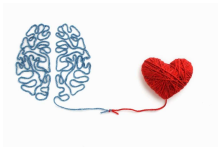
Vascular Brain Ageing

Biogerontology Study Day
Robert Briggs

Cardiovascular System

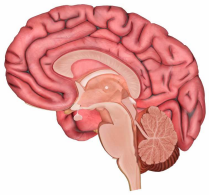


Brain Health

- Dementia
- Depression
- Gait Disturbance

Brain Blood Flow

2% of total body mass

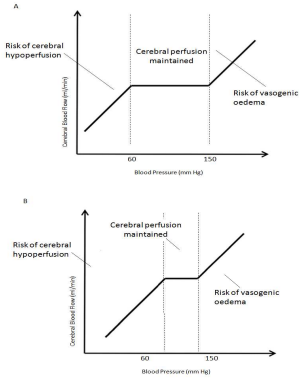


20% of total cardiac output

CBF in Adult 750 mls/min

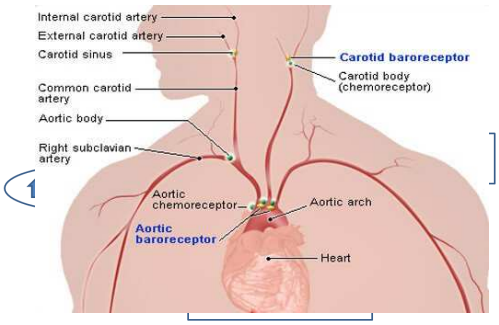
Tightly regulated

Cerebral Autoregulation

