What's new in *Medical Gas Research*: Highlights for 2015

Publishing 13 papers and cited 45 times in total till June 2016, the 2015 issue of *Medical Gas Research* did its best to offer wide-range selected papers focusing on gas research that aim at improving human health. Of the six research papers, including three reviews, one study protocol and three commentary articles, an article from Wu et al. (2015) addressing the issue of nonalcoholic fatty liver disease with hydrogen sulfide (H_2S) arouses our best interest. Acting as an endogenous signaling molecule in mammals, H_2S is dysregulated at the process of disease and the protective effects of elevating H_2S level in blood and tissue are still not enough for clinical transfer. In the study by Wu et al., by employing a stable C57BL/6 mouse model undergoing different fat diets, H_2S or saline was administrated once a day for continuous 4 weeks. From the aspects of lipids accumulation and liver damage, the authors objectively represented the beneficial results of H_2S using markers from fat accumulation, including triglyceride and total cholesterol accumulation and expression of fatty acid synthase and carnitine palmitoyltransferase-1, and elevated liver oxidative products including malondialdehyde, superoxide dismutase and glutathione peroxidase levels. All these self-explanatory results demonstrated that H_2S could mitigate nonalcoholic fatty liver by improving lipid metabolism and antioxidants potential in mice. Another study by Katz et al. (2015) focused on gas pharmacokinetics of xenon and argon therapy. It is to say, pharmacokinetics models of human, rats and other mammals would be the last piece of missing puzzle before the bloom of the study of noble gas on human disease therapy. The authors offered absorption, distribution, metabolism and excretion features of these two gases and showed that there could be a residual dose of xenon in humans but not in small animals in the pre-clinical studies. Further studies are indispensable for optimizing the therapeutic amount of noble gases. Other research articles published in the 2015 issue of *Medical Gas Research* concentrated further on H_2S and also on hyperbaric oxygen and molecular hydrogen. Langston and Toombs (2015) tried to determine a minimum does and schedule sufficient to restore perfusion in the rat hindlimb. And it turns out that intravenous infusion of 0.25 mg/kg sodium sulfide twice a day for at least 7 days was efficient to significantly enhance perfusion in ischemic hindlimb. Herrera et al. (2015) explored the effects of ATB-346, a H_2S-releasing naproxen derivative, in rats with ligature-induced periodontitis. Their results provided the first evidence that the presence of H_2S-releasing moiety in the ATB-346 compound structure not only inhibits bone loss and inflammation but also prevents the occurrence of deleterious effects. Parra et al. (2015) also added their results on hyperbaric oxygen research saying that hyperbaric oxygen attenuates the severity of acute distal colitis through the down-regulation of pro-inflammatory events. A latest study in this year addressed stimulation of human damaged sperm motility using hydrogen molecule (Nakata et al., 2015). Exposure sperms from patients with hydrogen molecule and forward motility and swim speed were measured. The authors expressed the idea that hydrogen molecular stimulates low sperm motility and considered it is a novel tool for male infertility treatments.

In the review section of the journal, the most cited review stands on the beneficial biological effects and the underlying mechanisms of molecular hydrogen using comprehensive review of 321 original articles (Ichihara et al., 2015). Implied with three methods of administration including gastrointestinal absorption using hydrogen water, inhalation using hydrogen gas and intraperitoneal using hydrogen rich saline, hydrogen molecule has fabricated a net connecting 31 disease categories and even extending to plants. Desperately desired is the underlying mechanism of molecular hydrogen on these diseases. Ichihara et al. (2015) not only offered a comprehensive handbook of knowing which has been published, but also thoroughly summarized the molecular mechanism of hydrogen. Other two reviews discussed hyperbaric oxygen and normobaric hyperoxia (Weaver and Liu, 2015; Yan et al., 2015). Yan et al. (2015) summarized indication and contraindications of hyperbaric oxygen therapy (HBOT) and relevant clinical and preclinical progress, while Weaver and Liu (2015) considered normobaric oxygen a viable neuro-protective strategy for acute ischemic stroke after critically reviewing current literature.

One study protocol presented by Kurokawa et al. (2015) invented hydrogen intake devices aiming at the use of hydrogen in patients conveniently and safely providing the changes in H_2 concentration. Three commentary articles focused on different aspect of hyperbaric oxygen application. Harch (2015) refined the definition of HBOT and expanded it to gene therapy. He emphasized that comprehensively understanding HBOT as a combination of pressure and oxygen does-dependent gene therapy would illuminate controversial problem on dual effects of this method. Hu et al. (2015) tried to solve the problem on the effect of HBOT on post-concussion syndrome that remains controversial. Their best assumption goes to the process of doing the research and do believe future studies would add in more confidence

of applying HBOT on post-concussion. Stoller (2015) commented that HBOT should be employed on anyone that truly need it as soon as possible and no more interference should stand in the middle of this beneficial action.

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