Age and time-dependent risk model for progressing to dementia

Kaur, D.[1], Bucholc, M. [2], Finn, D.P.[3], Todd, S.[4], Wong-Lin, K.[2], McClean, P.L.[1]

[1] Northern Ireland Centre for Stratified Medicine, Biomedical Sciences Research Institute, Derry~Londonderry, Northern Ireland, UK

[2] Intelligent Systems Research Centre, School of Computing, Engineering and Intelligent Systems, Ulster University, Derry~Londonderry, Northern Ireland, UK

[3] Pharmacology and Therapeutics, School of Medicine, National University of Ireland Galway, Republic of Ireland

[4] Altnagelvin Area Hospital, Western Health and Social Care Trust, Derry~Londonderry, Northern Ireland, UK

Background: This study evaluated some of the major cardio-metabolic risk factors associated with progression to dementia, among different age groups in healthy and MCI subjects. These risk factors were also analysed with respect to duration of progression.

Methods: The NACC database, one of the largest, most comprehensive longitudinal databases for dementia research was used in this study. Risk factors analysed, using multivariate-logistic regression were age, gender, smoking, BMI, alcohol-abuse, stroke, heart-attack/cardiac-arrest, geriatric depression scale (GDS), medications, diabetes, hypertension and hypercholesterolemia. Analyses were conducted at baseline and over time in those who progressed from healthy-to-dementia, and from MCI-to-dementia. Combinations of variables were also evaluated and ranked on basis of increasing risk. Analyses were stratified by age, gender and duration of progression. The aim is to generate a risk model, applicable across the life-course, to predict risk of progression from healthy and MCI to dementia.

Results: Active diabetes increased the risk of progression from healthy to dementia (odds ratio- OR: 3.274, p: $6e^{-04}$) in 61-70 age group. Individuals aged 81-90 years with active hypercholesterolemia were at reduced risk of progressing from healthy to dementia (OR: 0.59, p: 0.0023). Active hypertension reduced the risk of progression from MCI to dementia (OR: 0.8091, p: 0.0051) in 71-80 age group.

Depression (GDS score 6-10) in general, was significantly associated with increased risk of progression from healthy to dementia, irrespective of the duration of progression. Medications reduced the risk of progressing to dementia within 4 years, in the 71-80 age group (OR: 0.139, p: 0.0026). Healthy individuals aged 81-90 with active diabetes were at increased risk of progressing to dementia within 4 years (OR: 5.1798, p: 0.0012). Additionally, healthy individuals aged 61-70 with active diabetes, were at increased risk of progression (OR: 22.267, $p<2e^{-04}$), between 8~12 years from baseline.

High BMI in general (≥30) was significantly associated with reduced risk of MCI to dementia progression, over ~12 years from baseline. MCI patients with active hypertension were at reduced risk of progressing (OR: 0.8114, p: 0.0022) within 4 years from baseline. MCI patients aged 81-90 with a history of stroke, were at increased risk of progressing to dementia in ≤4 years (OR: 1.9052, p: 0.0076). Those aged ≥91 with GDS score 6-10 were also at increased risk of progressing to dementia within 4 years (OR: 9.8376, p: $4e^{-04}$).

Conclusions: Different risk factors are particularly relevant at different ages, and in terms of duration of progression to dementia, from healthy and MCI stages.