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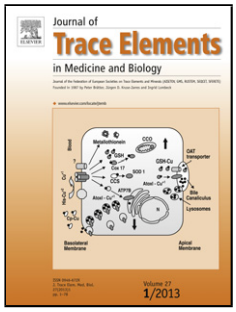

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Analysis of potassium iodate reduction in tissue homogenates using high performance liquid chromatography-inductively coupled plasma-mass spectrometry

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Abbreviations: KIO_3, potassium iodide; KI, iodide; IO_3^-, iodate; I^-, iodide; HPLC-ICP-MS, high performance liquid chromatography coupled to inductively coupled plasma mass spectrometry; TAA, total antioxidative activity; NADPH, reduced nicotinamide adenine dinucleotide phosphate.

Abstract

Potassium iodate (KIO_3) and potassium iodide (KI) are the major salt iodization agents used worldwide. Unlike iodide (I^-), iodate (IO_3^-) should be reduced to I^- before it can be effectively used by the thyroid. In this study, we developed a new method for analyzing IO_3^- and I^- in tissue homogenates using high performance liquid chromatography coupled to inductively coupled plasma mass spectrometry (HPLC-ICP-MS). We further applied the method to demonstrate the KIO_3 reduction process by tissues *in vitro*. The effects of KIO_3 on the total antioxidative activity (TAA) and reduced nicotinamide adenine dinucleotide phosphate (NADPH) were also investigated here. Finally, we found that IO_3^- can be reduced to I^- by tissue homogenates and IO_3^- irreversibly decreases the antioxidant capability of tissues. Our studies suggest that KIO_3 might have a big effect on the redox balance of tissue and would further result in oxidative stress of organisms.

Introduction

Iodine is an essential micronutrient that plays an important role in human growth and metabolism. In many countries, iodine deficiency in the population is a public health problem, particularly for pregnant women and young children [1-4]. Universal salt iodization (USI) is an effective solution to this public health issue. KIO_3 and KI are currently the major salt iodization agents. However, until now the safety of KIO_3 to humans has not been completely documented [2, 5]. KIO_3 differs from KI in its chemical properties. KIO_3 reveals oxidizing properties whereas KI is neutral. IO_3^- should be reduced to I^- before it can be effectively used by our body. Some studies have demonstrated that KIO_3 inhibits the growth of