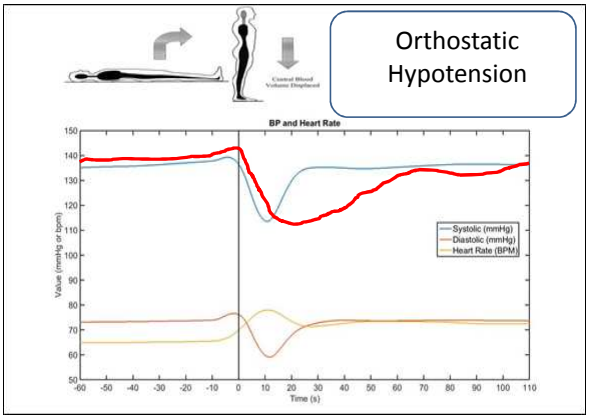


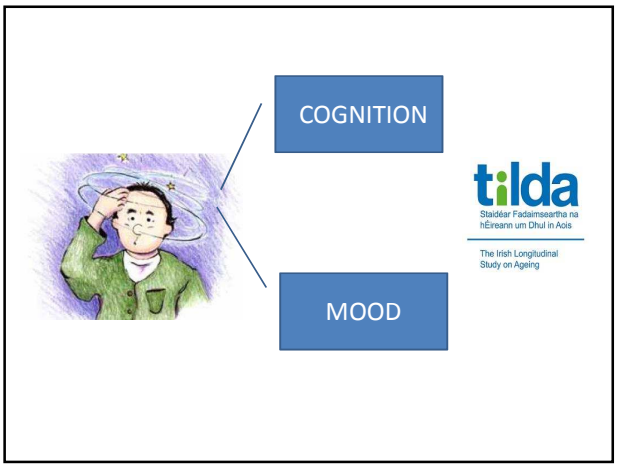
- Metabolic
- Myogenic
- Neural

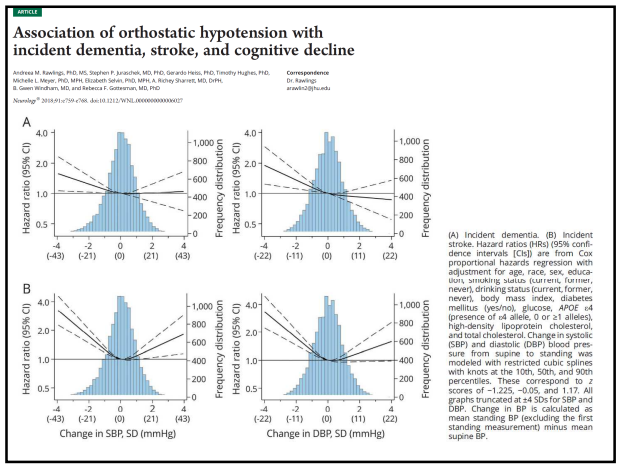
Baroreceptors

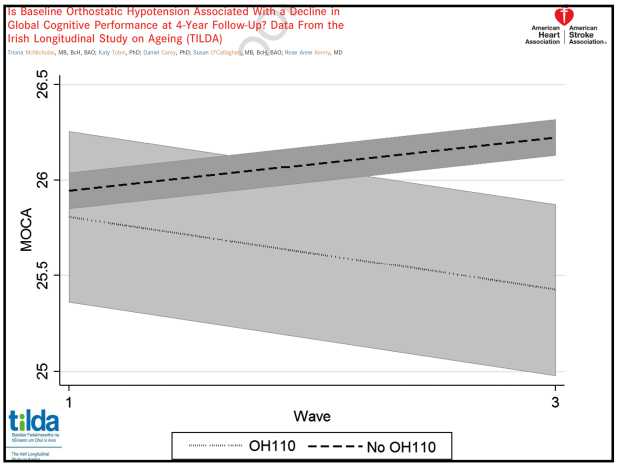


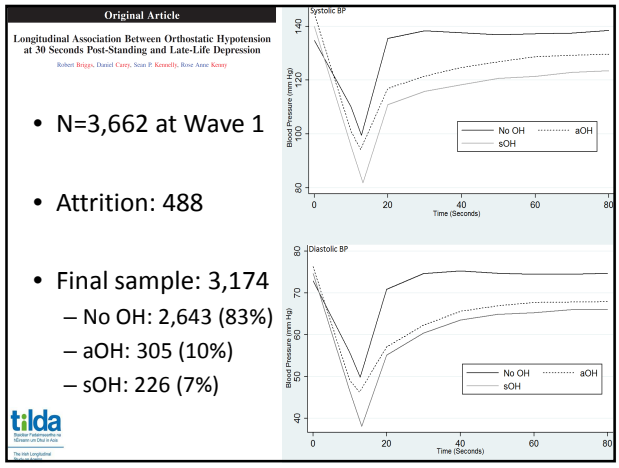
Orthostatic Hypotension

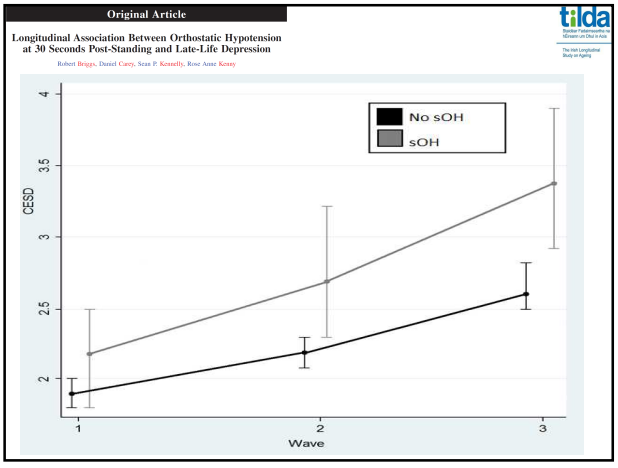


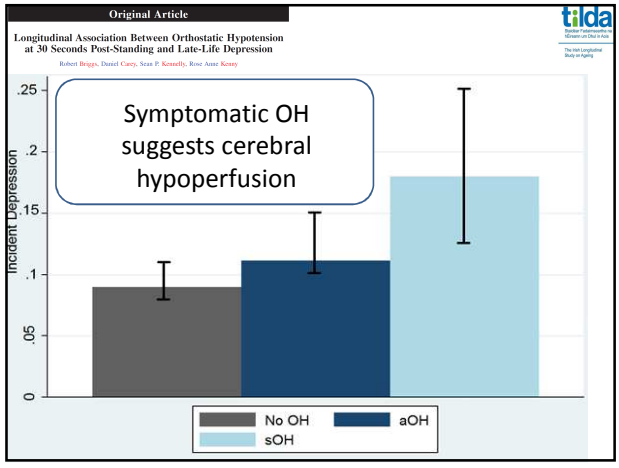

COGNITION
MOOD
tilda
Staidéar Fadaimseartha na hÉireann um Dhul in Aois
The Irish Longitudinal Study on Ageing


