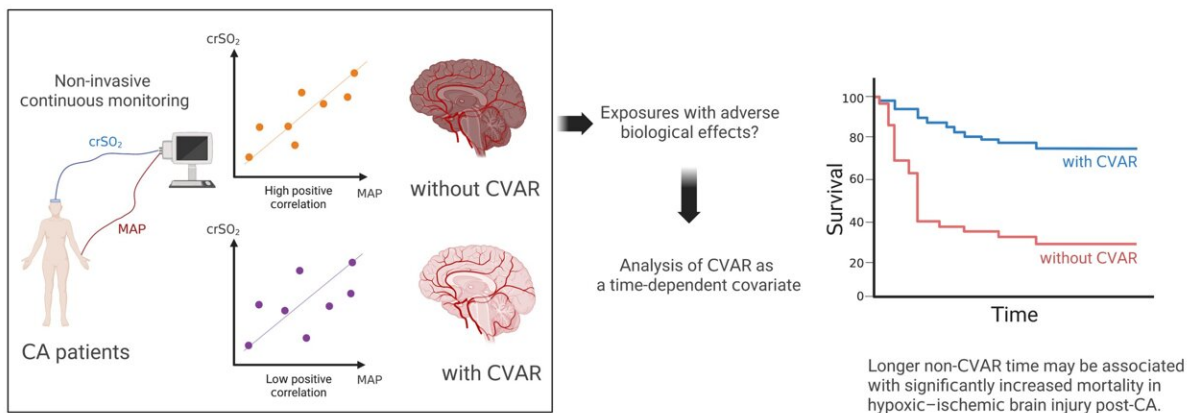


# Researchers link blood flow regulation in the brain and prognosis following cardiac arrest

July 3 2023



Schematic overview of the study. Newly-identified correlation could improve management and optimize post-resuscitation care for individual patients. Credit: Jotaro Tachino

A group of researchers at Osaka University have used a noninvasive method to evaluate cerebrovascular autoregulation (CVAR) in patients following out-of-hospital cardiac arrest. The mortality rate increased significantly with the duration of time that CVAR was undetectable. The article, "Association between time-dependent changes in cerebrovascular autoregulation after cardiac arrest and outcomes: a prospective cohort

study," was published in *Journal of Cerebral Blood Flow and Metabolism*.

It has been suggested that CVAR, a function that is present in the normal state, may be impaired after cardiac resuscitation. However, the relationship between CVAR function and patient prognosis has been unclear.

The research examined CVAR over time, using the moving Pearson correlation coefficient calculated from regional cerebral oxygen saturation and mean [blood pressure](#) data. The researchers performed a survival analysis using the presence or absence of CVAR as a time-dependent covariate.

The findings of this study may be useful in predicting neuroprognosis after cardiac resumption and may also help avoid early withdrawal of treatment in those who recover. In addition, they suggest that treatment and management that maintains proper CVAR after cardiac resumption may improve patient prognosis. This may then be applied to the management of post-[cardiac arrest](#) resuscitation, based on cerebral circulation, to optimize treatment for each individual patient.

Although standardization of treatment for out-of-hospital cardiopulmonary arrest has progressed and efforts to improve outcomes are being made worldwide, many patients still suffer neurological sequelae (hypoxic-ischemic brain injury, HIBI) even after return of spontaneous circulation.

It is known that if [brain function](#) is maintained normally, there is a mechanism (CVAR) that tries to maintain [cerebral blood flow](#) at a constant level even if systemic blood pressure changes, but until now, it was unclear whether such a reaction occurs in the brain after resuscitation. Cerebral regional oxygen saturation (crSO<sub>2</sub>), a measure of

oxygen supply and demand balance in the brain, is affected by blood pressure, and the researchers focused on a method to evaluate the presence or absence of CVAR using this correlation.

The team used this correlation to evaluate the presence or absence of CVAR in the post-resuscitated brain and assessed its relationship to life expectancy.

In this study, the research group analyzed 100 patients with out-of-hospital cardiac arrest who were transported to the trauma and acute critical care center of the Osaka University Graduate School of Medicine.

CVAR was determined by calculating the moving Pearson correlation coefficient and by continuously monitoring  $crSO_2$  and mean blood pressure for 96 hours after return of spontaneous circulation. Assuming undetected CVAR time as a bad exposure for the organism (time-dependent covariate), the association with life prognosis was evaluated by Cox proportional hazards model.

CVAR was detected in all 24 patients with good neuroprognosis (Cerebral Performance Scale: CPC 1–2) out of 100 analyzed subjects and in 65 (88%) of 76 patients with poor neuroprognosis (CPC 3–5). The analysis using the Cox proportional hazards model showed that the survival rate decreased significantly as the undetected time of CVAR increased.

The results of this study have two major implications. First, the ability to identify subgroups with high mortality from early post-resuscitation clinical data can help identify populations that should receive enhanced therapeutic intervention. In addition, it may help to avoid early withdrawal of treatment from those who may recover. Secondly, the researchers believe that intensive therapeutic management that maintains

proper cerebral perfusion suggests improved life outcomes, and that developing a systemic management approach based on cerebral perfusion may be a breakthrough in reducing post-resuscitation neurological sequelae.

**More information:** Jotaro Tachino et al, Association between time-dependent changes in cerebrovascular autoregulation after cardiac arrest and outcomes: A prospective cohort study, *Journal of Cerebral Blood Flow & Metabolism* (2023). [DOI: 10.1177/0271678X231185658](https://doi.org/10.1177/0271678X231185658)

Provided by Osaka University

Citation: Researchers link blood flow regulation in the brain and prognosis following cardiac arrest (2023, July 3) retrieved 3 May 2024 from <https://medicalxpress.com/news/2023-07-link-blood-brain-prognosis-cardiac.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.