Scotland's Healthy Ageing Innovation Cluster

Monday 28 February 2022, 1100-1300

Digital Health & Care Innovation Centre

ECHAlliance

enterprise europe network

DIGITAL OFFICE
Scottish Local Government

HIE
Highlands and Islands Enterprise
Iomairt na Gàidhealtachd 's nan Eilean

Scottish Enterprise

TEC Technology Enabled Care

Attendees please note

1. We are **recording this event** and it will be hosted on our HAIC webpage resources so it can be watched on demand
2. If you **do not** wish to appear on the recording, you should turn off your camera and microphone for the duration of the event
3. As a courtesy to our speakers and guests, we ask all attendees to **turn off** microphones and cameras during presentations
4. Drop your **questions in the chat field** or wait until the Q and A session, where they can be answered

Today’s event

Joanne Boyle, Digital Health & Care Innovation Centre

Agenda

- 1100 – Welcome and introductions – **Joanne Boyle**
- 1110 – Keynote – The Scottish Brain Health Service Model – **Craig Ritchie**
- 1210 – Refreshment break
- 1215 – Partner update – **Scottish Enterprise**
- 1230 – UKRI Healthy Ageing Challenge Update - **Julia Glenn**
- 1240 – Dementia Open innovation Challenge - **Suzanne Graham**
- 1250 – Commercial industry pre-recorded showcase videos
- 1255 – Final comments – **Joanne Boyle**
- 1300 – Event close

Welcome and introductions

Joanne Boyle, Digital Health & Care Innovation Centre

An Introduction to Scotland's Healthy Ageing Innovation Cluster

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The Scottish Brain Health Service Model

Craig Ritchie

Brain Health Scotland

Brain Health Scotland

National Delivery and Global Leadership

"The First Little Domino"

Prof Craig Ritchie
Professor Psychiatry of Ageing
University of Edinburgh
Director Brain Health Scotland

Your brain is amazing.
Let's keep it that way.

