Available online at www.sciencedirect.com
SCIENCE DIRECT®
Journal of Pharmaceutical and Biomedical Analysis
32 (2003) 1029–1036
JOURNAL OF PHARMACEUTICAL AND BIOMEDICAL ANALYSIS
www.elsevier.com/locate/jpba

Specific spectrophotometric method with trifluoroacetic acid for the determination of selenium(IV) in selenitetriglycerides

P. Suchocki [a,b,*], D. Jakoniuk [a], B.A. Fitak [a]

[a] *Department of Drugs Analysis, Warsaw Medical University, 1 Banacha Str., 02-097 Warsaw, Poland*
[b] *Department of Pharmaceutical Chemistry, Drug Institute, 30/34 Chelmska Str., 00-725 Warsaw, Poland*

Received 24 April 2002; received in revised form 28 February 2003; accepted 3 March 2003

Abstract

The role of selenium as an antioxidant and anticancer agent is very well documented in the literature. Selenium compound showing the highest activity as a free radicals scavenger and as an anticancer agent should contain selenium at +4 oxidation level. The synthesis of selenitetriglycerides (named selol) was carried out in the Department of Drug Analysis at Warsaw Medical University (Polish Patent 1999). Selenitetriglycerides showed a dimeric structure. In a single dose toxicity studies performed in rats, LD50 was 100 mg Se kg^{-1} after oral administration of selol. The subcutaneous and intraperitoneal administration of selol showed extremely low toxicity. The aim of this work was to develop a new specific method for the determination of Se(IV) in selol. We stated that selenitetriglycerides react quantitatively with trifluoroacetic acid (TFA) in dichloromethane giving a red-coloured conjugate. However, recorded spectrum showed the maximum absorption in the wavelength 380 nm. The optimal conditions of the reaction were established, namely temperature 35 °C and reaction time 35 min. The reaction was proved to be specific because neither selenites nor other selol constituents react with TFA. The constructed calibration curve obeyed the Lambert–Beer law in the range of 0.1–7.4 mg ml^{-1}. Molar absorption coefficient is $\varepsilon = 9.46 \times 10^3$ l mol^{-1} cm^{-1} and $\varepsilon = 2.36 \times 10^5$ l mol^{-1} cm^{-1} calculated for selenium and selenitetriglyceride dimer (m.w. 1972.72), respectively. Obtained results for selenium determination were confirmed by AAS method. The developed method showed specificity and high sensitivity.

Keywords: Selenium; Selol; Selenitetriglycerides; Selenitetriglycerides analysis

1. Introduction

Selenium is an essential trace element for animals and humans. Its biological role was established following the discovery that selenium is a structural component of the active centre of many enzymes. Selenium is present as selenocysteine (Se-Cys) in at least 30 proteins, for example: glutathione peroxidase, selenoprotein P, selenoprotein W, type 1 iodothyronine deiodinase [1–4]. Selenium is regarded to be important for metabolic protection from oxidative stress, especially in diseases of the heart muscle and can also be important in protection against cancer [5–7]. Despite evident progress in cancer diagnosis and

* Corresponding author. Fax: +48-225-72-0735.
E-mail address: suchoc@amwaw.edu.pl (P. Suchocki).

0731-7085/03/$ - see front matter
doi:10.1016/S0731-7085(03)00205-X