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## Old chemicals, now as potential life savers against ischemic and reperfusion injuries

**Myoung-Gwi Ryou**

Tarleton State University, USA

Ischemia and reperfusion (I/R) injuries are critical life-threatening diseases and may end up with serious adult disability, but FDA-approved treatment is limited. Classical chemicals such as methylene blue (MB) and pyruvate have been revisited to evaluate protective roles in I/R injuries including ischemic stroke and myocardial infarction. Oxidative stress and inefficient energy metabolism are the pivotal contributors to I/R diseases. Results from bench studies support that both pyruvate and MB increases ATP production and have potent antioxidant effect. However, detailed mechanisms of beneficial effects are different between pyruvate and MB. MB rather prevents electron leakage through electron transport chain in the mitochondria and by which energy metabolism enhanced. On the other hand, pyruvate enhanced endogenous redox state, such as the ratio of GSH to GSSG, and improves ATP production by providing metabolic resources required for the glucose metabolism. Furthermore, the effects of MB and pyruvate on the gene regulation have been investigated. Both MB and pyruvate enhances cellular ability to resist against ischemic stress by activating hypoxia inducible factor-1. In conclusion, pyruvate and MB, old chemicals, have two-phase effects on I/R injury. Short-term effect, MB and pyruvate can protect the victims of various I/R diseases by reducing oxidative stress and enhancing energy metabolisms. The long-term effects of MB and pyruvate allow the conversion of gene profiles to help protect and restore from I/R damage.

### Biography

Myoung-Gwi Ryou has completed his PhD in 2008 from University of North Texas Health Science Center and Post-doctoral studies from University of Texas Southwestern Medical School. He is the Director and an Assistant Professor, Dept. of Medical Laboratory Science and Adjunct Faculty in the UNTHSC. He has published more than 23 papers and chapters in reputed journals and has been serving as an Editorial Board Member of several peer reviewed journals.

ryou@tarleton.edu

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