

# Impact of Renal Impairment on Intensive Blood-Pressure–Lowering Therapy and Outcomes in Intracerebral Hemorrhage

## Results From ATACH-2

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### Study Question

Does the estimated glomerular filtration rates (eGFRs) affect clinical outcomes and modify the efficacy of intensive systolic blood pressure (BP)-lowering therapies in patients with intracerebral hemorrhage (ICH)?

### What Is Known and What This Paper Adds

The clinical effects of renal impairment in patients with ICH are currently unknown. This investigation's results provide evidence for an association between a decreased eGFR and unfavorable outcomes in patients with ICH and indicates that the intensive systolic BP lowering increased the risk of death or disability among patients with decreased eGFR.

### Methods

These post hoc analyses of clinical trial data included 974 patients with ICH who participated in the Antihypertensive Treatment of Acute Cerebral Hemorrhage II (ATACH-2) study (NCT01176565), which was an international, multicenter, randomized, 2-group, open-label, and blinded-endpoint trial in which participants received either standard BP control (i.e., target systolic BP of 140–179 mm Hg) or intensive BP control (i.e., target systolic BP of 110–139 mm Hg). The investigators calculated each ATACH-2 participant's baseline eGFR with the Chronic Kidney Disease Epidemiology Collaboration equation. The present study's primary outcome was death or disability 90 days after ICH, and the investigators used multivariate logistic regression models to examine the effects of baseline eGFR values on these outcomes.

### Results and Study Limitations

The median baseline eGFR was 88 mL/min/1.73 m<sup>2</sup> (interquartile range, 68–99 mL/min/1.73 m<sup>2</sup>); 451 (46.3%), 363 (37.3%), and 160 (16.4%) patients had baseline eGFR values of ≥90 mL/min/1.73 m<sup>2</sup>, 60–89 mL/min/1.73 m<sup>2</sup>, and <60 mL/min/1.73 m<sup>2</sup>, respectively. Compared with participants

**Table** eGFR Values and Unfavorable Outcomes

Baseline eGFR range	OR (95% CI) for unfavorable outcomes with intensive BP control vs standard BP control	p for interaction
<60 mL/min/1.73 m <sup>2</sup>	3.60 (1.47–8.80)	0.02
60–89 mL/min/1.73 m <sup>2</sup>	1.13 (0.68–1.89)	
≥90 mL/min/1.73 m <sup>2</sup>	0.89 (0.55–1.44)	

Effects of intensive BP control given various baseline eGFR values.

with eGFR values ≥90 mL/min/1.73 m<sup>2</sup>, those with eGFR values <60 mL/min/1.73 m<sup>2</sup> had greater odds of death or disability at 90 days (adjusted odds ratio [OR], 2.02; 95% confidence interval [CI], 1.25–3.26), but this was not true for patients with eGFR values of 60–89 mL/min/1.73 m<sup>2</sup> (OR, 1.01; 95% CI, 0.70–1.46). Decreased eGFR values exhibited strong associations with unfavorable outcomes in participants randomized to intensive BP control. This study provides Class II evidence that in spontaneous ICH, decreased eGFR identifies patients at risk of death or disability following intensive BP control. The present study's limitations include the exclusion of patients with typical ICH exhibiting more severe symptoms, thereby limiting generalizability, and the lack of data concerning pre-ICH eGFR values.

### Registration, Study Funding, and Competing Interests

This study was funded by the Japanese government, and the ATACH-2 study, funded by NIH, was registered at ClinicalTrials.gov (NCT01176565). Some authors report receiving personal fees and grants from healthcare companies. Go to [Neurology.org/N](https://www.neurology.org/N) for full disclosures.

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