Alzheimer Scotland
Action on Dementia

Scottish Government
Riaghaltas na h-Alba
gov.scot

Overview of presentation

Brain Health Scotland

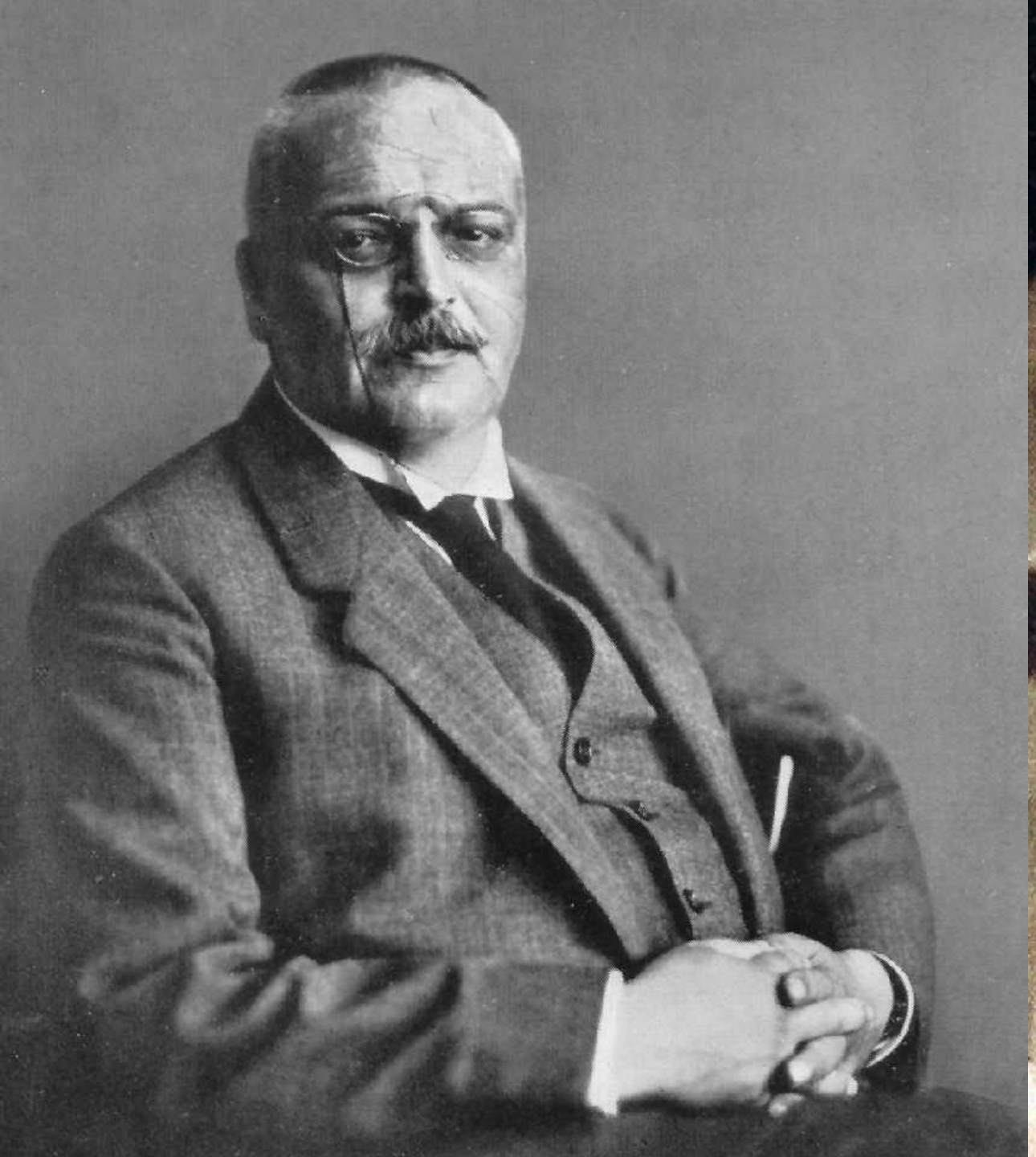
Disease before dementia

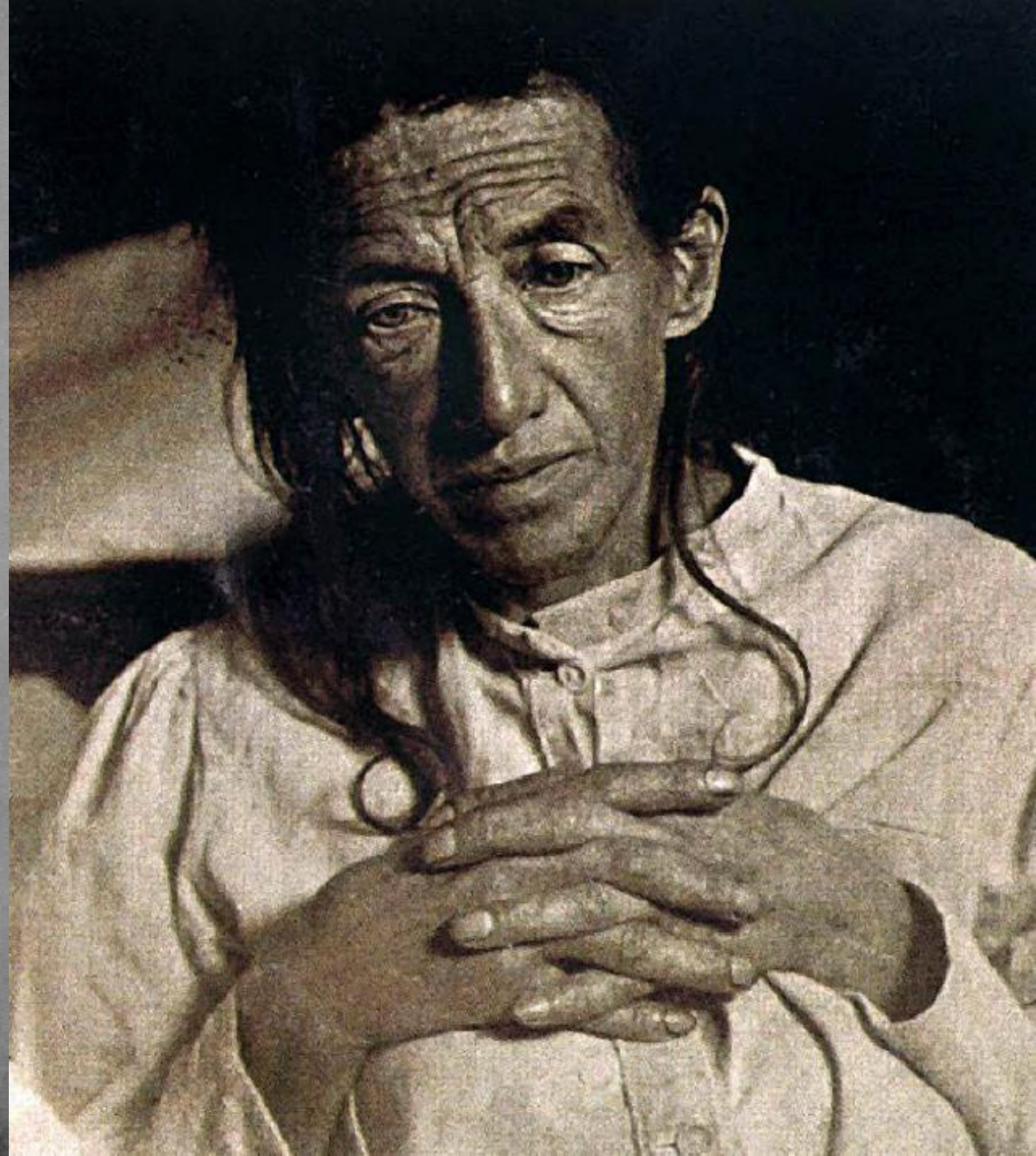
