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Junior Research Awards

JR01-01

Covariant perfusion patterns provide clues to the origin of cognitive fluctuations and attentional dysfunction in Dementia with Lewy bodies

John-Paul Taylor, Sean J. Colloby, Ian G. McKeith, John T. O'Brien, *Institute for Ageing and Health, Campus for Aging and Vitality, Newcastle University, United Kingdom*

Background: Fluctuations in cognitive function (FC), particularly in attention, are a core and defining symptom in dementia with Lewy bodies (DLB) but are seen much less frequently in Alzheimer's dementia (AD). However their neurobiological origin is poorly understood. The aim of our study was therefore to characterise perfusion patterns in DLB patients that are associated the severity and frequency of FC as measured both clinically and using objective neuropsychological assessments.
Methods: Spatial covariance analyses were applied to data derived from single photon emission computed tomography (SPECT) HMPAO brain imaging in19 DLB and 23 AD subjects. Subjects underwent clinical assessment of their FC and cognitive function as well as objective testing of their attention.
Results: Covariant perfusion principal components (PCs) were not associated with either FC or cognitive or attentional measures in AD. However, in DLB patients, the second PC (defined as DLB-cognitive motor pattern, DLB-PCI2) which was characterised by bilateral relative increases in cerebellum, basal ganglia and supplementary motor areas and widespread bilateral decreases in parietal regions, positively correlated with poorer cognitive function, increased FC and worse attentional function measured both clinically and neurophysiologically ($p<0.05$) as well as with the severity of bradykinesia ($p = 0.04$).
Conclusions: FC in DLB appear distinct from those seen in AD, and likely to be driven by internal neurobiological perturbations in brain circuitry as evidenced using spatial covariance analyses of cerebral perfusion. FC and certain aspects of attentional dysfunction in DLB may, in part, depend upon both distributed motor and non-motor networks.

JR01-02

Aberrant topographical organization in gray matter structural network in late life depression: A graph theoretical analysis

Hyun Kook Lim, *Department of Psychiatry, The Saint Vincent Hospital, Suwon, The Catholic University of Korea, Korea*
Won Sang Jung, *Department of Radiology, The Saint Vincent Hospital, Suwon, The Catholic University of Korea*
Howard J Aizenstein, *Departments of Psychiatry and Bioengineering, the University of Pittsburgh, United States*

Background: Although previous studies on late life depression (LLD) have shown the morphological abnormalities in frontal-striatal-temporal areas, alterations in coordinated patterns of structural brain networks in LLD are still poorly understood. The aim of this study was to investigate the differences in gray matter structural brain network between LLD and healthy controls.
Methods: We used gray matter volume measurement from magnetic resonance imaging to investigate large-scale structural brain networks in 37 LLD patients and 40 normal controls. Brain networks were constructed by thresholding gray matter volume correlation matrices of 90 regions and analyzed using graph theoretical approaches.
Results: Although both of the LLD and control groups showed a small-world organization of the group networks, there were no differences in the clustering coefficient, the path length and the small world index across wide range of network density. Compared with controls, LLD patients showed decreased nodal betweenness in the medial orbitofrontal and angular gyrus region. In addition, LLD patients showed hub regions in superior temporal gyrus and middle cingulate gyrus, and putamen. On the other hand, the control group showed hub regions in the medial orbitofrontal gyrus, middle cingulate gyrus and cuneus.
Conclusion: Our findings suggest that the gray matter structural networks are not globally but regionally altered in LLD patients. This multivariate structural analysis using graph theory might provide a more appropriate paradigm for understanding complicated neurobiological mechanism of LLD.

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JR01-03

More insight into the concept of apathy: a multidisciplinary depression management program has different effects on depressive symptoms and on apathy in nursing homes

Ruslan Leontjevas, *School of Psychology, Open University of the Netherlands, Department of Primary and Community Care, Center for Family Medicine, Geriatric Care and Public health, Radboud University Nijmegen, Medical Centre, and Nijmegen Alzheimer Centre, Radboud University Nijmegen, Medical Centre, the Netherlands*
Steven Teerenstra, *Department of Epidemiology, Biostatistics, and HTA, Radboud University Nijmegen Medical Centre, the Netherlands*
Martin Smalbrugge, *Department of Nursing Home Medicine, EMGO Institute for Health and Care Research, VU University Medical Center, Amsterdam, the Netherlands*
Myrra J.F.J. Vernooij-Dassen, *Department of Primary and Community Care, Center for Family Medicine, Geriatric Care and Public health, Radboud University Nijmegen, Medical Centre, Scientific Institute for Quality of Healthcare, Radboud University Nijmegen Medical Centre, and Kalorama Foundation, Beek-Ubbergen, the Netherlands*
Ernst T. Bohlmeijer, *Department of Mental Health Promotion, Twenthe University, Enschede, the Netherlands*
Debby L. Gerritsen, Raymond T.C.M. Koopmans, *Department of Primary and Community Care, Center for Family Medicine, Geriatric Care and Public health, Radboud University Nijmegen, Medical Centre, and Nijmegen Alzheimer Centre, Radboud University Nijmegen, Medical Centre, the Netherlands*

Background: Apathy is common in nursing home (NH) residents and it overlaps with depression. This study examines the effects of a multidisciplinary depression program on apathy, and depressive motivational and mood symptoms.

Methods: Secondary analyses were conducted of a stepped-wedge cluster-randomized controlled trial with six measurements. 16 dementia NH units and 17 somatic units were enrolled. In the intervention condition, a program containing depression assessment procedures, and multidisciplinary treatment (activating strategies, psychotherapy, and medication) was introduced. Usual care was provided in the control condition. Outcomes were assessed using the Apathy Evaluation Scale-10 items, and the Cornell Scale for Depression in Dementia. Trial registration: http://www.trialregister.nl/trialreg/index.asp, NTR1477.

Results: Intention-to-treat analyses showed that the whole depression management program reduced apathy in dementia units ($P<0.001$; Cohen's d, -0.35), and depressive motivational symptoms in somatic units ($P = 0.008$; Cohen's d, -0.40). Depressive mood symptoms were not affected in both unit types. The effect on apathy in dementia units was mainly attributable to activating strategies ($P<0.001$; Cohen's d, 0.73). The effect on motivational symptoms in somatic units was mainly attributable to psychotherapy ($P = 0.002$; Cohen's d, -0.80). Apathy worsening was associated with pharmacological depression treatment in both unit types ($P = 0.009$; Cohen's d, 0.35).

Conclusions: Depression management may affect apathy and depressive symptoms differently, which underpins the position of apathy as a distinct syndrome. NH professionals can effectively use activating strategies in dementia units, and psychotherapy in somatic units. More research is needed on treating depressive mood symptoms, and on effects of antidepressants in NHs.

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