

Effect of Nitric Oxide on Protein Thermal Stability

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Abstract.

Nitric oxide (NO) is one of the most important signal molecules in living cells. Before it had been considered as an atmospheric pollutant and bacterial metabolite, and recently a huge discover of NO role in physiological process occur, making it the target of many studies. It appears that a simple molecule like NO can play a key bio-regulatory function in a number of physiological processes.

Some of these processes are still unknown, in such a way the interaction of NO in RBC's is vital to clarify the metabolic fate of NO in vascular systems ^[1], and this leads to another goal, in which the related effect of NO on hemoglobin (Hb) and other proteins may leads to the explanation of the controversial issues surrounding NO.

Since the unique native structure of most proteins is a basic requirement for proper functioning, the ability to build and keep this native and functional structure needs a particular range of temperature ^[2]. Therefore, temperature variation was applied on the protein in the presence and absence of NO to study their both effect on protein structural stability and hydration. After that, another parameter was considered, which include the usage of different ions to study their effects on proteins structural stability and hydration.

Specific NO donors were accustom and various proteins were used in this investigation such as hemoglobin (Hb), Bovine Serum Albumin (BSA) and myoglobin which were prepared either in, Phosphate Buffer Saline (PBS, sodium based), or in Circular Dichrosim buffer (CD, potassium based).

A numerous technique was employed to characterize the structural and dynamical properties of proteins, such a technique was the Quasielastic Light Scattering (Dynamic Light Scattering). It is an optical method used for the determination of hydrodynamic radius and

translational diffusion of protein particles that undergo Brownian motion.

Around 60 experiments were performed using different proteins; some of these results are shown in Fig.1, in which the effect of nitric oxide, different ions and temperature variation was examined.

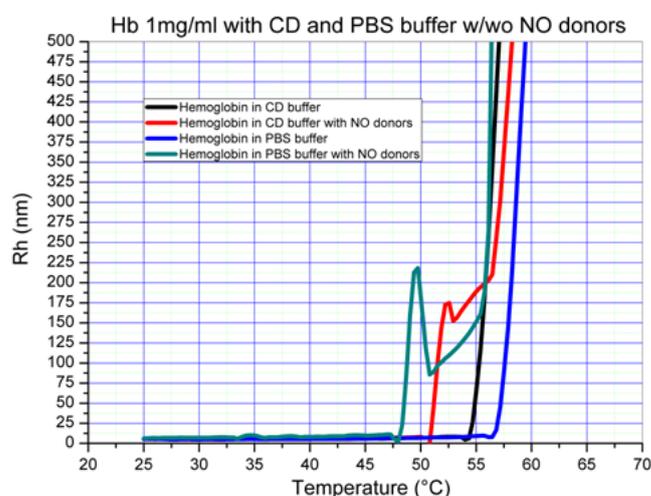


Fig. 1 Effect of NO and different ions on Hemoglobin.

Therefore, as a deduction from these results, we can conclude that proteins mainly in vitro, denature totally at a temperature between 57°C - 62°C, and they also affected by NO and different ions types. In which mainly, NO cause earlier protein denaturation, which means that, NO has a destabilizing effect on proteins, and also different ions will alter the protein denaturation in which, some ions will cause earlier protein denaturation while others not.

References.

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