

螺旋藻转化纳米元素硒的制备及其体外清除自由基活性的初步研究

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摘要:

研究利用高密度富硒螺旋藻(Se-SP)细胞通过生物转化制备纳米元素硒(Nano-Se)的可行性,观察Nano-Se在体外对氧自由基的清除作用。用梯度离心分选Nano-Se,原子力显微镜(AFM)、透射电镜(TEM)及X-射线能谱(EDX)联用表征纳米粒中的元素硒形态,电感耦合等离子质谱仪(ICP-MS)测定Nano-Se中的硒含量,化学发光方法检测Nano-Se在体外对超氧自由基和羟自由基的清除作用。结果发现,Nano-Se主要由元素硒构成,形态呈球形,73%的纳米粒子直径大小分布在(61±17)nm范围。Nano-Se在体外对两种氧自由基的最大清除率分别为:30.1%和27.6%,相应的EC50分别为:0.8 μg/ml和2.2 μg/ml。相同剂量时,Nano-Se对氧自由基的清除作用比硒代蛋氨酸(Se-Met)及Se-SP中其它含硒活性成分更强。结果提示,利用高密度Se-SP可诱导Nano-Se的大量生成,Se-SP转化的Nano-Se可能是一种新的抗氧化硒形态,其作用机制和体内生物活性有待深入研究。

关键词: 纳米元素硒 螺旋藻 自由基

Nano Elemental Selenium Bio-transformed from *S. platensis* and Scavenging Activity on Oxygen Free Radicals *in vitro*

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Abstract:

Preparation of Nano elemental selenium (Nano-Se) bio-transformed from Se enriched *S. platensis* (Se-SP) and scavenging activity on oxygen free radicals was investigated. Nano-Se was harvested from high cells density cultures of Se-SP with total Se supplementation of 600 μg/ml in form of sodium selenite. The shape and size of Nano-Se was characterized by atomic force microscope (AFM), transmission electron microscope (TEM) and energy-dispersive X-ray (EDX). Se contents were detected by inductively coupled plasma mass spectrometry (ICP-MS). The scavenging activities of Nano-Se on superoxide anions and hydroxyl radicals were detected by chemiluminescence method. The data showed that the bio-transformed Nano-Se was constructed mainly by elemental Se. A 73% fraction of Nano-Se was collected by gradient centrifugation, in which it was spherical in shape and uniform in size with average diameter of (61±17)nm. In vitro maximum scavenging rates of Nano-Se on superoxide anions and hydroxyl radicals were 30.1% and 27.6%, and the correspondence EC50 were 0.8 and 2.2 μg/ml, respectively. The scavenging activities of Nano-Se on oxygen free radicals were much higher than that of selenomethionine and other Se containing compounds isolated from Se-SP at the same dosages. In conclusion, present results suggested that Nano-Se produced by high cells density cultures of Se-SP is a novel Se species with anti-oxidative activity in vitro.

Keywords: Nano elemental selenium (Nano-Se) *Spirulina platensis* Free radical

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