

Effects of regional body temperature during asphyxial cardiac arrest on mortality and brain damage in rats

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Abstract

Purpose: To date, hypothermia has focused on improving rates of resuscitation to increase survival rates in cardiac arrest (CA) patients. For this, it needs to understand what body temperature affects neuronal damage/death in the brain during CA. However, few studies on effects of regional temperature in the body during CA on survival rate and neurological outcomes have been studied.

Materials and methods: Here, we used adult male rats (12 week-old) which were subjected to 4 conditions as follows: (i) whole body normothermia ($37\pm0.5^{\circ}\text{C}$) plus (+) no asphyxial CA, (ii) whole body normothermia+CA, (iii) whole body hypothermia ($33\pm0.5^{\circ}\text{C}$)+CA, (iv) body hypothermia/brain normothermia+CA, and (v) brain hypothermia/body normothermia+CA.

Results: Survival rate after resuscitation was significantly high in groups of whole body hypothermia+CA and body hypothermia/brain normothermia+CA, but not in groups of whole body normothermia+CA and brain hypothermia/body normothermia+CA. However, the group of hypothermia/brain normothermia+CA exhibited higher neuroprotective effect against asphyxial CA injury: neurological deficit and neuronal death in the hippocampus were improved compared to those in the group of whole body normothermia+CA. In addition, neurological deficit and neuronal death in the group of brain hypothermia/body normothermia+CA were similar to those in the group of whole body normothermia+CA.

Conclusions: In brief, only brain hypothermia during CA did not show effective survival rate, neurological function and neuronal protection compared to those under body (not brain) hypothermia during CA. Our present study suggests that regional temperature in patients during CA can significantly affect outcomes in survival rate and neurological recovery.

Biography:

Jun Hwi Cho, MD, PhD is professor in department of Emergency Medicine and Neurobiology, Kangwon National University Hospital, South Korea. His major research fields are cardiac arrest and cardiopulmonary resuscitation (CPR) using hypothermia, toxicology and critical care, experimental ischemic stroke: about neuronal damage and protection in the ischemic brain.

Speaker Publications:

1. Jung YS, Kim KS, Suh GJ, Cho JH (2019) "Pre-Comparison between Gel Pad Cooling Device and Water Blanket during Target Temperature Management in Cardiac Arrest Patients". *Acute Crit Care* 33(4):246-251.
2. Lee CH, Park JH, Ahn JH, Kim JD, Cho JH, Lee TK, Won MH (2019) "Stronger antioxidant enzyme immunoreactivity of *Populus tomentiglandulosa* extract than ascorbic acid in rat liver and kidney". *Iran J Basic Med Sci* 22(8):963-967.
3. Lee TK, Kim H, Song M, Lee JC, Park JH, Ahn JH, Yang GE, Kim H, Ohk TG, Shin MC, Cho JH, Won MH (2019) "Time-course pattern of neuronal loss and gliosis in gerbil hippocampi following mild, severe, or lethal transient global cerebral ischemia". *Neural Regen Res* 14(8):1394-1403.

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