It could work!

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When I read the article by Weiser and coworkers,¹ 2 scenes of the famous movie *Young Frankenstein*² came to mind: In the first scene, a skeptical Gene Wilder stated “You have more chance of reanimating this scalpel than you have to mending a broken nervous system.” In the second scene, he shouted the famous sentence “It could work!” realizing he was able to give new life to Frankenstein. This animal study was well performed and proved to be a smart idea to improve the chances for emergency preservation and resuscitation in case of cardiac arrest (CA).

CA is a major cause of mortality and neurologic disability. The incidence of out-of-hospital CA is approximately 80 patients per 100,000 persons annually. Despite advances in resuscitation, outcomes remain dismal, with 10% of patients surviving until hospital discharge and 5% experiencing full neurologic recovery.³

The primary determinant of outcome after CA is hypoxic ischemic brain injury. Hypoxic ischemic brain injury is the primary cause of death in 68% of inpatient CA and in 23% of out-of-hospital CA.⁴

Brain injury after CA is the main cause of mortality and long-term neurologic disability in survivors. Injuries after CA can be classified as primary and secondary.⁵

The primary brain injury after CA is due to sudden cessation of oxygen delivery, resulting in neuronal ischemia and cell death by few minutes. Oxygen-delivery cessation causes energy-dependent ion channel function with subsequent edema, anaerobic metabolism, cerebral lactate, and activation of lytic enzymes up to apoptosis.⁵

Hypothermia historically has been the main tool to address both primary and secondary cerebral injuries after CA.⁶ Cerebral metabolism is reduced by 5% to 10% per 1°C decrease in core body temperature. In addition, global carbon dioxide production and oxygen consumption are decreased proportionally to reductions in core body temperature.⁷ By decreasing cerebral metabolism, hypothermia avoids excessive intracellular anaerobic metabolism, improves cerebral glucose use, allows available cellular energy stores, prevents apoptosis, and reduces inflammatory response. Thus, since 1950, hypothermia has

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Central Message

The article in this issue of the *Journal* has 2 great strengths: (1) the use of near real-size/weight conditions of adults and (2) the proposal of a new unique novel multilumen catheter and perfusion apparatus that seems to rapidly induce profound cerebral hypothermia for potential preservation of the brain and heart after CA with a no-flow time of 15 minutes.

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been considered one of the best protectors of the neurologic system, especially for the brain, in congenital and aortic arch surgery.

Although many studies have focused on the binomial hypothermia and emergency preservation and resuscitation, there are 2 important insights of the present animal study: the use of near real-size/weight conditions of adults and the proposal of a new unique novel multilumen catheter and perfusion apparatus that seems to rapidly induce profound cerebral hypothermia for potential preservation of the brain and heart after CA with a no-flow time of 15 minutes.

The median cooling rate was 1.3°C/min, reaching the target of 5% to 10% of cerebral metabolism reduction per minute. Because of the flush solution, a lot of blood pooled into the peripheral veins and arteries, which along with venting allows maintenance of a good level of hemoglobin. It is well known that hemoglobin is a major determinant of arterial oxygen content because it is involved in the secondary injury.

Another strength of the present study is that Weiser and coworkers¹ clearly identified the necessity for the precise catheter placement below the separation of the truncus brachiocephalicus in the aorta, a key point for effective cooling of the brain. This has never been reported before and seems to be critical for effectively cooling the brain.

Although Weiser and coworkers¹ concluded that future refinements in flush catheter design are needed to simplify the procedure and to develop the optimal “flush cocktail” to improve the effectiveness, let’s say “It could work!”

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