- The research direction
- PREVENT Dementia Measurement of a ‘relevant’ early pathology
- European Prevention of Alzheimer’s Dementia (EPAD)

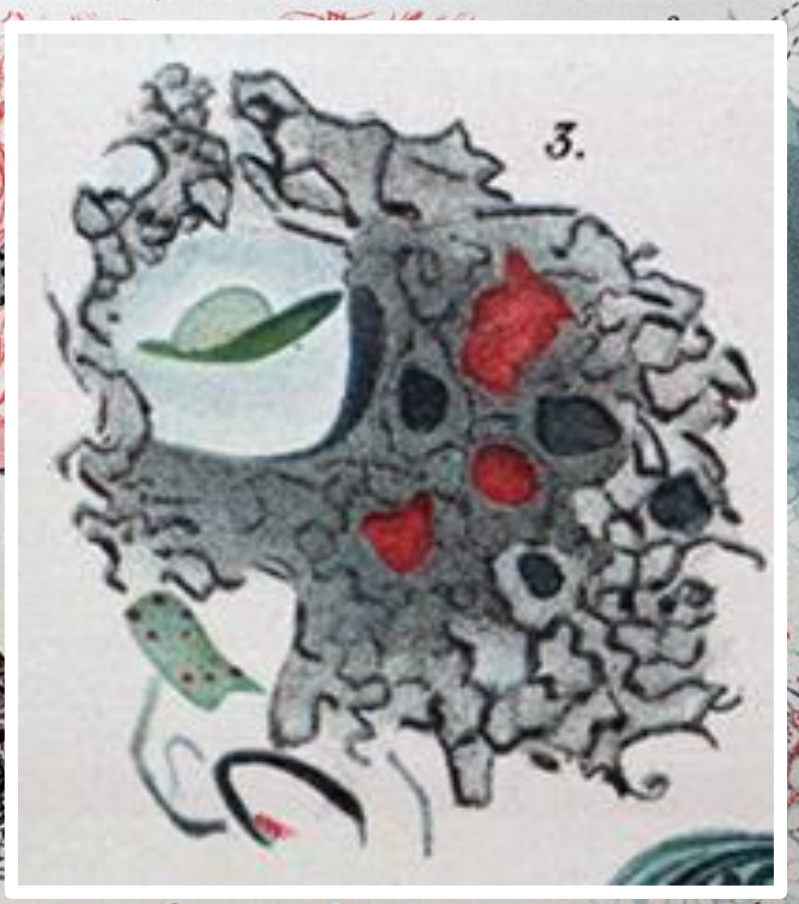
Translation from Research into Practice

- The Brain Health Scotland ‘Ecosystem’

