Mapping of polar fox renal cortex proteins using two-dimensional gel electrophoresis and mass spectrometry – a preliminary study

A.K. Ciechanowicz¹, M. Ożgo¹, Ł.R. Stański¹, A. Herosimczyk¹, A. Piotrowska², R. Szymeczko², M. Laszczyńska³, W.F. Skrzypczak¹

¹ Department of Physiology, Cytobiology and Proteomics, Faculty of Biotechnology and Animal Husbandry, West Pomeranian University of Technology Szczecin, Dr Judyma 6, 71-466 Szczecin, Poland
² Department of Animal Physiology, Faculty of Animal Breeding and Biology University of Technology and Life Sciences, Mazowiecka 28, 85-084 Bydgoszcz, Poland,
³ Laboratory of Histology and Developmental Biology, Pomeranian Medical University, Zolnierska 48, 71-210 Szczecin, Poland

Abstract

The aim of the present study was to establish protein map of polar fox (Alopex lagopus) renal cortex. Kidney cortex proteins of isoelectric point ranging from 3 to 10 were analysed using two-dimensional electrophoresis and MALDI-TOF mass spectrometry. Sixteen protein spots corresponding to thirteen different gene products were identified. These proteins were divided into following groups: lipid and fatty acid metabolism, amino acid metabolism, energetic pathways, regulatory proteins, transport proteins and structural proteins. This is the first attempt to create reproducible 2-D map, of renal cortex proteins characteristic for polar foxes, used as animal model for carnivores. It is worth emphasizing that the results of this study may broaden currently available protein databases.

Key words: polar fox, kidney, cortex, proteome, two-dimensional electrophoresis, mass spectrometry

Introduction

The kidneys are paired organs that play a key role in the maintenance of a stable internal environment with regard to the system volume and composition of the body fluids. The complex renal functions are carried out by the basic morphological and functional unit – nephron, which consists of several specialized types of cells. Functional specialization along the nephron cells is reflected in specific gene and protein expression in different structural renal regions. Filtration takes place in the glomerulus within the renal cortex and is subsequently followed by intense absorption of ultrafiltrate components (glucose, amino acids, water and electrolytes) along the renal proximal tubule. Moreover, hormones responsible for modulating blood pressure, haemopoiesis and calcium homeostasis are produced by the renal cortex. Renal medulla is responsible for urine concentration, mainly due to high osmolality of the surrounding environment. That environ-