Highlights from the 3rd International Congress on Gait and Mental Functions Held in February 26-28, 2010 in Washington D.C.., USA.

The Interplay between Walking, Behavior and Cognition

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Summary

The 3rd International Congress on Gait and Mental Functions held in February 26-28, 2010 in Washington D.C, USA. The congress was organized by *Kenes international.* The objectives of the congress was to explore the relationship between the gait and mental functions like behavior and cognition and also the clinical interventions to improve the gait and mental functions. This report will brief about the various topics discussed in the congress related to the relationship between gait and Mental functions .the conference was made up of the various sessions namely plenary sessions, oral presentations, poster presentation , workshop and socioculture programmes.

The 3rd International Congress on Gait and Mental Functions (GAIT 2010) was held in February 26-28, 2010 in Washington D.C, USA. The congress was organized by *Kenes international.* The objectives of the congress was to explore the relationship between the gait and mental functions like behavior and cognition, ageing , cognitive and psychiatric disorders, risk factors for cognitive and motor impairment ,dual task performance, various diagnostic approaches and various clinical interventions to improve the gait and mental functions which includes various pharamacological therapies , surgical interventions and non-pharmacological approaches physical rehabilitation and cognitive rehabilitation. This report will brief about the various topics discussed in the congress related to the relationship between gait and mental functions.

Plenary sessions:

Session I and II

Theme: - Exercise interventions across Gait and mental disorders

In this session the keynote address was given by Dr.E.Dishman, *Intel Fellow, Director, Health Innovation and Policy, Hillsboro, OR, USA*. His talk was on Minding And Mining Our Behavioral Markers: Towards An Independence Industry; he explored that, we are giving too little conversation about how to solve the problems related to Global Aging, We face age-related epidemics of cognitive, mobility, and sociability impairments, yet most nations, and especially the United States, are stuck in a reactive model of care that waits for these conditions to manifest in the hospital for extreme, emergency, expensive intervention. we must shift towards a home-based, consumer-enabled, prevention-oriented care paradigm that helps people to live with dignity, support, and purpose from wherever they choose, How can we use disruptive technologies to help prevent, predict, and detect declines in cognition and balance before they become an emergency room visit? What are the barriers to these kinds of innovations coming to the marketplace.

Followed by this, Dr.J.Hausdorff Discussed that gait becomes less automatic, for example, it requires more attention. He demonstrated that variability of the gait cycle was a good measure of gait problems and probability of falling. Given this situation, it is possible to improve gait by cognitive training and by increasing attention. Pharmacological interventions can help such as methylphenidate improving Parkinson gait, and donepezil improving Alzheimer gait. Cognitive training of various kinds can also improve gait. This has been demonstrated for Parkinson disease with dual task training and a virtual reality training to walk paying attention to obstacles in the path [1, 2].

Dr. A. Kramer, reviewed a number of studies in older adults that showed that physical activity improved mental health, increased cognitive function, decreased anxiety and depression, and increased self-esteem. Exercise appears to decrease the conversion rate from mild cognitive impairment to Alzheimer disease. Physical exercise increases both grey and white matter in brain, including an increase in hippocampal volume. He noted that individual differences might be due to genetic differences yet to be defined.

Followed by this Dr. C. Cotman, discussed about the issues relating to the improvement of brain cognition with physical exercise reviewing his work in animal models. Exercise can decrease pathology in animal models of Parkinson disease and Alzheimer disease. A striking effect of exercise is an increase of the neurotrophic factor, BDNF, which is prominently increased in the hippocampus. Recent studies, it is found that like humans dogs also show cognitive decline with aging, show that exercise, environmental enrichment and antioxidants (which act in part to improve mitochondrial function) can all work to improve brain health.

Dr.D.Bennett follow up the relation of risk factors and neuropathology to cognitive and motor impairment, he discussed that Several risk factors including *APOE*, diabetes, olfactory identification, physical activity, and social engagement were related to cognitive and motor outcomes, and neuropathologic indices of Alzheimer's disease, cerebrovascular disease, and Lewy bodies were shown to be related to cognitive and motor function [3].

