Effects of L-carnitine on morphology and cellular parameters of hen erythrocytes

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Abstract

The aim of our study was to determine the influence of L-carnitine (L-CAR) on the cellular parameters of hen erythrocytes during a 48 hour exposure to L-CAR at concentrations of 25, 50 and 100 µg/mL in nutrient-deficient medium. Cell morphology, haemolysis, caspase 3/7 activity and glucose uptake (GU) were determined. The results showed a lower percentage of apoptotic cells and decreased haemolysis of erythrocytes treated for 48 hours at all the concentrations of L-CAR. The amino acid at 50 µg/mL inhibited the activity of proapoptotic caspase 3/7; however, it increased GU. In contrast, caspase 3/7 level was increased but GU was decreased in erythrocytes treated with 100 µg/mL of L-CAR when compared to the control. It may be hypothesized that reduction of apoptotic changes in hen erythrocytes may result from increased GU.

Key words: L-carnitine, erythrocyte morphology, caspase 3/7, hemolysis, apoptosis

Introduction

L-carnitine (L-CAR) (β-hydroxy-γ-trimethylammonium butyrate) is an amino acid synthesized by microorganisms, plants and animals (Bremer 1983). Little is known about the protective effects of L-CAR on the morphology and cytophysiological parameters of avian erythrocytes in nutritional deficiencies. The purpose of our study was to determine the influence of L-CAR on the morphology, hemolysis, caspase 3/7 activity and glucose uptake in hen erythrocytes incubated in nutrient-deprived culture medium.

Materials and Methods

L-carnitine hydrochloride (L-CAR; ≥ 98% purity; Sigma-Aldrich, Germany), was diluted in RPMI 1640 to make three concentrations: 25, 50 and 100 µg/mL. Blood was taken from 10 green-legged partridge hens (Gallus gallus domesticus) from the wing vein. Erythrocyte suspension (10 replicates) in RPMI 1640 with 120 U penicillin (Polfa Tarchomin, Poland) without L-glutamine or HEPES and without FBS-Foetal Bovine Serum) was exposed to the appropriate concentrations of L-CAR for 48 hours at 41.2°C. After incubation erythrocyte hemolysis was determined using the spectrophotometric method and cell morphology was