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Interobserver variability of cerebral blood flow measurements obtained using spectral analysis and technetium-99m labeled compounds

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Radionuclide angiography with technetium-99m hexamethylpropylene amine oxime (^{99m}Tc-HMPAO) or technetium-99m ethyl cysteinate dimer (^{99m}Tc-ECD) enables the non-invasive estimation of absolute cerebral blood flow (CBF) to be determined by using spectral analysis (SA). We previously demonstrated the clinical use of SA; however, this method involves a few manual steps. The aim of this study was to evaluate the interobserver variability of CBF estimations made using SA and compare these results with those obtained by using graphical analysis (GA). In twenty patients with various brain diseases (27–74 years old), radionuclide angiography examinations were performed using ^{99m}Tc-labeled compounds (10 patients, ^{99m}Tc-HMPAO; 10 patients, ^{99m}Tc-ECD). Bilateral cerebral hemispheres were studied in all patients, and the brain perfusion index (BPI) values were estimated using SA and GA. The interobserver variability between two observers was then assessed. A good correlation between the BPI values assessed using both SA (BPI^S) and GA (BPI^G) was obtained. The correlation coefficient for BPI^S ($r = 0.987$) was almost the same as that for BPI^G ($r = 0.982$). The degree of interobserver variability was not affected by the measurement of elevated BPI values. Measurements carried out by two observers using both SA and GA exhibited a similar degree of interobserver variability. SA appears to have a satisfactory interobserver variability and may be more suitable for clinical applications.

Key words: brain perfusion index, cerebral blood flow, spectral analysis, graphical analysis, single-photon emission tomography