ARTICLE
Association of orthostatic hypotension with incident dementia, stroke, and cognitive decline
Correspondence
Hazard ratio (95% CI)
Frequency distribution
Change in SBP, SD (mmHg)
Change in DBP, SD (mmHg)


Is Baseline Orthostatic Hypotension Associated With a Decline in Global Cognitive Performance at 4-Year Follow-Up? Data From the Irish Longitudinal Study on Ageing (TILDA)
American Heart Association
American Stroke Association
MOCA
Wave
OH110
No OH110


Original Article
Longitudinal Association Between Orthostatic Hypotension at 30 Seconds Post-Standing and Late-Life Depression
• N=3,662 at Wave 1
• Attrition: 488
• Final sample: 3,174
– No OH: 2,643 (83%)
– aOH: 305 (10%)
– sOH: 226 (7%)
Systolic BP
Diastolic BP
Blood Pressure (mm Hg)
Time (Seconds)
No OH
aOH
sOH


Original Article
Longitudinal Association Between Orthostatic Hypotension at 30 Seconds Post-Standing and Late-Life Depression
CESD
Wave
No sOH
sOH


Original Article
Longitudinal Association Between Orthostatic Hypotension at 30 Seconds Post-Standing and Late-Life Depression
Symptomatic OH suggests cerebral hypoperfusion
Incident Depression
No OH
aOH
sOH

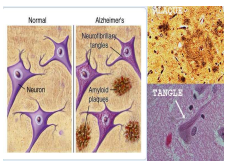
OH: marker of CV Inefficiency

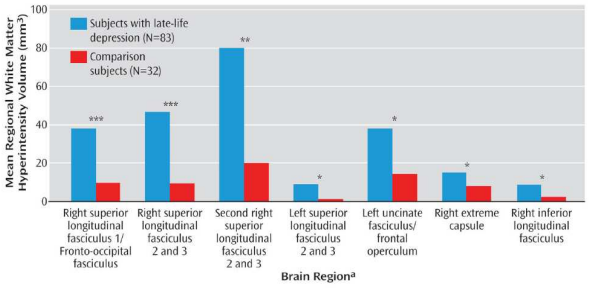
Dementia

How?

Depression

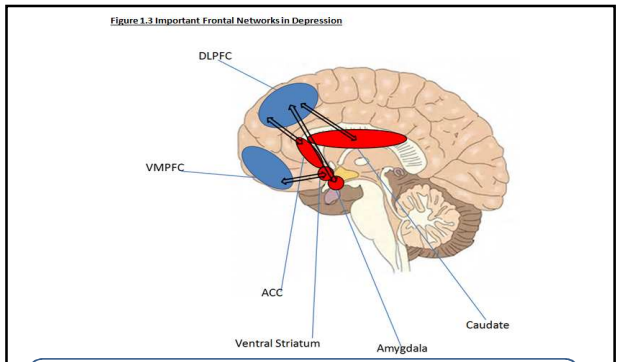
Hypothesis: Structural / functional brain changes, possibly due to cerebral hypoperfusion





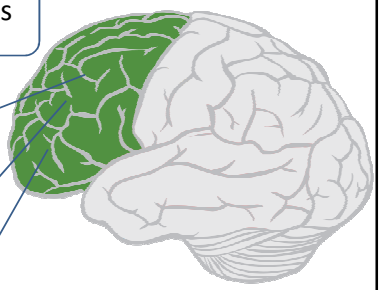
Regional White Matter Hyperintensity Burden in Automated Segmentation Distinguishes Late-Life Depressed Subjects From Comparison Subjects Matched for Vascular Risk Factors

Yvette I. Sheline, M.D., Joseph L. Price, Ph.D., S. Neil Vaishnavi, B.S., Mark A. Mintun, M.D., Deanna M. Barch, Ph.D., Adrian A. Epstein, B.A., Consuelo H. Wilkins, M.D., Abraham Z. Snyder, M.D., Lars Couture, B.A., Kenneth Schechtman, Ph.D., and Robert C. McKinstry, M.D., Ph.D.



