

Baroreflex

The baroreflex or baroreceptor reflex is one of the body's homeostatic mechanisms that helps to maintain [blood pressure](#) at nearly constant levels. The baroreflex provides a rapid negative feedback loop in which an elevated blood pressure reflexively causes the [heart rate](#) to decrease and also causes blood pressure to decrease. Decreased blood pressure decreases baroreflex activation and causes heart rate to increase and to restore blood pressure levels. The baroreflex can begin to act in less than the duration of a cardiac cycle (fractions of a second) and thus baroreflex adjustments are key factors in dealing with postural hypotension, the tendency for blood pressure to decrease on standing due to gravity.

The system relies on specialized neurons, known as baroreceptors, in the aortic arch, carotid sinuses, and elsewhere to monitor changes in blood pressure and relay them to the [brainstem](#). Baroreceptors are stretch receptors and respond to the pressure induced stretching of the blood vessel in which they are found. Baroreflex induced changes in blood pressure are mediated by both branches of the [autonomic nervous system](#) - that is the parasympathetic and sympathetic nerves. Baroreceptors are active even at normal [blood pressures](#) so that their activity informs the brain about both increases and decreases in blood pressure.

The body contains two other, slower acting systems to regulate blood pressure: the heart releases atrial natriuretic peptide when blood pressure is too high, and the kidneys sense and correct low blood pressure with the renin-angiotensin system.

Sykora et al. prospectively analyzed patients with [acute ischemic stroke](#). Autonomic nervous system (ANS) was measured using the cross-correlational baroreflex sensitivity (BRS) at [admission](#). The occurrence and cause of in-hospital infections was assessed based on the clinical and laboratory examination. Demographic and clinical variables including initial stroke severity, dysphagia, procedures as nasogastric tubes, central venous and urinary catheters and mechanical ventilation were included in the analysis.

They included 161 patients with ischemic stroke, of those 49 (30.4%) developed a nosocomial infection during the first 7 days of hospital stay. Patients with infections had significantly lower BRS (median 3 vs 5 ms/mmHg, $p < .001$) higher initial NIHSS (median 15 vs 5, $p < .001$), had more often non-lacunar etiology and underwent more invasive procedures. In the multivariable regression model decreased BRS (adjusted OR 1.21, 95% CI 1.03-1.41, $p = .02$), admission NIHSS (adjusted OR 1.10, 95% CI 1.02-1.19, $p = .02$) and invasive procedures (adjusted OR 1.46, 95% CI 1.03-2.06, $p = .03$) were independently associated with infection after ischemic stroke.

Decreased BRS was independently associated with infections after ischemic stroke. Autonomic shift may play an important role in increased susceptibility to infections after stroke. The possible diagnostic and therapeutic relevance of this finding deserves further research ¹⁾.

[Autonomic impairment](#), as measured by [heart rate variability](#) and [baroreflex](#) sensitivity, is significantly associated with increased [mortality](#) after [traumatic brain injury](#). These effects, though partially interlinked, seem to be independent of age, trauma severity, intracranial pressure, or autoregulatory status, and thus represent a discrete phenomenon in the pathophysiology of [traumatic](#)

[brain injury](#). Continuous measurements of [heart rate](#) variability and baroreflex sensitivity in the [neuromonitoring](#) setting of [severe traumatic brain injury](#) may carry novel pathophysiological and predictive information ²⁾.

¹⁾

Sykora M, Siarnik P, Szabo J, Turcani P, Krebs S, Lang W, Jakubicek S, Czosnyka M, Smielewski P. Baroreflex sensitivity is associated with post-stroke infections. An open, prospective study. J Neurol Sci. 2019 Sep 3;406:116450. doi: 10.1016/j.jns.2019.116450. [Epub ahead of print] PubMed PMID: 31610381.

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Sykora M, Czosnyka M, Liu X, Donnelly J, Nasr N, Diedler J, Okoroafor F, Hutchinson P, Menon D, Smielewski P. Autonomic Impairment in Severe Traumatic Brain Injury: A Multimodal Neuromonitoring Study. Crit Care Med. 2016 Mar 10. [Epub ahead of print] PubMed PMID: 26968025.

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