

Organic and Biomolecular Chemistry 2014 vol.12 N28, pages 5151-5157

Polyamine modification by acrolein exclusively produces 1,5-diazacyclooctanes: A previously unrecognized mechanism for acrolein-mediated oxidative stress

Tsutsui A., Imamaki R., Kitazume S., Hanashima S., Yamaguchi Y., Kaneda M., Oishi S., Fujii N., Kurbangalieva A., Taniguchi N., Tanaka K.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Acrolein, a toxic unsaturated aldehyde generated as a result of oxidative stress, readily reacts with a variety of nucleophilic biomolecules. Polyamines, which produced acrolein in the presence of amine oxidase, were then found to react with acrolein to produce 1,5-diazacyclooctane, a previously unrecognized but significant downstream product of oxidative stress. Although diazacyclooctane formation effectively neutralized acrolein toxicity, the diazacyclooctane hydrogel produced through a sequential diazacyclooctane polymerization reaction was highly cytotoxic. This study suggests that diazacyclooctane formation is involved in the mechanism underlying acrolein-mediated oxidative stress. © 2014 the Partner Organisations.

<http://dx.doi.org/10.1039/c4ob00761a>
