

**1. Changes in the Distribution of Regional Cerebral Blood Flow in Children with Moyamoya Disease: An Analysis Using  $^{99m}\text{Tc}$ - HMPAO SPECT**

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CT scan in moyamoya disease frequently shows low density areas confined to the cerebral cortex and subcortical regions sparing the basal ganglia. So we compared the cerebral blood flow (CBF) ratio between the cerebral hemisphere and basal ganglia in patients with moyamoya disease with those in normal controls.

We studied 16 children with angiographically diagnosed moyamoya disease (11 males and 5 females; mean age  $8.4 \pm 3.1$  years). 20mCi of  $^{99m}\text{Tc}$ -labelled hexamethylpropyleneamine oxime (HMPAO) was injected intravenously and single photon emission computed tomography (SPECT) scanning was performed. Cross-sectional images were corrected for tissue absorption employing Chang's method. The coronal slices containing basal ganglia and thalamus were selected and were reformed as a single slice by group add technique. Two regions of interest (ROIs) were defined by the collection of pixels in the area of deep gray matters (ROI-1) and by those in the bilateral cerebral hemisphere above the former (ROI-2). Using average pixel counts in both ROIs, hemisphere to deep gray CBF ratio was obtained in each patient. Using Student's test, the results were compared with those in 10

normal controls (7 males and 3 females; mean age  $6.5 \pm 2.5$  years).

In 10 normal controls the range of the average pixel counts of ROI-1 was from 12,186 to 14,692 and the of ROI-2, which contains subcortical white matter as well as the cortex, was from 10,984 to 13,690. Hemisphere to deep gray CBF ratio in normal control was  $90.6 \pm 2.9\%$ . In 16 patients with moyamoya disease the range of the average pixel counts of ROI-1 was from 11,121 to 16,623 and that of ROI-2 was from 8,864 to 12,875. Hemisphere to deep gray CBF ratio was decreased to  $81.5 \pm 6.1\%$  in patients with moyamoya disease ( $p < 0.001$ ).

We conclude that the blood flow to the cerebral cortex and white matter is decreased more significantly than that to the deep gray matter in moyamoya disease. This finding is relevant to the fact that infarctions frequently occur in the cortex and subcortical areas sparing the basal ganglia. Although the basal ganglia are supplied by the abnormal moyamoya collateral vessels, CBF may be maintained above the level enough to escape the ischemic damage.

**2. Usefulness of  $^{99m}\text{Tc}$ -HMPAO SPECT in the Localization of the Epileptic Focus in Temporal Lobe Epilepsy: Comparison with EEG, MRI and CT**

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Cerebral functional imaging methods provide information on the location of the epileptic focus. To evaluate the clinical usefulness of  $^{99m}\text{Tc}$ -HMPAO SPECT in the diagnosis and localization of the epileptic focus in temporal lobe epilepsy (TLE), we reviewed the findings of interictal  $^{99m}\text{Tc}$ -HMPAO SPECT, electroencephalography (EEG) and magnetic resonance imaging (MRI) and/or cranial computed tomography (CT) in 31 patients with TLE. The patients were injected intravenously with 750 MBq (20 mCi) of  $^{99m}\text{Tc}$ -labelled HMPAO in adults or 370 MBq (10 mCi) in child. They were scanned within 1 hour of injection using a ZLC-750 ROTA Gamma camera producing 6 mm axial sections parallel to the orbito-meatal line with 12 mm FWHM resolution. There were no significant correlations between the SPECT findings and the clinical parameters (age, length of history and age of onset). Abnormalities of regional cerebral blood flow were found in 23 out of 31 patients (74.2%). There were temporal hypoperfusion in 17 patients (54.8%). Nasopharyngeal EEG with standard international 10~20 system electrode monitorings gave lateralization in 24 out of 31 patients (77.4%). Where SPECT and EEG recordings were both lateralizing, agreement between them was good, 8 out of 12 patients (correlation rate=66.7%). CT of 16 patients detected no specific lateralization, MRI of 27 patients detected lateralising abnormalities in only one patient.

It is concluded that  $^{99m}\text{Tc}$ -HMPAO SPECT supports the evidence of origin of an epileptic focus in a substantial proportion of cases.

### 3. 내경동맥 Balloon Occlusion Test시

#### $^{99m}\text{Tc}$ -HMPAO SPECT 상 Brain

#### Perfusion의 의미

연세의대 진단방사선과

정태섭 · 서정호 · 김동익 · 박창윤

	신경외과	
이	규	성
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악성종양 등 광범위한 두경부 병변의 절제술시 내경동맥 결찰술 등 내경동맥을 희생시켜야 될 가능성이 높다. 이 때 수술전에 미리 내경동맥을 희생시킬 경우 발생할 수 있는 뇌허혈성 변화가 동반될지 판정하여야 한다. 만약 수술전에 적절한 검사가 없이 내경동맥을 희생시키는 경우 41~54%에서 뇌졸중 등 심각한 후유증이 생길 수 있으며 이 중 32~60%의 사망율이 동반된다. 그러나 수술전에 실험적 내경동맥 Balloon occlusion test를 하여 환자를 선택한 경우는 후유증이 5~10%로 낮아지며 그 후유증의 심각도도 적어진다.

현재 가장 많이 이용하는 방법은 내경동맥에 Balloon occlusion test를 하며 약 30분간 EEG monitoring과 신경학적 검사를 시행하여 내경동맥의 희생시 생길 후유증을 예견한다. 최근 Xe/CT/CBF 방법을 이용하기도 하나 여러가지 검사의 불편한 점이 동반된다. 따라서 저자들은 보다 간편한 방법으로 내경동맥 Balloon occlusion test전과 시술중  $^{99m}\text{Tc}$ -HMPAO SPECT를 시행하여 이 때 중뇌 동맥 부위에서 방사선 방출량의 비율을 측정하여 환자의 증상에 따른 분석을 하여 새로운 지침을 만들고자 하였다.

최근 1년간 연세대학교 의과대학 세브란스병원에서 두경부수술을 위해 내경동맥 Balloon occlusion test한 12명의 환자를 대상으로 하였다. 이들 중 2명에서는 각각 혼수상태와 반신불수의 심각한 신경학적 증상이 있었으며, 중뇌동맥 부위의 방사선 방출량이 검사전에 비해서 77~85%로 감소되었으며, test상 신경학적 증상이 없었던 10명중 CCF, internal carotid aneurysm 등 3명의 혈액 순환성 관계 환자는 오히려 105~118%로 증가되었으며 그 외 7명의 환자는 95~101%로 큰 변화를