of UCB-MSCs, and the combination therapy of UCB-MSCs and PRP improves regeneration efficacy of radiation-trauma complex injury via enhancing angiogenesis.

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P-140

4-Hydroxycinnamic acid protects mice from cigarette smoke-induced pulmonary inflammation via MAPK pathways

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Introduction: Cigarette smoke (CS) is the main etiological cause of chronic obstructive pulmonary disease, the prevalence of which has continuously increased in recent years. 4-Hydroxycinnamic acid (HA) is a plant phenolic acid that has anti-inflammatory activities. In this study, we explored the therapeutic effects of HA on airway inflammation caused by CS and lipopolysaccharide (LPS) in mice.

Materials and Methods: The animals received 1 h of CS exposure for 7 days and intranasal instillation of LPS on day 4. HA (10 and 20 mg/kg) was administered to animals via oral gavage 1 h before CS exposure.

Results: HA treatment significantly decreased the accumulation of inflammatory cells and production of cytokines, including tumornecrosis factor-α, interleukin (IL)-6, and IL-1β, caused by CS and LPS exposure. After histological examination, we observed that HA treatment significantly reduced the infiltration of inflammatory cells into lung tissue caused by CS and LPS exposure. Furthermore, HA-treated groups showed significantly decreased phosphorylation of extracellular signal-regulated kinase, c-Jun N-terminal kinase, p38, and nuclear factor-κB, and activity of cytochrome c oxidase subunit-2 caused by CS and LPS.

Conclusions: In conclusion, HA effectively suppresses the airway inflammatory response induced by CS and LPS exposure, and is closely associated with the downregulation of mitogen-activated protein kinases signaling.

P-141

Effects of exhaustive swimming on magnesium redistribution and transporters

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Introduction: Magnesium (Mg) plays a central rolein energy production, neuronal activity, cardiacexcitability, neuromuscular transmission, muscular contraction,vasomotor tone, and blood pressure, all of which aresignificantly related to physical performance. Blood Mg levels have been shown to increase during exhaustiveswimming exercise. However, Mg redistribution and transporter expression duringthe exercise remains to be determined.

Materials and Methods: The maleSprague-Dawley rats (n=20, 220-250 g) were subjected to 30 min forced swimmingexercise until exhaustion. Afterswimming, inductively coupled plasma-mass spectrometry was applicable to the determinationof Mg in serum, red blood cell (RBC), quadriceps muscle, heart, kidney, liver,lung and brain. The levels of glycogen, adenosine triphosphate (ATP), hexokinase (HE), citrate synthase (CS), malondialdehyde (MDA) and superoxidedismutase (SOD) in quadriceps muscle were measured by spectrophotometry. Also,the Transient receptor potential melastatin-7 (TRPM7) channels and solutecarrier family 41 member A1 (SLC41A1) gene expressions were measured byreal-time PCR.

Results: After exercise, Mg in serum, heart, kidney, liver, lungand brain were increased, while Mg in RBC and quadriceps muscle were decreased. Also, HK, CS, MDA and SOD in quadriceps muscle wereincreased, but glycogen and ATP in the muscle were decreased. The geneexpression levels of TRPM, the Mg influx as aMg channel, were not changed but the levels of SLC42A1, the Mg efflux as a Na^+/Mg^{2+}exchanger, were upregulated.

Conclusions: These results suggested that the exhaustiveswimming exercise could produce Mgredistribution from quadriceps muscle to serum of circulatory system. Thedecreased Mg levels in quadricepsmuscle were related to the increased metabolic demands andthe stimulation of Mg efflux.

P-142

Anti-fatigueactivities of Korean Red Ginseng and Antler Velvet response to exhaustiveswimming exercise

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Introduction: Despite herbal medicine have been used throughouthistory to enhance physical performance, improve recovery, maintain health andreduce fatigue during intense periods of exercise, they have seldom been studiedscientifically as a possible aid to physical performance. This study wascarried out to investigate whether Korean Red Ginseng (KRG) or Antler Velvet hasanti-fatigue activities response to exhaustive exercise and the underlyingmechanism.

