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Influence of transition metals on stability of various s-nitrosothiols

Anatoly F. Vanin, Bernard Muller, Jacicarlos L. Alencar, Irina I. Lobysheva, Francoise Nepveu, Jean-Claude Stoclet

The analysis of the destroying action of copper and iron ions on S-nitrosocysteine (cys-NO) demonstrated that the amount of intrinsic copper in the solutions was too low (.0.2 μM) to produce a destabilizing effect on cys-NO. Only admixtured iron present in the solutions at the concentrations of about 1-2 μM was responsible for the process of cys-NO degradation, which occured through the formation of dinitrosyl iron complexes (DNIC) resulting in free NO liberation. The conclusion was drawn from demonstration of the capacity of copper/iron chelator, bathophenantroline disulfonic acid to selectively block the destructive effect of iron, but not of copper ions on cys-NO. Similar results were obtained in relation with the influence of intrinsic copper/iron on vasorelaxant properties of cys-NO on isolated rat aorta. By contrast, the concentrations of both intrinsic copper and iron ions in the solutions were proved to be not large enough to initiate the decomposition of S-nitrosoglutathione. The process was initiated when copper/iron ions were added to the solution at the concentration of 100 μM in the presence of reducing agents, ascorbate or GSH. S-dinitrosodithiotreitol (DTT-2NO) was decomposed spontaneously without any effect of intrinsic copper/iron ions in the solution. Nevertheless, the addition of copper/iron (20 μM) in the presence of ascorbate (1 mM) also accelerated the process of DTT-2NO decomposition. Such type of enhancing effect of copper/iron ions was suggested to be characteristics of enzymatic manner of RS-NO decomposition. The process of GS-NO or DTT-2NO decomposition catalyzed by iron ions (100μM) in the presence of GSH or DTT was associated with formation of DNIC with GSH or DNIC with DTT, respectively. These results allow to propose that the process of GS-NO and DTT-2NO decomposition catalyzed by iron ions proceeded, as with cys-NO, through the formation of DNIC. The subsequent decomposition of DNIC ensures appearence of free NO molecules in the solution.