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Preventive Role of Antioxidants towards Drug induced Methemoglobinemia

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Methemoglobinemia is a hematological disorder in which there is an excess amount of hemoglobin containing iron in Fe3+ state, known as methemoglobin. Methemoglobin is more capable of binding to oxygen resulting in reduced oxygen release to tissues. Administration of low doses of nitrates over prolonged periods may lead to chronic methemoglobinemia [1]. Nowadays the therapeutic uses of natural products are well considered for the treatment of various diseases. Previous reports have shown that natural products like curcumin, vitamin E, vitamin C, etc., are capable to inhibit the nitrite induced methemoglobin formation [2]. Hence in this study we aimed to investigate the preventive role of polyphenols present in our diet, like caffeine and catechin hydrate which are commonly found in coffee and tea. Our study revealed that pretreatment with caffeine inhibited nitrite induced oxidation of hemoglobin to methemoglobin to some extent whereas it's one major metabolite, 1-methyluric acid, exhibited better efficiency at physiological concentration. On the contrary, catechin hydrate enhanced the rate of methemoglobin formation at higher concentration.

Again, some selenium containing drugs are reported to exhibit potential anticancer effect. However, these anticancer drugs may exert adverse effects when used over a prolonged period. But little is known about the interaction of these selenium containing drugs with vital erythroite protein like hemoglobin. We found that selenium containing drugs like selenomethionine, selenocystine, methylseleninic acid and selenourea have toxic roles to induce methemoglobinemia. Hence our target is to find out whether antioxidants like vitamin C, caffeine and its metabolite can prevent the oxidation of hemoglobin induced by these selenium containing drugs. A comparative study of the antioxidants towards the prevention of methemoglobinemia has been performed using different spectroscopic techniques.

Biography:

Debashree Das has completed B.Sc and M.Sc in Chemistry in 2008 and 2010 respectively. She obtained her PhD from Saha Institute of Nuclear Physics (SINP) in 2017 under Prof. Abhijit Chakrabarti. Title of her thesis is "Spectrin and membrane interactions of heme and heme proteins". After PhD she carried out her postdoctoral research funded by DST SERB in University of Hyderabad on "Ligand binding and chaperone like activities of seminal plasma proteins" for 2 years (2016 August-2018 August). Presently she is doing her second postdoctoral work funded by DSKPDF, UGC in University of Calcutta from August 2018.