

COMPARATIVE CHARACTERISTICS AND DYNAMICS OF IL-1 β AND IL-17 IN ISCHEMIC AND HEMORRHAGIC STROKE.

Ilia Nakashidze, Shota Nakashidze, Shorena Potskhishvili, Zeinab Pagava, Salome Zoidze

Georgia, Batumi, Batumi Shota Rustaveli State University

e-mail: dr.ilia.nakashidze@gmail.com

DOI: 10.52340/geoanesthesia.2026.09.01

Keywords: ischemic stroke, hemorrhagic stroke, IL-1 β , IL-17, neuroinflammation, microglia.

Background. Neuroinflammation is one of the principal mechanisms of secondary brain injury following stroke. Interleukin-1 β (IL-1 β) is a key mediator of the early innate immune response and contributes to endothelial activation, blood–brain barrier disruption, and inflammatory cell recruitment. Interleukin-17 (IL-17) is involved in Th17-mediated inflammation, endothelial injury, and the maintenance of neuroinflammatory responses. The comparative dynamics of these cytokines in ischemic and hemorrhagic stroke remain insufficiently investigated.

Objective. To compare baseline IL-1 β and IL-17 concentrations in ischemic and hemorrhagic stroke and evaluate their changes during treatment.

Materials and Methods. This single-center pilot observational study included 35 patients: 22 with ischemic stroke and 13 with hemorrhagic stroke. Plasma IL-1 β and IL-17 concentrations were measured at admission and reassessed during treatment. The concentrations of both cytokines were expressed in pg/mL. Paired measurements were available for 20 patients with ischemic stroke and 7 patients with hemorrhagic stroke. Data are presented as median and interquartile range: Me [Q1–Q3]. Between-group differences were assessed using the Mann–Whitney U test, and paired measurements were analyzed using the Wilcoxon signed-rank test. The Benjamini–Hochberg procedure was applied to adjust for the two simultaneously analyzed cytokines.

Results. At admission, IL-1 β concentrations were higher in patients with ischemic stroke than in those with hemorrhagic stroke: 3.499 [2.564–9.479] versus 2.479 [2.338–2.811] pg/mL; $p=0.015$. The difference remained statistically significant after adjustment for multiple comparisons: $q=0.031$. Baseline IL-17 concentrations did not differ significantly between the groups: 1.801 [1.611–2.522] pg/mL in ischemic stroke and 2.129 [1.616–2.546] pg/mL in hemorrhagic stroke; $p=0.682$.

In the paired ischemic stroke subgroup, IL-1 β decreased from 3.499 [2.633–6.533] to 2.525 [2.323–3.242] pg/mL, although the difference did not reach statistical significance: $p=0.053$. IL-17 increased from 1.857 [1.672–2.574] to 2.123 [1.801–2.984] pg/mL; $p=0.079$. Neither result remained statistically significant after adjustment for multiple comparisons.

In patients with hemorrhagic stroke, median IL-1 β concentrations were 2.479 [2.132–2.598] pg/mL at the first measurement and 2.318 [2.199–2.329] pg/mL at the second measurement; $p=0.375$. IL-17 concentrations were 1.665 [1.547–2.871] and 1.715 [1.504–2.282] pg/mL, respectively; $p=0.578$.

Discussion. The higher baseline IL-1 β concentration observed in ischemic stroke is consistent with early activation of innate immunity following cerebral ischemia. Recent experimental evidence indicates that microglia become one of the principal sources of IL-1 β in ischemic brain tissue during the hyperacute phase [1]. IL-1 β is also considered an important contributor to blood–brain barrier disruption and the expansion of secondary ischemic injury [2]. The absence of significant IL-17 changes may reflect a more variable or

delayed activation of the Th17-mediated response. Marked IL-1 β outliers and the small paired hemorrhagic stroke subgroup limit the interpretation of mean concentrations.

Conclusions. Ischemic stroke was associated with a higher baseline IL-1 β concentration than hemorrhagic stroke. No significant between-group difference in IL-17 or statistically confirmed changes in IL-1 β and IL-17 during treatment were identified.

References

1. Bourne JH, Suthya AR, Wanrooy BJ, et al. Microglia are prominent producers of inflammatory cytokines during the hyperacute phase of ischemic stroke. *Communications Biology*. 2025;8:1193. doi: 10.1038/s42003-025-08636-1.
2. Matys P, Mirończuk A, Starosz A, et al. Expanding Role of Interleukin-1 Family Cytokines in Acute Ischemic Stroke. *International Journal of Molecular Sciences*. 2024;25(19):10515. doi: 10.3390/ijms251910515.