Dr. B. Bloem discussed about exercise and mental disorders , he stated that the disorders like parkinson's disease make the immobile and sedentary , the sendatary life style may lead high risk of caridiovascular diseases and physical activity is inversely related to all-cause mortality, Current guidelines promote participation in regular physical activity in patients with Parkinson's disease, they are advantages like the cardiovascular risk can be minimized and improve their physical fitness and evidence in the elderly and in Alzheimer patients suggests that exercise may postpone cognitive deterioration.

Dr. M. Carlson spoke about Integrating and evaluating physical activity in the everyday lives of older adults and he stated that Moderate amounts of physical activity is associated with a host of health benefits, including reduced risk of heart dementia, depression, disability, and changes in physical function. These findings have been translated into targeted exercise programs that have improved physical function in selected populations.

R. Macko discussed about task oriented training and its significance in improving locomotor functions and cardiovascular health in chronically disabled stroke survivors. Aerobic training can both modify risk factors for cerebrovascular diseases and improve selected elements of cognitive-executive function that translate into improved motor learning in chronic stroke survivors. These advances support a rationale to test structured exercise as a model to improve long-term functional mobility and alter the natural history of vascular cognitive impairment and declines after stroke.

Session III and IV

Theme: - Dual task training across Gait and Mental disorders

In this sessions the topics related to pharmacology of gait , cognitive approaches in improving the gait ,dual task and its significance in improving the symptoms in Parkinson's patients and neurochemical imaging techniques available to understand the gait and mental functions were discussed.

Professor Kaye spoke of the need to ensure that the monitoring tools, which to this stage have been undertaken on a yearly or two yearly basis, should in fact reflect day to day events of the participants. To this end he described his development of "smart apartments" in which movement sensors were installed in strategic locations such as the bathroom and refrigerator doors. Subjects were all taught computer use and were required to use the computer daily.

Monitoring of phone use and medication compliance with electronic attachments to the phone or to the dispenser. Infrared ceiling sensors enabled measures of walking speed, while the computer use and documentation of compliance indirectly documented cognition.

Dr. Holtzer was involved in study related to relationship of cognition and walking by the use of regular psychological tests, genetic tests which may reflect central processing of cognition and movement as well as measures of brain blood flow. The brain blood flow may change over time with changes in mobility or cognition.

Dr.Verghese spoke about important role for cognitive processes in maintaining mobility and gait performance in seniors and his approach about improving the gait velocity by engaging the subject in dual task performance using computer program resulted in improved walking speed in the experimental subjects by 15% overall.

Dr.E.Uc spoke about the effect of dual task on drivers with cognitive dysfunction, in his speech he concluded that Dual task interference in driving performance in individuals has important parallels with the growing literature on dual task interference in gait performance, Dual tasks during driving like following a newly learned route, searching for landmarks, talking to a passenger or on mobile phone) may vary in their demands on cognition, vision, and motor function. Drivers with PD and AD perform worse on dual tasks, and their driving safety is degraded by the secondary task more than control drivers due their limited cognitive reserves and by Minimizing distraction by dual tasks may
help to improve driving safety of cognitively impaired drivers [4].

In the next session Dr. N. Giladi discussed about the pharmacology of gait, he has highlighted the mental aspects that can be influenced by medications in order to improve secured gait. Further he stated any medical treatment that improves muscles activation and synchronization or limbs coordination will improve gait and stability.

Dr. N. Bohnen has discussed the use of neurochemical imaging in understanding the gait and mental functions inn Parkinson's disease, in his speech he discussed that the falls in PD can be caused by disturbances of vertical mobility, i.e. postural imbalance, or horizontal mobility, such as freezing of gait (FoG) along with the other etiologies ,he also stated that falls due to postural instability may reflect a non-dopaminergic phenomenon and may be related to subcortical cholinergic dysfunction of the pedunculopontine nucleus (PPN)-thalamus system.
PD fallers also had significant more cortical cholinergic denervation compared to the PD non-fallers, even in the absence of dementia.

