SESSION 4:

PROTEIN METABOLISM

Communication no. 27

3-Hydroxy-3-methylbutyrate affects muscle cathepsin D and calpain activities in rats during the post-dexamethasone recovery period. M. Jank[a], S. Rosochacki[b], J. Wilczak[b], B. Balasinska[b], P. Ostaszewski[b] ([a] Department of Animal Physiology, Veterinary Faculty, Warsaw Agricultural University, Nowoursynowska 166, 02-787 Warsaw, Poland; [b] Institute of Genetics and Animal Breeding, Polish Academy of Sciences, Jastrzebiec, 05-551 Mroków, Poland)

Stress of any type (surgery, trauma, sepsis) is associated with metabolic changes resulting in an increase in proteolysis. During stress the level of glucocorticoids is always high. These hormones inhibit protein synthesis but their action on proteolysis is less clear. Our first objective was to study the roles of calpains and cathepsines in mediating the action of glucocorticoids in skeletal muscle. Accordingly, we investigated the action of synthetic glucocorticoid (Dexamethasone – DEX) on two enzymes of muscle protein degradation: calpain II and cathepsin D. Our main objective was to assess the modulatory effect of 3-hydroxy-3-methylbutyrate (HMB) on the post-dexamethasone recovery period since some observations in humans indicate that HMB decreases muscle protein breakdown in situations of elevated muscle proteolysis (Nissen et al., J. Appl. Physiol. 81 (1996) 2095–2104).

The experiment was performed on Sprague-Dawley rats divided into four groups: C – control pair fed, D – 5 days DEX treatment, Drec – 5 days DEX followed by 5 days recovery, DHMB – 5 days DEX followed by 5 days HMB treatment. DEX and HMB were administrated by an intragastric tube. After an overnight fast, general anesthesia with diethyl ether was given and a sample of quadriceps femoral muscle was excised and stored in liquid nitrogen. Blood samples were also collected. Calpain activity, principally calpain II, was determined after the isoelectric precipitation separation of enzymes and inhibitors. Cathepsin D and acid activity with or without specific inhibitors, leupeptin and pepstatin were also determined.

Five day DEX administration resulted in an increase in calpain activity ($P < 0.05$) in group D. After a 5-day recovery, calpain activity significantly decreased ($P < 0.01$) in the group fed HMB (DHMB) and this value dropped to around 50 % of the control value. DEX treatment did not significantly change cathepsin D activity (group D). During post-DEX recovery, cathepsin activity increased in the group not treated with HMB (DRec; $P < 0.01$), whereas HMB administration activity decreased. In conclusion, lysosomal- and Ca-dependent proteinases involved in intracellular protein degradation differ in their activity following DEX treatment. HMB modulates the post-dexamethasone recovery period.

Communication no. 28

Growth hormone and milk protein gene polymorphism in relation to the levels of some hormones, enzymes and metabolites in growing dairy cattle. J. Oprzadek, L. Zwierzchowski, M. Lukaszewicz, E. Dymnicki, Z. Reklewski, R. Grochowska (Institute of Genetics and Animal Breeding, Polish Academy of Science, Jastrzebiec, 05-551 Mroków, Poland)

Two-hundred-and-sixty-two progenies of both sexes, sired by 31 AI Polish Friesian bulls were genotyped for growth hormone (GH), κ-casein (CASK) and β-lactoglobulin (BLG) gene variants. The levels of thyroxine (T_4), triiodothyronine (T_3), insulin (IRI),