Kees H. Polderman

Neuroprotection and cardioprotection after cardiac arrest: how cool is cool enough?

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Dear Editor,

I congratulate doctors Cariou and co-workers on their superb article discussing strategies to increase survival after cardiac arrest (CA) [1]. I fully agree with almost all of their statements and recommendations. However, I have one important comment.

In their discussion on improving post-resuscitation care, the authors state that “today, the only way to maximize neurological recovery is to lower body temperature during the first 24 h, even if the optimal target is still debated (between 33 and 36 °C)”. This statement advances a widely held belief that therapeutic hypothermia (TH) equals cooling to 33 °C. However, there is no compelling scientific rationale for setting the lower limit of the target temperature range to be discussed at 33 °C.

While it is true that many centers using TH have settled on a target of 33 °C, the reason for this choice is mainly that this is the average of the 32–34 °C range used in the pivotal HACA trial [2], and the average of the range recommended in current guidelines from the American Heart Association, European Resuscitation Council, and Neurocritical Care Society.

However, there are intriguing data suggesting that using lower temperatures, 32 °C or even lower, might further improve outcomes. Lopez-de-Sa et al. [3] performed a randomized controlled trial comparing 32–34 °C after CA, and reported significantly better outcomes at 32 °C especially in patients with an initial rhythm of ventricular fibrillation or pulseless ventricular tachycardia. A larger trial comparing 32–34 °C is currently ongoing (ClinicalTrials.gov identifier: NCT02035839). Other clinical observations and data from numerous animal experiments also strongly suggest that using temperatures lower than 33 °C could provide more cardioprotection and neuroprotection, and could further improve outcomes [4, 5]. In addition, maintaining a lower temperature significantly decreases a patient’s shivering response, and may enhance the efficacy of shivering suppression strategies such as skin counter warming through an increased skin–core gradient [4]. The difference in shivering response at a temperature of 32 °C compared to 33–34 °C can be substantial [4].

All this is not to suggest that the debate regarding optimal temperature after CA has been settled in favor of 32 °C; clearly, it has not, and recent data suggest that even 36 °C can provide significant neuroprotection in many patients. However, discussions and studies on the optimal target temperature after CA should at a minimum address a temperature range of 32–36 °C, and probably a range of 30–36 °C.

Of note, lowering core temperatures even further, below 28 °C, will significantly increase the risk of cardiac arrhythmias [4]; this should therefore be avoided. But mild to moderate hypothermia (30–35 °C) actually decreases this risk, and enhances hemodynamic stability [4, 5]; thus, fear of arrhythmias or hemodynamic instability should not be

regarded as a reason not to explore somewhat lower temperatures.

I again congratulate the authors on their excellent article, and would end by strongly endorsing the first and perhaps most important recommendation that they have made: that we all need to work hard to increase the rate and quality of bystander CPR by laypeople, first responders, and health care providers.

Conflicts of interest No relevant disclosures.

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K. H. Polderman (✉)
Department of Critical Care Medicine,
University of Pittsburgh Medical Center,
3550 Terrace Street, Scaife Hall/6th Floor,
Pittsburgh, PA 15261, USA
e-mail: k.polderman@tip.nl;
poldermankh@upmc.edu