Letters to the Editor

Acetazolamide Test Evaluating Cerebral Autoregulation

To the Editor:

We read with interest the article by Piepras et al.1 and congratulate the authors for their excellent work. We hope to show how to obtain additional information with the acetazolamide test.

The parameters of cerebral circulatory resistance are easy to calculate using the normal fast-Fourier transformed Doppler spectra. In particular, the Pourcelot index2 (maximum systolic velocity—end diastolic velocity/maximum systolic velocity) and the pulsatility index3 (amplitude of peak systolic velocity—end diastolic velocity/mean velocity) are valid markers of the resistance of the autoregulative small arterioles.

We used the same acetazolamide test in 23 patients with extracranial carotid artery disease. Similar to the findings of Piepras et al.,1 our results show that, in cases with normal cerebrovascular reserve capacity with an increase in mean flow velocity of the middle cerebral artery, there is a noticeable (40–50%) decrease of the Pourcelot pulsatility indices. Moreover, this decrease in cerebral circulatory resistance explains the increase in mean flow velocity (like Ohm's law), suggesting a direct effect of the acetazolamide-induced acidosis. Finally, some patients with no increase in mean flow velocity show a decrease in resistance parameters. This surprising combination is always seen ipsilaterally in patients with severe extracranial carotid stenosis. One explanation might be a steal effect of the normal side, which, despite a decrease in resistance, prevents the extracranial stenosis from producing any significant increase in mean flow velocity. In these cases, the resistance parameters are a suitable tool to quantify autoregulation disturbances and improve the sensitivity of this test.

The assessment of autoregulation and physiological or pharmacological responses of cerebral arteries will bring important new views in noninvasive diagnostic methods.4 The calculation of resistance parameters of the cerebrovascular vessels should play an equally important role.5

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References

The following is in response:

To the Editor:

We very much appreciate the kind comments of Dr. Hamann et al regarding our article.1 They raise important considerations in their thoughtful letter regarding additional information on our test to assess cerebrovascular reserve capacity by means of transcranial Doppler. However, we would like to stress that this test was validated for cerebral blood flow, quantified with a xenon-133 inhalation technique. The mentioned “resistance indices” (Pourcelot index, pulsatility index) reflect vascular impedance and are, therefore, influenced by all factors influencing pulsatile flow, mainly peripheral resistance and vessel elasticity.2–3 The Pourcelot index is pressure dependent. If used in combination with a stimulation test, acetazolamide should be the method of choice because no changes in systemic arterial blood pressure occur.

Findings of a decrease in resistance parameters, indicative of a steal effect on the normal side in patients with severe extracranial stenosis, are important phenomena and concur with observations by colleagues Fürst et al.4 This group of patients appears to benefit the most from recanalizing or revascularizing procedures.

We appreciate the encouragement of Dr. Hamann et al to enhance further the diagnostic techniques and options for patients suffering from cerebrovascular disease.

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A Glass of Water at Midnight for Possible Prevention of Cerebral Infarction

To the Editor:

We previously proposed1 that an abrupt increase in hematocrit, and secondly in blood viscosity, early in the morning may be directly associated with the initiation of cerebral infarction, which most frequently occurs in the morning hours. Dr. Wood2 explained that this change in hematocrit is a result of hemocoagulation due to a loss of plasma volume from renal glomerular filtration that continues during sleep in the absence of fluid intake. He recommended a couple of glasses of water in the middle of the night to rectify the reduced plasma volume for people who have risk factors of stroke or who have ingested ethanol before sleep.
Acetazolamide test evaluating cerebral autoregulation.
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