Detect the Changes of the Cerebral Cortex Blood Perfusion of a Cardiac Arrest and Return of Spontaneous Circulation Mouse Model

Background and Customer Needs

Cardiac arrest is the sudden termination of the cardiac ejection function, the disappearance of the great artery pulsation and heart sound, and the serious ischemia and hypoxia of vital organs (such as the brain), resulting in the termination of life. Making sure the resuscitation happens ASAP is a vital procedure to improve the survival rate. But the resuscitation also induces damage to all the organs.

After cardiac arrest (CA) and resuscitation, the unfolded protein response (UPR) is activated in various organs including the brain. The main purpose of the UPR is to restore ER homeostasis and promote cell survival. It has been well established that brain I/R insult caused by transient ischemic stroke or CA/resuscitation leads to ER stress and subsequent activation of the UPR. A previous study of this team has demonstrated that the XBP1s/HBP/O-GlcNAc axis functions in the brain and is activated after ischemic stroke or CA (6, 8). Here, the goal was to clarify the effect of this axis on functional outcomes after CA in young and aged mice.

The Demand of the Research

Monitor brain cortical CBF after CA in young and aged mice, to make sure the brain cortex blood perfusion changes induced by the different cardiac states show up, along with quantized perfusion data.

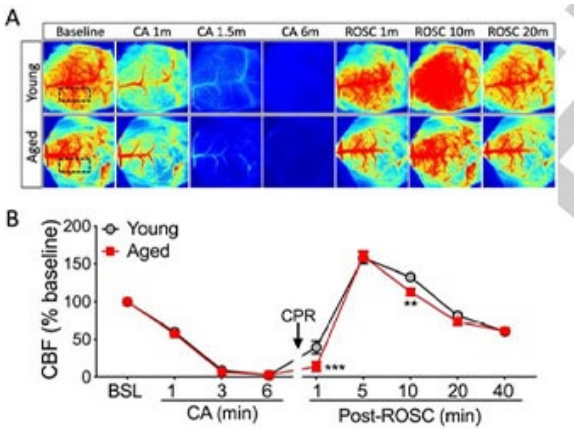
The blood perfusion data also can make a combination with the Glucosamine(GlcN) Western blotting, Rotarod performance, Neurologic Score, Open field and Bodyweight, Survival Rate to figure out that the activation of the XBP1 UPR branch in the post-CA brain is neuroprotective.

How was The System Used

In the beginning, RWD gave an online demonstration to the researchers to tell them that RFLSI Ⅲ Laser Speckle Imaging System is capable to detect the changes in the cerebral cortex blood perfusion of a Cardiac arrest (CA) and Return of spontaneous circulation (ROSC) mouse model.

During the experiment, technicians of microcirculation and in vivo imaging solutions from RWD offer support and assistance all the time via e-mail or phone call, to make sure all the puzzles and issues are handled timely. Speeding up life science research is always the duty of RWD.

Results and Effects



- CA outcome was worse in young mice with neuron-specific deletion of Xbp1 in the brain.
- CA outcome was improved in young mice with neuron-specific expression of Xbp1s in the brain.
- Short-term CA outcome in young mice was improved after post-CA treatment with glucosamine.
- Long-term CA outcome in aged mice was improved after post-CA treatment with glucosamine