International Association of Scientific Innovation and Research (IASIR)
(An Association Unifying the Sciences, Engineering, and Applied Research)

ISSN (Print): 2279-0047
ISSN (Online): 2279-0055

International Journal of Emerging Technologies in Computational and Applied Sciences(IJETCAS)

www.iasir.net

Measurement of Uric Acid Level In Vivo by Reverse Iontophoresis

Nasrul Wathoni, Alya Nur Hasanah, Anandhita Utami
Faculty of Pharmacy, Universitas Padjadjaran, Bandung, West Java, Indonesia

Abstract: *The routine method of the blood sampling for measuring uric acid level is achieved by using a syringe which is an invasive method. Reverse iontophoresis is an alternative non-invasive method for sampling of uric acid in the blood. The aim of the present work was to determine the effectiveness of reverse iontophoresis method on measurement of uric acid level in rat. The research was conducted by using an in vivo modified diffusion cell and wistar strain male rats. The reverse iontophoresis method was used 0,5 mA/cm2 current density with a modified iontophoresis device. The average uric acid levels after diffusion testing for 6 hours was 1.73 ppm, while in the blood were 63.8 ppm. The coefficient correlation between the levels of uric acid in the blood and the levels of uric acid in the receptor fluid was 0.5215. In the previous study, the in vitro study indicated that uric acid had been successfully extracted through the abdominal skin of rat to a collection solution of modified diffusion cell as much as 7.35 ppm. In conclusion, in vitro and in vivo studies showed the possibility to describe the levels of uric acid from interstitial fluid with reverse iotophoresis method.*

Keywords:*uric acid, reverse iontophoresis, in vivo, invasive, rats*

I. Introduction

Gout is the most common inflammatory arthritis in the elderly population.[1]Closely associated with a metabolic disorder of uric acid in the body that can cause abnormal uric acid levels in the blood. The condition is known as hyperuricemia. It may exist for several years to decades before the first symptoms of gout attacks appear, therefore, the disease associated and correlated with aging.[2]

In general, method to determine blood uric acid level is achieved by blood sampling. However, this method is invasive, painful, and inconvenient. Reverse iontophoresis can be used as alternative method that is non-invasive to determine the blood uric acid level.[3] Reverse iontophoresis refers to the passage of a low level of current through the skin to promote the transport of both charged and neutral molecules.[4] The main mechanisms that contribute to Reverse iontophoresis are the electromigration of charged species to the electrode of opposite polarity, electroosmosis of neutral molecules to the cathode or anode, or a combination of both.[5]

The purpose of this study was to determine the effectiveness of reverse iontophoresis method on determination of uric acid level in vivo in rat.

II. Materials and Methods:

A. *Materials*

Ammonium acetate (Merck), aquabidest (IPHA), uric acid (Sigma Aldrich), phosphoric acid 85% (Merck), acetonitrile pro HPLC (JT beaker), Disodium Edetas (Merck), pure Ag wire (PT. Antam, Tbk), Platinum/Pt wire (PT. Antam, Tbk), KCl (Merck), methanol pro HPLC (JTbeaker), sodium Hydroxide (Merck), blood plasma (PMI Bandung), monobasic sodium phosphate (Merck), and wistar strain male rats (PAU ITB).

B. *Equipment*

A modified diffusion cell, modified Iontophoresis devices, 99.95% pure silver wire 1 mm diameter, 99.95% pure platinum wire, pH-metre (Metroohm Type 774), spectrophotometer UV-Vis (Specord Analytic Jena 200-222U179) membrane millipore 0,45 µm, vortex; centrifugation apparatus (Hettich); HPLC instrument Shimadzu (Liquid Chromatograph LC-6A, Auto Injector SIL-9A, UV Spectrophotometric Detector SPD-6A, Chromatopac CR 501) ; Waters Spherisorb S5 C18 (250x4.6 mm SS, Waters USA); Sonicator Branson 5200

C. *Preparation of modified diffusion cell*

The diffusion cell for in vivo studies was adopted and modified from Chih-Kuei et al(2010) as described in figure 1.[3]