We have reviewed and studied Karluss T.’s comment [1] that was written to the Editor in reference to our original research article entitled: “Exposure to dodecamethylcyclohexasiloxane (D6) affects the antioxidant response and gene expression of Procambarus clarkii” [2]. We thank you very much for the chance to respond to this comment.

In the comments, Karluss T. firstly criticized that the concentrations of 10–1000 mg/L of D6 set in our research are too high and not reasonable because the concentrations do not represent the true situation in the environment. We state that for acute ecotoxicity experiment, researchers usually set a higher concentration of pollutants. If the concentrations are set too low, we could not observe the toxic effects in such a short time (72 h). Thus, setting a higher concentrations of chemicals tested is necessary to understand the acute ecological effects in the lab experiment. It is true that D6 has a low solubility in water. However, in lab acute toxicological experiment, organic chemicals are usually dissolved in ethanol or dimethyl sulfoxide before the experiments [3], and all the treatments are compared with the control (without D6 treatment).

Further, Karluss T. insisted that D6 is not a widely distributed organic pollutant in the environment and has no problems in the ecosystem. By checking the literature, we found that silicone including D6 is an organic pollutant with higher contents in some typical environment due to its wide use in industry. For instance, Liu et al. [4] reported the hazard quotients of cyclic methylsiloxanes in river and sea sediments. Some authors assessed the bioaccumulation factor (BAF) of methylsiloxanes in fishes in the food web [5–8], and found that the methylsiloxanes have existed in the blood plasma of turtles, cormorants, and seals from Canadian freshwater and marine ecosystems; the absorptions of D6 in males and females rates are 11.9% and 11.8% respectively, and in rats, the LC50-value exposed to D6 is >50,000 mg/kg bw.

Behavioral and pulmonary effects have been reported as animal toxicity (ChemIDplus Advanced) [9]. Since the high concentrations of D6 are evident in the industrial area, the adverse effect of siloxanes is reported for animals and humans, and the bioaccumulation of cyclic methylsiloxanes is evaluated in the aquatic marine food webs [10,11]. However, in the some local water ecosystem, D6 shows negligible ecological risks [12]. Moreover, according to Zhang et al. [13] who measured the concentrations in surface waters, sediments, and soils, cVMS (D4–D6) poses low environmental risks to aquatic, sediment-dwelling, and terrestrial organisms (without any environmental risk).

Based on the above research, and since cyclic methylsiloxanes have been found in surface water, soil, sediment, and vertebrate and invertebrate species, we believe it is...
necessary to evaluate the ecotoxicology of D6 by checking the stressed activities of enzymes and non-enzymes, as well as the related gene expression in crayfish experiment in the lab.

Finally, Karluss T. commented that our test aquaria was crowded and lacked cover; thus, he argued that the stress on crayfish was not from D6 but from our test system itself. The black box size used was 47.0 cm × 34.0 cm × 15.5 cm and each box had six adult crayfish. In fact, the box had a cover to prevent the escape of crayfish and was big enough for these specimens (the picture omitted). We speculate whether the commenter knows that there was no cover in our test aquaria.

Many evidences show that D6 exhibits ecotoxicity in the environment, and more and more countries begin to limit its use, e.g., in China. Many studies have reported the impact of polysiloxanes on the human and animal organism. We also recommend that the use of different types of polysiloxanes or silicones should be continuously monitored.

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