Grey matter hyperintensities influence perception of bodily pain in elderly people

Ramalingam SK, Staff RT, Fox HC, Whalley LJ, Murray AD

1495 UNIVERSITY OF ABERDEEN

SINAPSE
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Introduction

- Pain is a common symptom in late life
- Causative factors are irreversible
- Management - pain relief
- Challenging
  - Social factors
  - Physiological factors – medication, side effects
  - Co-existing conditions – cognitive decline
  - Difficulty in communication - assessment of pain and extent of pain relief
  - Pain perception and modulation

Pain perception and modulation

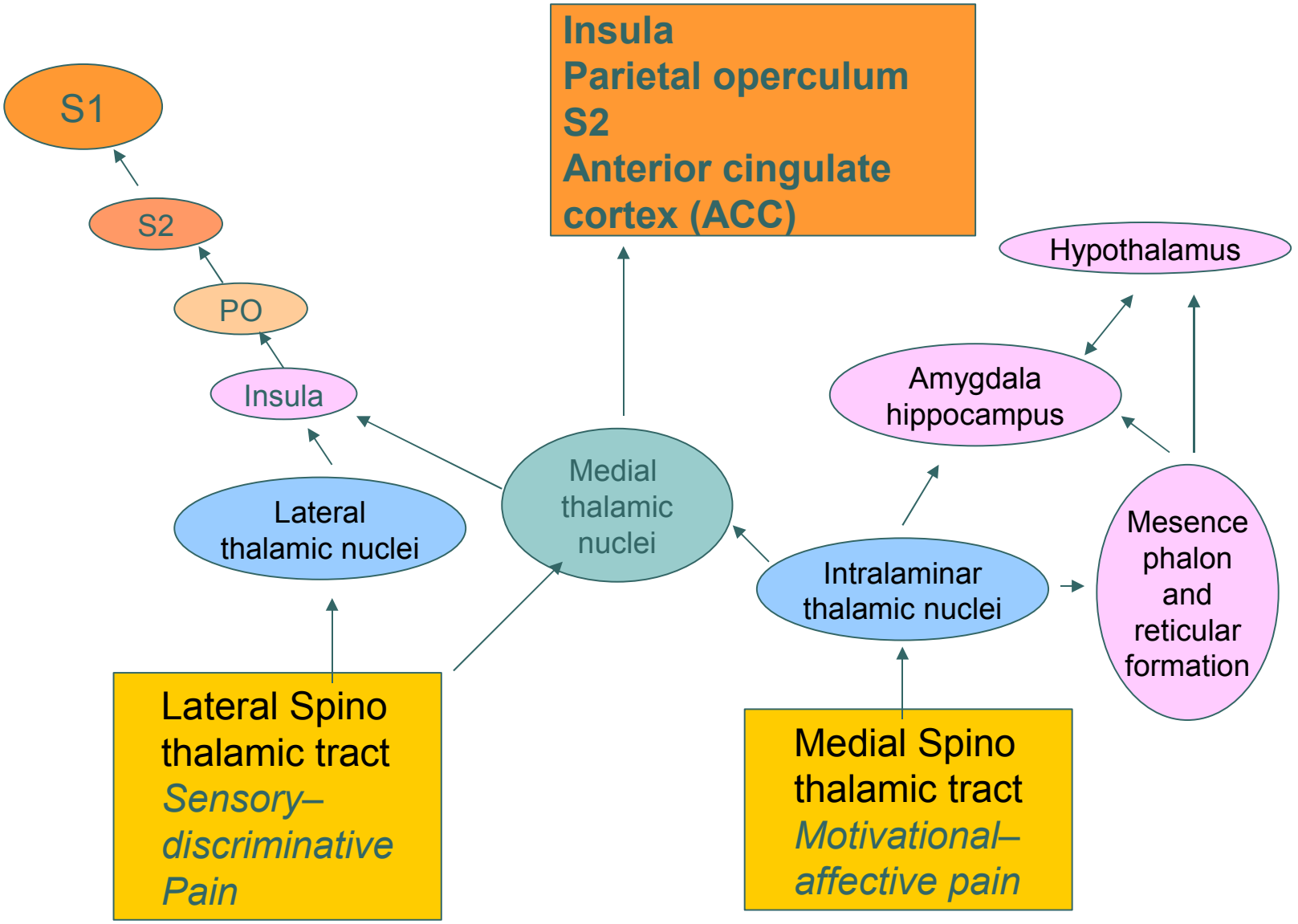
- Neuronal loss
  - Peripheral Nerves
    - Loss of myelin, axonal atrophy and loss of function[1]
  - Spinal cord
  - CNS
- Functional change[2]
  - Neurotransmitter content and expression
  - Decreased metabolic turnover

1. Verdu et al, Influence of aging on peripheral nerve function and regeneration. J Peripher Nerv Syst 5. 191-208.2000
2. Laporte A.M et al, Autoradiographic mapping of serotonin 5HT1A, 5HT1D, 5HT2A and 5HT3 receptors in the aged human spinal cord. J Chem Neuroanat 11. 67-75.1996;

