

Summary

Evaluation of Time Dependency of the Acetazolamide Effect on Cerebral Hemodynamics as Measured by ^{99m}Tc -ECD Single-Photon Emission Computed Tomography

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[Purpose] Kuwabara et al. have examined the cerebral artery dilation with acetazolamide (ACZ) challenge test using PET. And, they reported that ACZ reaction came out time dependently. We have developed a unique SPECT's method using Technetium-99m ethyl cysteinate dimer (^{99m}Tc -ECD) to verify the results obtained by Kuwabara et al.

[Method] 1000 MBq of ^{99m}Tc -ECD was exactly divided into three syringes. Each of which was intravenous infused (IV) at rest, 7.5, and 20 minutes after ACZ administration. Data collection was started using dynamic SPECT immediately after ^{99m}Tc -ECD IV at rest. Using necessary data only, SPECT images representing each of the three ^{99m}Tc -ECD IV was reconstructed. SPECT counts were obtained by the ROI method from each images to calculate relative CBF from rest to 7.5 and 20 minutes after ACZ administration.

[Result] The 18 hemispheres of nine patients in the negative control group in whom ACZ was not loaded, CBF was stable during the three evaluation. The measurement error our method was estimated as small. The

18 hemispheres of nine patients in the positive control group who has normal vasodilatory reserve, CBF was increased by $26.2 \pm 8.1\%$ at 7.5 minutes and $29.3 \pm 13.1\%$ at 20 minutes after ACZ administration. Seven patients with and chronic stage unilateral internal carotid artery severe stenosis and/or occlusion were evaluated as the test group. Case of unaffected side, CBF was increased by $17.6 \pm 6.9\%$ at 7.5 minutes and $24.8 \pm 11.3\%$ 20 minutes after ACZ administration. And, increase rate of CBF in the affected side was $2.8 \pm 1.6\%$ at 7.5 minutes and $17.3 \pm 5.0\%$ at 20 minutes after ACZ administration. In the affected side, timing of the maximum CBF increase caused by ACZ was remarkably delayed.

[Conclusion] Our method based on ^{99m}Tc -ECD SPECT also revealed delayed cerebral artery dilation in the affected side. It was suggested that ACZ reaction came out time dependently, as reported by Kuwabara et al.

Key words: ^{99m}Tc -ECD, Acetazolamide, Split-dose, Time dependency, Response.