Dr. L. Lundin-Olsson discussed about dual-task walking performance and fall risk in old age, the highlights of his talk are Most falls in older people occur while they are walking, cognitive

information processing is key in walking especially among older adults and, in line with this, the Stops-walking-when-talking observation indicated an increased risk of falling in disabled older people and he concluded that Increasing evidence links abnormal executive function due to aging or disease to dual-task gait disturbances

Dr. A. Nieuwboer discussed about Training the Untrainable: Dual Task Walking in Parkinson's disease , the main points of his speech was Dual task walking is substantially compromised in PD and associated with exaggerated slowing and increased gait variability, A recent randomized controlled trial showed that dual task balance training led to improved balance and cognitive function in unstable elderly people. He concluded that conclude that dual task walking is trainable in PD but confirmatory study is needed in subgroups at risk of falling.

Session V and VI

Theme: Preventing Falls in Gait and Mental Disorders

In this sessions the topics related to various causes and circumstances of falls, capturing of various of falls, approaches for understanding fall risk and intervention and prevention of falls were discussed.

Dr. S. Robinovitch discussed about observed associations between fall characteristics, injury patterns, cognitive and physical function, and environmental factors, and corresponding recommendations for the prevention of falls and fall-related injuries in this population.

Dr. S. Lord discussed about a multifactorial approach for understanding fall risk in older people and he explored that a longitudinal cohort study with a 12-month follow-up in 500 community-dwelling people aged 70-90 years and used a decision tree-structured survival analysis was done to identify the interrelationships and discriminatory value of a broad range of objectively measured explanatory risk factors for falls like medical, disability, physical, cognitive and psychological.

The decision tree analysis revealed that people with impaired static balance, reduced executive function, poor dynamic balance and low exercise levels increased fall risk.

Dr. M. Redfern discussed about inhibitory processes in postural control, he stated that the Interactions between peripheral sensorimotor deficits and central inhibitory function may be a key to understanding balance disorders in the elderly and Age-related decline in postural control and gait has been related to a decline in executive functions, which include working memory, planning, and inhibitory processes.

Dr. C. Todd discussed about preventing falls in older people, Prevention of Falls Network Europe (ProFaNE) an EC funded network, focuses on developing prevention programmes to reduce falls and fracture incidence amongst elderly people.

In discussed about the studies conducted in UK and Europe in older people for assessing beliefs and attitudes regarding falls prevention programmers' and He concluded that Participation may

be enhanced by maximizing and promoting immediate benefits rather than potential for reducing falls; by removing practical barriers, by trying programmes to demonstrate their immediate benefits. A focus on exercise as promoting health, fitness and independence will have wider acceptability.

Dr. S. Lamb discussed about the interventions for preventing falls in older people living in the community, objectives of his study was to assess the interventions to reduce the incidence of falls in older people , in results he explored that Multiple-component group exercise reduced rate of falls and risk of falling, Assessment and multifactorial intervention reduced rate of falls but not risk of falling , vitamin D did not reduce falls but may do so in people with lower vitamin D levels, home safety interventions did not reduce falls but were effective in people with severe visual impairment, and in others at higher risk of falling, An anti-slip shoe device reduced rate of falls in icy conditions , Gradual withdrawal of psychotropic medication reduced rate of falls but not risk of falling , Pacemakers reduced rate of falls in people with carotid sinus hypersensitivity and First eye cataract surgery reduced rate of falls

Poster sessions

Poster sessions related to various topics were divided in to six sessions. In Session 1. Treatments and Other Interventions, Session 2. Assessment of gait and mental functions, Session 3. Focus of Parkinson's disease, Session 4. Dual task performance, Session 5. Assessment of gait and mental functions II, Session 6. Novel techniques and measures .were covered.

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