 가  
 (Gaussian kernel) (smoothing) SPM  
 SPM99 가  
 EMDR SPECT (paired t - test)  
 , 10 2  
 EMDR (two sample t - test)  
 threshold p - value 0.01  
 , extent threshold voxels 100  
 cluster (local maximum)  
 Talairach

5. 신경해부학적 위치 추적

SPM99 Talairach Talairach  
 daemon (UTHSCSA Research Imaging Center)  
 Brodman area

( BA) . 7 , CAPS 96 ( :28 ,  
(option) ‘ search nearest gray matter ’  
Talairach 가 가 : 42 , :26 )  
60 , 61 .  
CGI 4 , CAPS 60

6. 분석결과

1) EMDR 치료 후 두 환자의 임상증상 및 임상척도 점수의 변화

(1) A

EMDR

가 , , ,

( :19 , :25 ,  
:16 ) 41

, 44 .

(2) B

가 , ,

. CGI 6  
CAPS 71 ( :23 ,  
24 , 24 )

58 , 50 .

CGI 3 , CAPS 31 ( :10 , :14 , :7

) 43

39 .

2) 환자군에서 치료 전후 SPECT 영상 비교

(1) EMDR ,

가

EMDR ,

right middle frontal gyrus right superior frontal gyrus 가 ,

BA 6, 8, 9, 10, 46 . left medial frontal gyrus, right superior frontal gyrus

Table 1. Incremental regions in the cerebral perfusion after EMDR

Coordinate	Z value	Region	Brodman area
44, 48, 24	4.46	Right middle frontal gyrus	46
40, 34, 44	4.06	Right middle frontal gyrus	8
40, 44, 30	3.69	Right superior frontal gyrus	9
10, 14, 72	4.30	Right superior frontal gyrus	6
-8, 48, 58	3.95	Left superior frontal gyrus	8
8, 66, 14	3.44	Right superior frontal gyrus	10
-6, 64, 14	3.39	Left medial frontal gyrus	10
-14, 52, 10	3.38	Left medial frontal gyrus	10



Fig. 1. Incremental regions in the cerebral perfusion after EMDR(result of SPM analysis of SPECT data). Pointer is located at right middle frontal gyrus.

10 ( 1, 1).  
 BA 8, 9, 10, 46 dorsolateral prefrontal cortex

(2) EMDR 가

EMDR right middle temporal gyrus right sub-gyral BA 20, 21 ( 2, 2).

3) 정상군과 치료 전 환자군의 SPECT 영상 비교

(1)

가

가 left parahippocampal gyrus(BA 34), right parahippocampal gyrus(BA 19), left precentral gyrus(BA 6), left middle frontal gyrus(BA 6), right cingulate gyrus(BA 31), right sub-gyral(BA 40) (limbic area)

Table 2. Decremental regions in the cerebral perfusion after EMDR

Coordinate	Z value	Region	Brodman area
60, 12, -10	3.81	Right middle temporal gyrus	21
58, 6, 20	3.73	Right middle temporal gyrus	21
44, 10, -20	3.69	Right sub-gyral	20

(2)

left superior frontal gyrus(BA 10), right middle frontal gyrus(BA 10), left postcentral gyrus(BA 40), left inferior parietal lobule(BA 40), right postcentral gyrus(BA 3), right precentral gyrus(BA 4), left middle frontal gyrus(BA 46), left superior frontal gyrus(BA 9) prefrontal area

4) 정상군과 치료 후 환자군의 SPECT 영상 비교

(1)

가

가 right hippocampal gyrus(BA 19), left precentral gyrus(BA 6), left cingulate gyrus(BA 32), right cingulate gyrus(BA 31)

가 (cluster) (voxel)

(2)

right middle temporal gyrus(BA 21), right inferior temporal gyrus(BA 20), left medial frontal gyrus(BA 11), right superior frontal gyrus(BA 10)

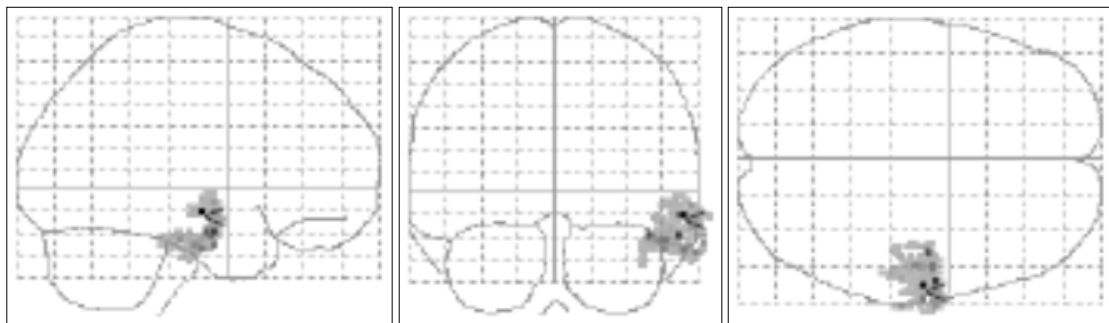


Fig. 2. Decremental regions in the cerebral perfusion after EMDR(result of SPM analysis of SPECT data). Pointer is located at right middle temporal gyrus.

가 (somato-sensory) 가 (association cortex) <sup>18)</sup> (amygdala) basolateral nuclei central nucleus , central nucleus (major psychological trauma) (brain stem) . EMDR ,

**고찰**

가 EMDR 가 , SPECT right temporal lobe anterior and lateral temporal region (retrograde memory) EMDR right middle frontal gyrus superior frontal gyrus(BA 6, 8, 9, 10, 46) 가 <sup>16)</sup> , left medial frontal gyrus superior frontal gyrus(BA 8, 10) 가가 EMDR 가 , prefrontal lobe, dorsolateral prefrontal cortex (executive function) (working memory) 가 EMDR <sup>16)</sup> 가 (emotional expression) , (limbic system) 가 (emotional response)

EMDR <sup>17)</sup> PTSD prefrontal cortex anterior cingulate gyrus 가 left frontal lobe late prefrontal cortex <sup>19)</sup> Levin <sup>10)</sup> . EMDR prefrontal lobe 가 , prefrontal 가 .

**결론**

EMDR , right middle temporal gyrus inferior temporal gyrus(BA 20, 21) . lobe 가 , EMDR 1) prefrontal , 2) , 3)

frontal lobe , 4) pre-  
가 .  
(2 ) (10 ) 가  
SPM corrected p - value  
<0.05  
uncorrected p - value<0.01  
20  
A EMDR  
6 paroxetine 40mg al-  
prazolam 0.75mg B  
risperidone  
SPECT 14  
SP-  
ECT (spatial resolu-  
tion) (MRI)  
, SPM (tem-  
plate) 가  
가 EMDR SPECT  
SPM  
가 가 .

중심 단어 : EMDR · SPECT · SPM.

감사의 글 \_\_\_\_\_

SPECT

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