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Biological implications of 2-chlorocyclohexa-2,5-diene-1,4-dione toward ribonuclease A

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ABSTRACT

2-Chlorocyclohexa-2,5-diene-1,4-dione (CBQ) or 2-chloro1,4-benzquinone is one of the common metabolites of polycyclic aromatic hydrocarbons generated through industrial processes. This report describes the biological effects of CBQ toward ribonuclease A (RNase). We also investigated the inhibition of RNase modifications and the reactivity of CBQ toward selected amino acids. The study was carried out by incubating RNase or amino acids with CBQ in a concentration- and a time-dependent manner at 37?C and pH 7.0. SDS-PAGE results showed oligomerization as well as polymeric aggregation of RNase when incubated with CBQ as early as in 10 min. CBQ-induced RNase modifications were inhibited in the presence of NADH or ascorbic acid. CBQ reactivity toward selected amino acids was also evaluated by determining the second-order rate constants for the reactions of CBQ with selected amino acids. It was found that the reactivity toward CBQ decreased in the order of lysine > threonine > serine >> aspartate > cysteine.

KEYWORDS

Chlorobenzoquinone; PAH; Protein Modification; Ribonuclease A

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