Materials and Methods: During4 weeks, distilled water (DW), KRG (0.5, 1 and 2X, 1X equal to human equivalentdose as 3 g/60 kg) or Antler water extract (AWE, 0.5, 1 and 2X, 1X equal tohuman equivalent dose as 2 g/60 kg) were administrated by oral gavage toSprague Dawley rats. After acute exhausted swimming, blood pH, ions, gasescompositions, metabolites, enzymes and antioxidant activities were measured.

Results: Theswimming times to exhaustion and forelimb grip forcesof rats administeredwith KRG or AWE were longer and stronger than exercise control rats. The ergogenic effectswere not dose-dependent, but administration of 1X showed the greatest effects. The treatment of KRG or AWE inhibited the exercise-induced reduction in bloodglucose, pH and partial pressure of oxygen and inhibited the exercise-inducedelevation in blood lactate, Mg^{2+}, K^{+}, serum creatinine, uricacid, total cholesterol, urea nitrogen, creatine kinase, lactate dehydrogenase,alanine aminotransferase, aspartate aminotransferase, and alkaline phosphatase.The level of blood superoxide dismutase and glutathione were all up-regulatedby the treatments, accompanied by reductions in the level of malondialdehyde.

Conclusions: KRG or AWE has anti-fatigue activities andergogenic effects mediated through changes in blood ions, gases, energymetabolism and antioxidant actions. The effects showed the greatest in 1X equal to human equivalentdose.

P-143

Glucocorticoid induced calcium-related genes expression reduces mouse pulmonary mucin secretion

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Introduction: Calcium is important for physiological functioning in many tissues and is essential in mucus secretion and muscle contraction. Intracellular concentrations of calcium are regulated by calcium-related proteins such as TRPV4, TRPV6, CaBP-9k, NCX1, and PMCA1. In this study, the relationship between secretion of pulmonary mucus and calcium regulation was investigated.

Materials and Methods: To confirm the effect of steroid hormones, immature mice were injected with estrogen (E2) or progesterone (P4) and mature mice were injected with dexamethasone (DEX). Subsequently, the location and expression of TRPV4, TRPV6, CaBP-9k, NCX1, and PMCA1 in lung tissue were examined. PAS staining was performed to investigate functional aspects of the protein expressions.

Results: There were no significant differences in calcium-related gene expressions in E2- and P4-treated mice, but TRPV4, NCX1, and PMCA1 were increased in DEX-treated mice and were recovered by RU486 treatment. This regulation is via the glucocorticoid receptor and is involved in the mucus secretion in the lung. TRPV4, TRPV6, CaBP-9k, NCX1, and PMCA1 were specifically expressed in Clara and alveolar type 2 cells of mouse lung. CC10,a marker of Clara cell, was decreased by DEX. In addition, mucin secretion, which is a functional aspect of this cell, also decreased by DEX treatment.

Conclusions: Control of calcium-related gene expression may affect the control of mucus secretion in the lung. Such a control mechanism can form the basis of studies into diseases such as inflammation due to mucus secretion abnormalities, coughing, and respiratory disorders and distress.

P-144

Effect of EDCs on calcium channels in cardiomyocytes derived from mES cell

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Introduction: Endocrine-disrupting chemicals (EDCs) are structures similar to steroids hormones which can interfere with hormone synthesis and normal physiological functions of male and female reproductive organs. EDCs tend to bind to steroid hormone receptors (e.g., estrogen receptor, progesterone receptor and androgen receptor). Sex steroid hormones influence calcium signaling of the cardiac muscle in early embryo-development. Progesterone (P4) has been reported to affect both blood pressure and other aspects of the cardiovascular system.

Materials and Methods: To confirm the affect of progesterone(P4), octyl-phenol(OP) and bisphenol A(BPA) on early differentiation of mouse embryonic stem (ES) cells into cardiomyocytes, the hanging-drop method was performed to form embryoid bodies. The mouse embryoid bodies (mEB) were suspended, attached onto 6 well plates and cultured in differentiation medium containing steroid-free FBS without LIF. P4, OP and BPA were treated at two days after attachment and media were replaced