Translating Practice into Investment



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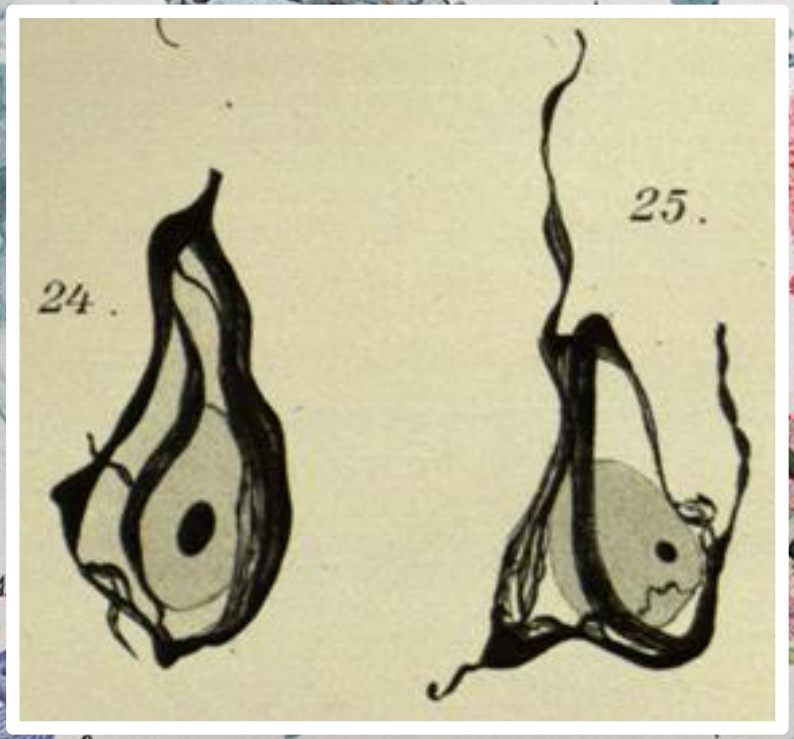
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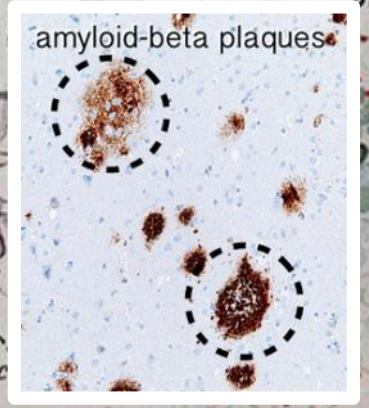
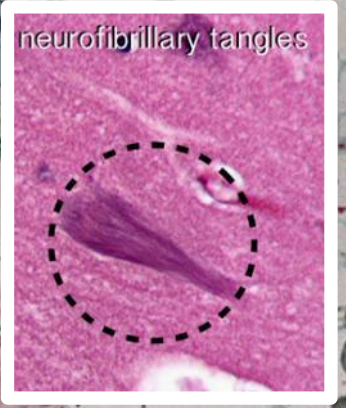