'Disconnection Hypothesis': WMH disrupt important neural networks in mood, cognition and gait regulation

Frontal Networks



Cognition

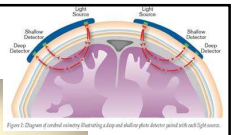
Mood

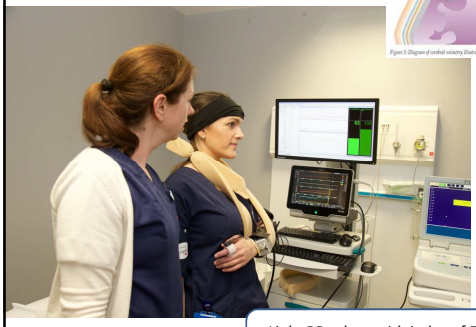
Gait

Frontal Lobe more susceptible to hypoperfusion & therefore tract / network injury

The association between frontal lobe perfusion and depressive symptoms in later life

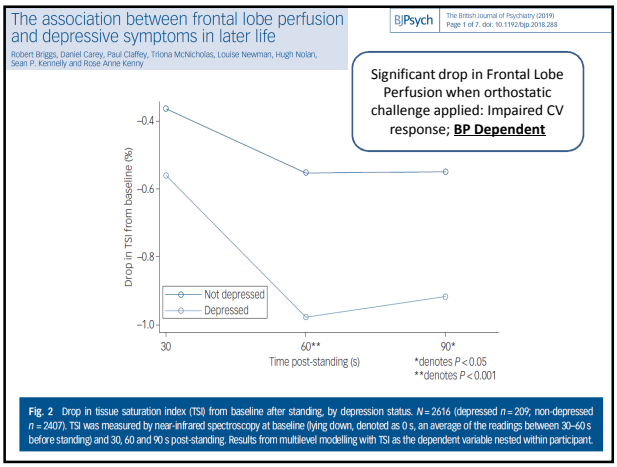
Robert Briggs, Daniel Carey, Paul Claffey, Triona McNicholas, Louise Newman, Hugh Nolan, Sean P. Kennelly and Rose Anne Kenny

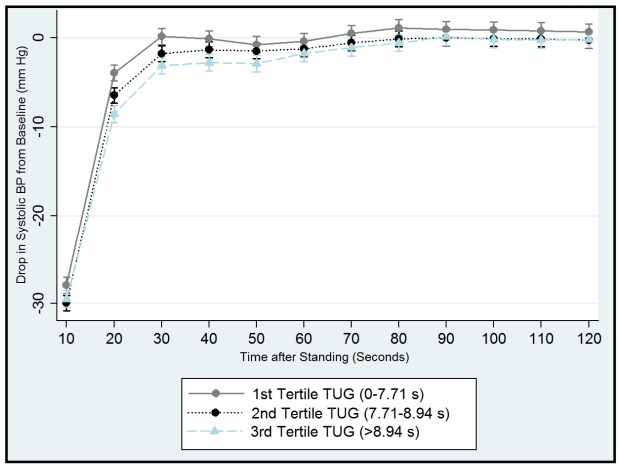


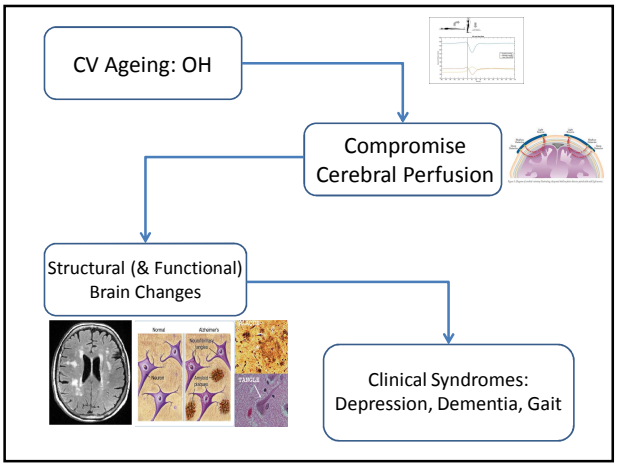


Links BP values with index of Frontal Lobe perfusion

BJPsych The British Journal of Psychiatry (2019) Page 1 of 7. doi: 10.1192/bjp.2018.288







Conclusion

- Functional heart-Brain Axis key role in brain health
- Example: OH, marker of caridovascular inefficiency/failure of cerebral autoregulation, reliably predicts dementia, depression, gait problems
- Clinical relevance: Now measurable at bedside; Potentially modifiable?