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Quercetin treatment reverse endothelial dysfunction and oxidative stress in patients with rheumatoid arthritis

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Background: Rheumatoid arthritis (RA) is a chronic inflammatory disease associated with premature atherosclerosis. Endothelial dysfunction, which represents the earliest stage of atherosclerosis, has been observed in patients with RA with high inflammatory activity. The endothelial dysfunction increases cardiovascular mortality for this disease. Oxidative stress (OS) plays a significant role in the pathogenesis of endothelial dysfunction in RA. The purpose of this study is to investigate the effects of Quercetin (Que) treatment in inflammation, endothelial dysfunction and serum levels of OS in patients with RA.
Patients and methods: We studied 45 consecutive patients with RA (33 women, 12 men; mean age, 57 years [23-75 years]) with active disease (mean Disease Activity Score 28 [DAS28]), without clinically overt cardiovascular disease and 45 control subjects matched for age, sex, hypertension, blood cholesterol and glucose. The patients with RA were treated with Que for four weeks (500 mg Que/day). Blood samples were collected at the beginning and at the end of the treatment. We assessed the serum levels of endothelin-1 (ET-1), intercellular adhesion molecule 1 (ICAM-1), the marker of oxidative stress (malondialdehyde, MDA and carbonylated proteins, CP) and the activity of erythrocytaire antioxidant enzymes (superoxide dismutase, SOD and catalase, CAT).
Results: The serum levels of ET-1 and ICAM-1 were significantly higher in patients with RA than controls ($P < 0.05$) and were significantly lower in patients with RA treated with Que. The serum levels of MDA and CP of patients with RA increased significantly ($P < 0.05$) and SOD and CAT activities decreased significantly ($P < 0.05$) compared to those of the controls. Treatment with Que of RA patients also resulted in significant reduction ($P < 0.05$) of ET-1, ICAM-1, lipid peroxidation and protein carbonilation. These reductions were observed after four weeks of treatment. However, Que administration significantly increased ($P < 0.05$) SOD and CAT activities in the RA patients.
Conclusions: In patients with RA, treatment with Que contributed significantly to the reduction of biochemical markers of endothelial dysfunction.

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The effects of body mass on CMRgluc-related metabolic activity in mouse joints investigated by in vivo dynamic PET/MRI

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Aim: In the case of Glucose Cellular Metabolic Rate (CMRgluc) the uptake of 18F-Fluoro- Deoxy-Glucose (FDG) is theoretically to be quantified insensitively from the body mass of the subject. Our aim was to test the validity of CMRgluc to express joint metabolic activity using PET/MRI measurements in healthy mice. Our hypothesis was that higher body mass induces a higher burden on joints thereby increasing their metabolic activity and provides a body mass-dependent CMRgluc.
Methods and materials: We imaged three healthy c57bl6 mice with a body mass of 27.00±0.35 g and another three animals weighing 38.80±1.10 g. An activity of 8.9±1.6MBq FDG was injected intravenously, and we performed a dynamic whole-body PET scan in each of them. We then determined all knee joint and ankle joint PET dynamic quantitative analyses. We then expressed CMRgluc-s of all joints as well as performed Logan, Patlak and RE-plotting on the data using our own code written under Octave to determine kinetic constants in the joints.
Results: There is a significant difference between low mass and high mass animals in both ankle and knee CMRgluc values. We also found a correlation between FDG (CMRgluc) and body mass (both cases $p < 5\%$). In all cases of pharmacokinetic models, k-values also significantly differed between groups.
Discussion – Conclusion: We observed a body mass dependence in FDG PET values both in ankle and knee joints. The study points to a translational setting where higher wear and tear by higher body mass did increase CMRgluc values in joints therefore it is expected that even without inflammatory or degenerative changes a patient's body mass is a variance factor in FDG- PET joint inflammation studies.

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Exposure to static magnetic field induces decrease of antioxidant oligoelements in aging heart

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Introduction: With rapid technological development, everyday exposure to static magnetic fields (SMF) is increasing. The list of potential sources of SMF is wide and their effects could be both, beneficial and adverse. However, a response to certain stimuli could be changed in aging. The aim of this study was to examine SMF effects on status of cardioprotective antioxidant oligoelements Selenium (Se), Manganese (Mn), Cooper (Cu) and Zinc (Zn) in elderly rats.
Material and methods: Eighteen male Wistar rats, 36 months old, were randomly divided into two groups: Control (n=9) and Magnet (n=9). Horseshoe shaped iron magnets were placed directly beneath cage with Magnet group, and rats were moving freely inside the cage. Intensity of static magnetic field was 30mT. Control group was not exposed to magnetic field. After 10 weeks, animals were sacrificed, hearts were collected, and concentration of Selenium (Se), Manganese (Mn), Copper (Cu) and Zinc (Zn) was determined.
Results: Concentration of Selenium and Copper in heart significantly decreased in Magnet group when compared to Control group. There was no significant difference in Manganese and Zinc concentration between Control and Magnet group.
Conclusion: Results of our study indicated that 30 mT SMF exposure in elderly rats induced decrease of antioxidant oligoelements Selenium and Copper in heart.