amyloid-beta plaques


neurofibrillary tangles

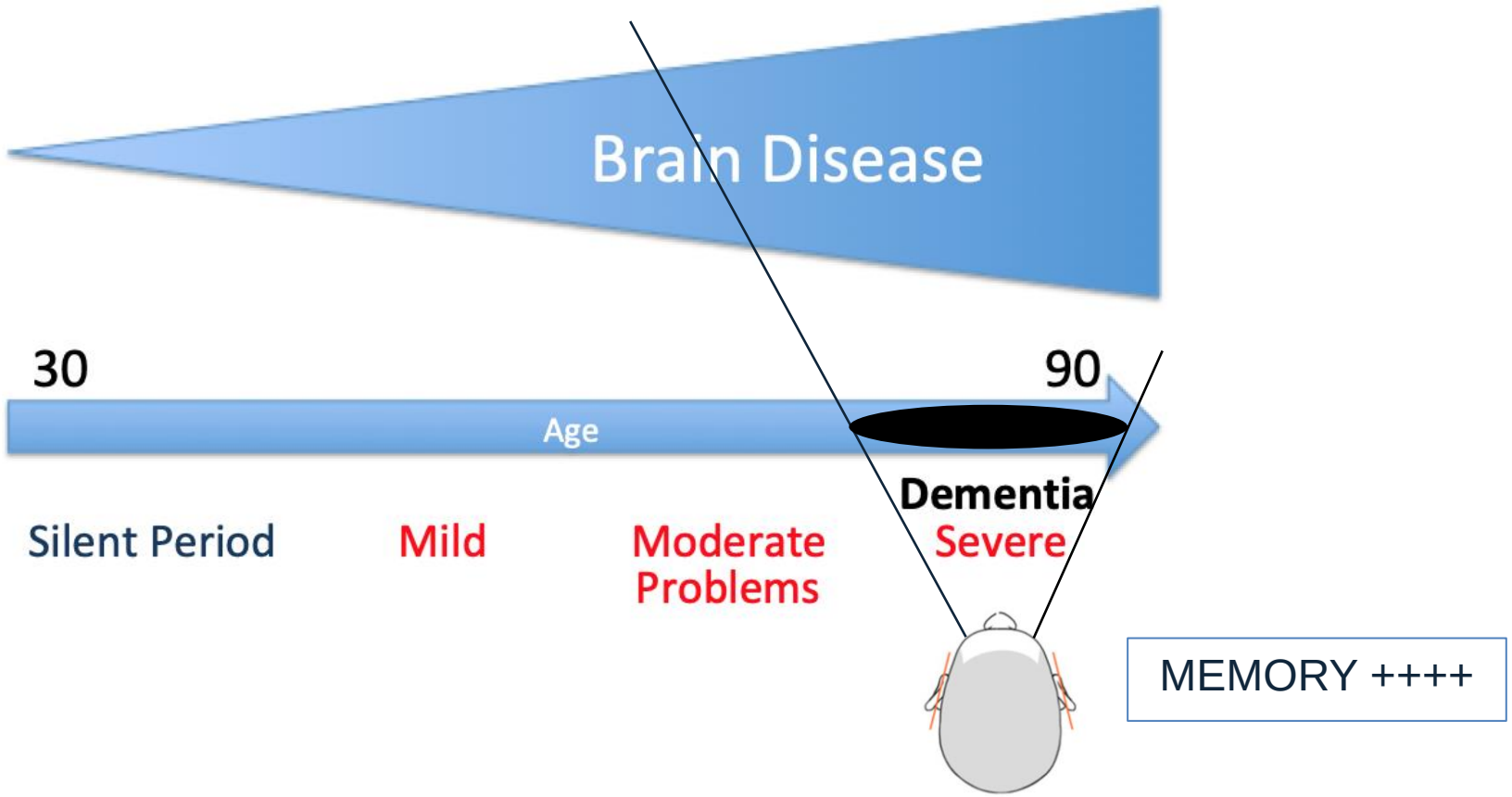
Dementia

Brain Health Scotland

- The term dementia is (quite rightly) under threat!
- **SCIENCE v SYNDROME**
- The 1990s saw the scientific breakthrough giving us the ability to measure neurodegenerative disease through brain imaging and spinal fluid
- Alzheimer’s disease itself could be ‘measured’