Aim of the study

- Imaging features of neuronal degeneration
  - Hyperintensities in the white and grey matter
- Relationship between the brain hyperintensities and pain perception

Medial and Lateral pain pathways



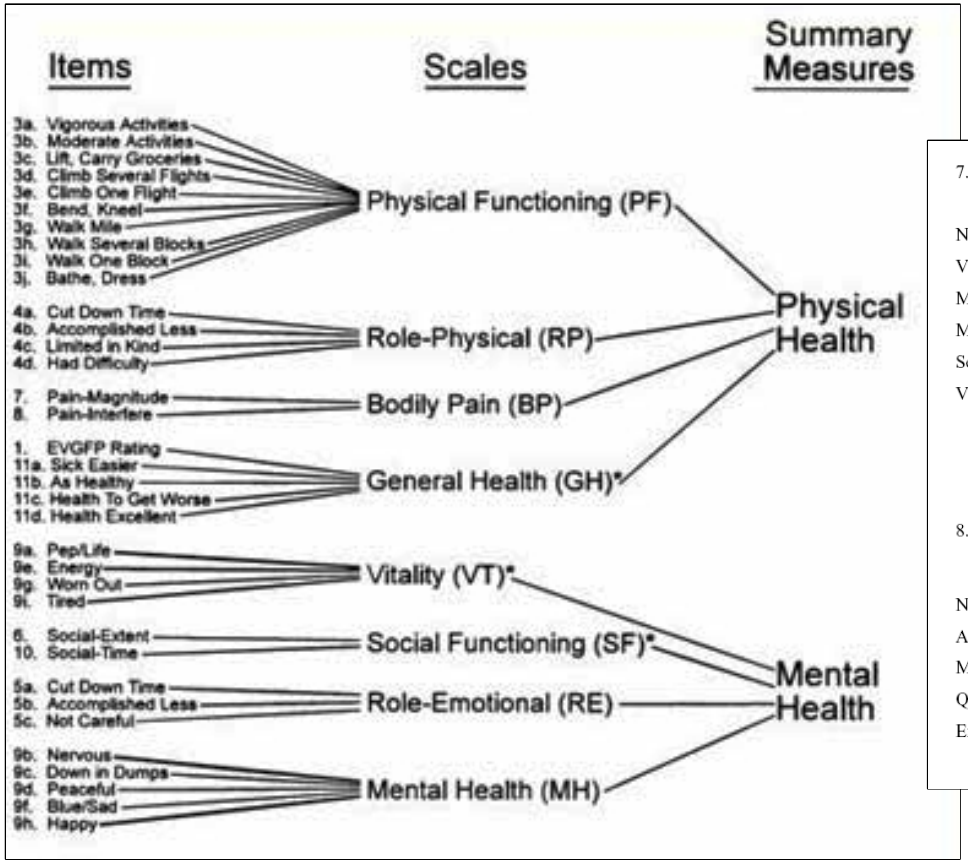
Method

- 206 volunteers of the 1936 Aberdeen Birth Cohort
- Subsample of survivors of the Scottish Mental Survey of 1947
- Brain MRI at 1.5T
- Completed the SF36® Health survey questionnaire

SF36® Health survey

- 36 questions
- 8 scale health profile and summary measures of health-related quality of life

SF36® Health survey



7. How much bodily pain have you had during the past 4 weeks?

(circle one)

None	.....	1
Very mild	.....	2
Mild	.....	3
Moderate	.....	4
Severe	.....	5
Very severe	.....	6

8. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

(circle one)