Keywords: static magnetic field, aging, heart, antioxidant oligoelements

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The projected increase of rheumatoid diseases due to an aging population in Austria from 2012 to 2050

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Purpose: The aim of this study is to present projected numbers of Austrians in 4 different age classes with rheumatoid diseases in 2012 to 2050 and to discuss possible implications for currently used therapeutic strategies in the future. Methods: The work is based on 2 data sources: Population projections in Austria and age dependent prevalences for rheumatoid diseases provided by STATISTICS AUSTRIA for subjects at the age of 15-30, 30-45, 45-60, 60-75 years and at the age of 75 years or older.
Results: Whilst the absolute numbers of diseased subjects remain stable for the age classes from 15-75 years, the number of diseased subjects at the age of 75 years or older will increase from approx. 90.000 to 211.000 (lower limit:183, upper limit:237) which corresponds to a relative increase of 235% (203%-262%).
Conclusions: The dramatically increasing number of aged individuals aggravates the health economic issue of rheumatic diseases especially for non-inflammatory, degenerative rheumatic disorders. From a health economic point of view, cost effective therapies in the prevention or management of rheumatic diseases are of great importance since rheumatic disorders state a relevant cost factor due to the need for long term medication, frequent hospitalizations, joint arthroplasty and sick leave. The long term intake of medication causes severe side effects that result in additional medical interventions and dramatically reduce the life quality of the affected individual. Some years ago, the mortality rate caused by gastro-intestinal side effects due to NSAID intake was about 2000 per year in Germany and 16.500 per year in the USA. Despite the additional intake of gastro-protective drugs, the ratio of NSAID-consumers suffering from gastro-intestinal ulcers was 1 in 400 and the ratio of those who died was 1 in 8000. The generation of COX-2 inhibitors diminished the risk for gastro-intestinal complications, however, the elevated risk for cardio-vascular events remained. Taken together, from the patient´s as well as from the socio-economic point of view there is an urgent need for new therapeutic strategies that allow for a reduction of medicamentation.

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Beta-herpesviruses related to aging and frailty

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The comprehension of the physiological mechanisms of aging in human subjects has been the target of many efforts. Immunosenescence is an age-related diminution of immune system capacity associated with frailty which can lead to severe consequences in older persons. Cytomegalovirus (CMV) and Epstein-Barr (EBV) were associated with aging and immunosenescence. CMV, Human Herpesvirus-6 (HHV-6) and Human Herpesvirus-7 (HHV-7) are beta-herpesviruses which are ubiquitous and can cause latent infectious. Latent infection is a well-controlled infection resulted of a balance between minimal viral replication and activity of specific T-CD8 cells. This study aimed to compare the EBV, CMV, HHV-6 and HHV-7 viral loads between elderly and young (control group) as well as subgroups with frailty. Sera were separated from blood and DNA extracted using standard protocol. Real-time PCRs were carried out for CMV, HHV-6, HHV-7 and EBV and viral loads were determined. Among total of elderly, 59.1% presented positive to CMV in contrast to 8.3% of young individuals. Elderly classified as frail, pre-frail and non-frail presented 81.8%, 56.5% and, 47.8% of positivity, respectively. The viral load was significantly higher in elderly than control group ($p < 0.0001$) and, higher in elderly with frailty than without frailty ($p=0.01$). HHV-6 was found in 4.2% of elderly and was not detected in control group. HHV-7 was found in 47.9% of elderly and in 8.3% of control group. Elderly classified as frail, pre-frail and non-frail presented 77.2%, 43.5% and, 26.9% of positivity, respectively. The viral load was significantly higher in elderly than control group ($p < 0.0001$) and, higher in elderly with frailty than without frailty ($p=0.01$). EBV was found in 29.6% of elderly and in 25% of control group. No difference was found among subgroups. CMV was associated with aging and frailty and could act driving the differentiation of T cells and accelerating the immunosenescence as an antigenic stressor such as described on the literature. HHV-7 was also associated with aging and frailty, however, the physiopathological mechanisms remains to be elucidated but hypothetically it could act similarly.