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Lanthanum chloride-induced conformational changes of bovine liver catalase: A computational and biophysical study

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Abstract

We have investigated the effects of lanthanum chloride (LaCl_3) on catalytic activity and conformation of bovine liver catalase (BLC) in different buffer solutions *in vitro* at 25°C. Higher concentration of the salt caused decrease in catalase activity in the following order, HEPES>MOPS>Tris > Phosphate buffer. Results obtained from circular dichroism, fluorescence and absorption spectroscopy and from computational docking studies indicate that reduction in activity of BLC by LaCl_3 is due to induction of conformational changes. Lanthanum-induced reduced BLC activity in MOPS, HEPES and Tris buffer is characterized by a significant loss in native fluorescence and increase in absorbance spectra of BLC. Nevertheless, the change in secondary conformation of BLC was maximum in HEPES and MOPS followed by Tris and least in Phosphate buffer. Therefore, the significant loss of BLC activity in phosphate buffer at higher molar concentration of lanthanum is attributed to the change in buffering capacity of the buffer. The conformational transition of BLC by LaCl_3 was followed as a function of concentration. Therefore, the reduced BLC activity is directly controlled by lanthanum-induced conformational change of BLC in HEPES, MOPS and Tris buffer and indirectly controlled by the change in buffering capacity of the phosphate buffer.

Key words: Catalase, Enzyme, Lanthanum, Rare earth elements, Buffer

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