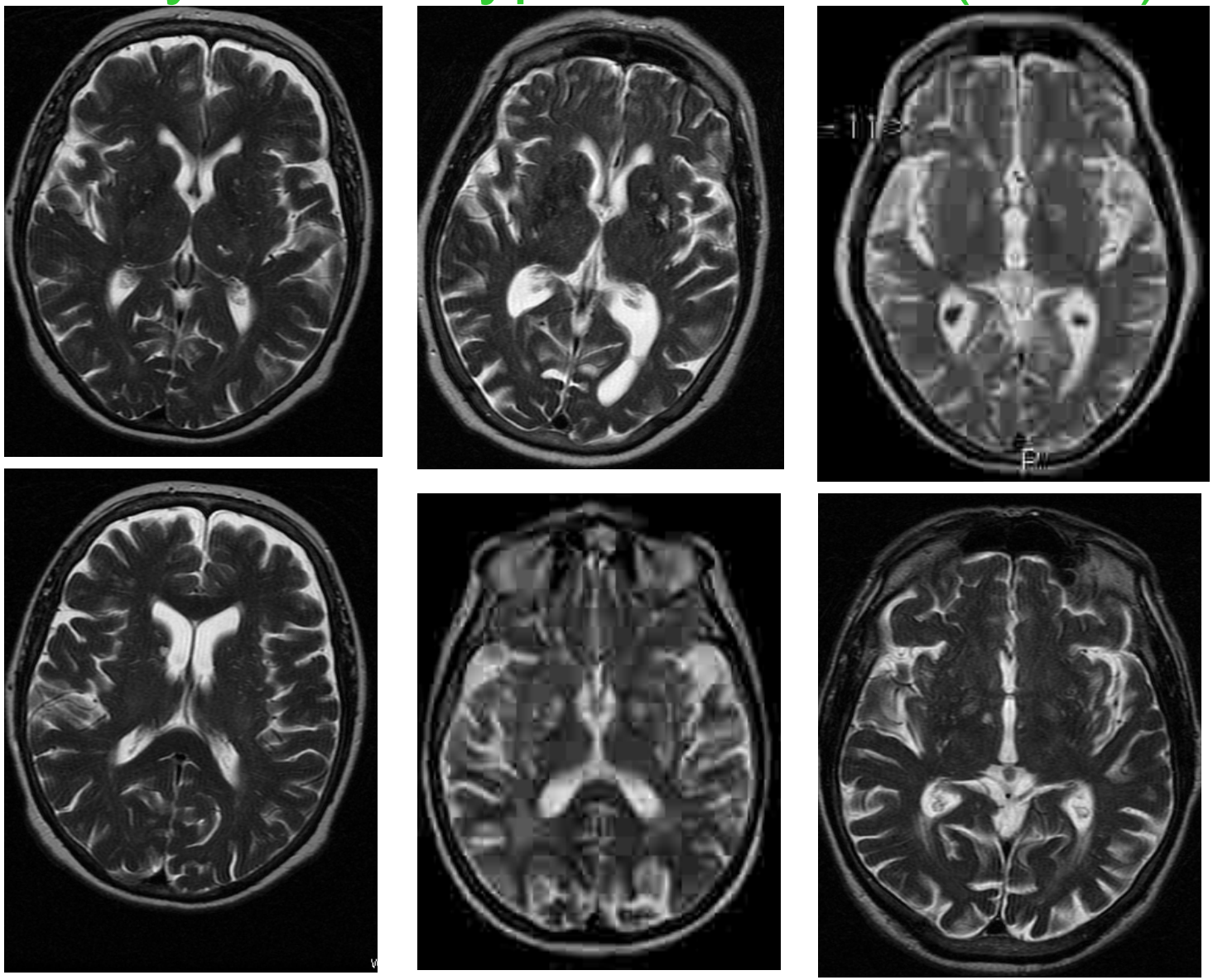
Not at all	.....	1
A little bit	.....	2
Moderately	.....	3
Quite a bit	.....	4
Extremely	.....	5

Brain Hyperintensities

- T2W MRI images
- Grey matter (GMH)
- White matter (WMH) and
- Periventricular hyperintensities (PVH)
- Quantified by using a modified Scheltens' method*

* Scheltens P et al. Semi-quantitative rating scale for the assessment of signal hyperintensities on MRI. J Neurol Sci 1993;114:7-12

Grey matter hyperintensities (GMH)



Statistical analysis

- Factor analysis data reduction process
- Single standardized factor representing
  - Bodily pain (BP),
  - General health (GH),
  - Physical function (PF) and
  - Mental health (MH) were extracted.
- Similarly, two orthogonal factors of measure physical health (PH1 and PH2) were extracted from blood pressure (systolic and diastolic), PEFR, FEV, FVC and BMI

Results

- Correlations between imaging measures and estimates of perceived and measured health
- Significant association between the imaging measures and also between BP and other estimates of perceived and physical health.

	WMH	***PVH***	***BP***	***GH***	***PF***	***MH***	***PH1***	***PH2***
GMH	.523**	.494**	.152*	0.076	-0.005	0.111	-.137*	-0.006
WMH	1	.721**	0.064	0.022	0.027	0.039	0.026	0.062
PVH		1	0.073	0.085	-0.03	-0.017	-0.013	0.094
BP			1	.565**	-.179**	.505**	-.210**	0.093

***p<.05, **p<.001**

General Linear Modelling

- To assess influence of MRI scores on perceived bodily pain
- Self-perceived PF, GH, MH and PF1 and 2 as co-variables and sex as a fixed factor.
- GMH showed significant correlation with bodily pain perception scores ($p<.05$)

	F	Sig.	Partial Eta Squared
GMH	**4.371**	**0.038**	0.022
PF	**17.372**	**0**	0.082
MH	**25.546**	**0**	0.116
GH	**7.168**	**0.008**	0.035
PH1	0.377	0.54	0.002
PH2	1.013	0.315	0.005
GENDER	0.462	0.498	0.002

Conclusion

- In a normal elderly population, grey matter hyperintensities in the basal ganglia are related to self perceived pain independent of health perception

- There were no other significant relationships between other brain MRI variables and perceived bodily pain

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