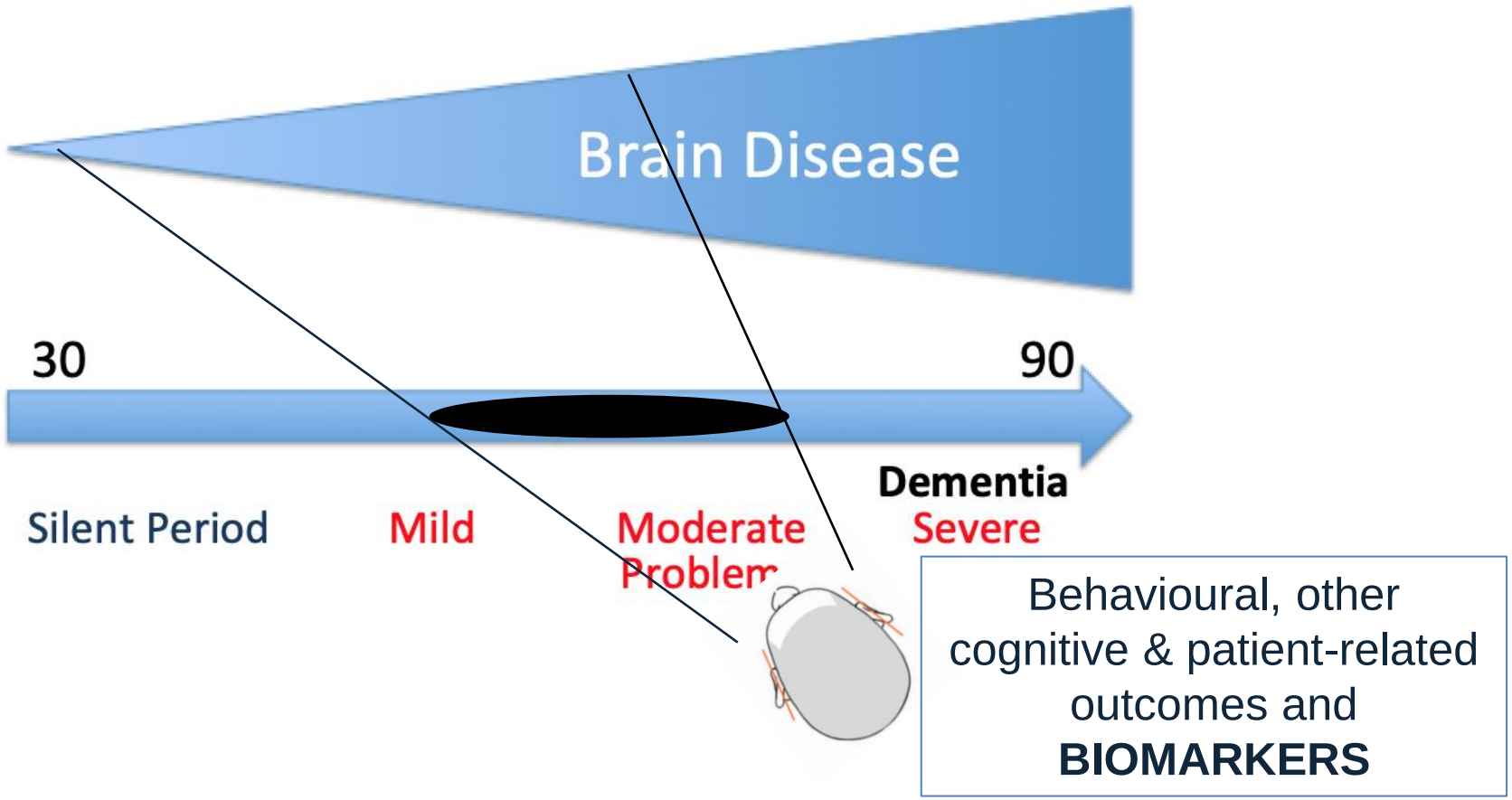
The world (until now) has only seen neurodegenerative brain disease through the ‘peep hole’ of ‘dementia’

Brain Health Scotland



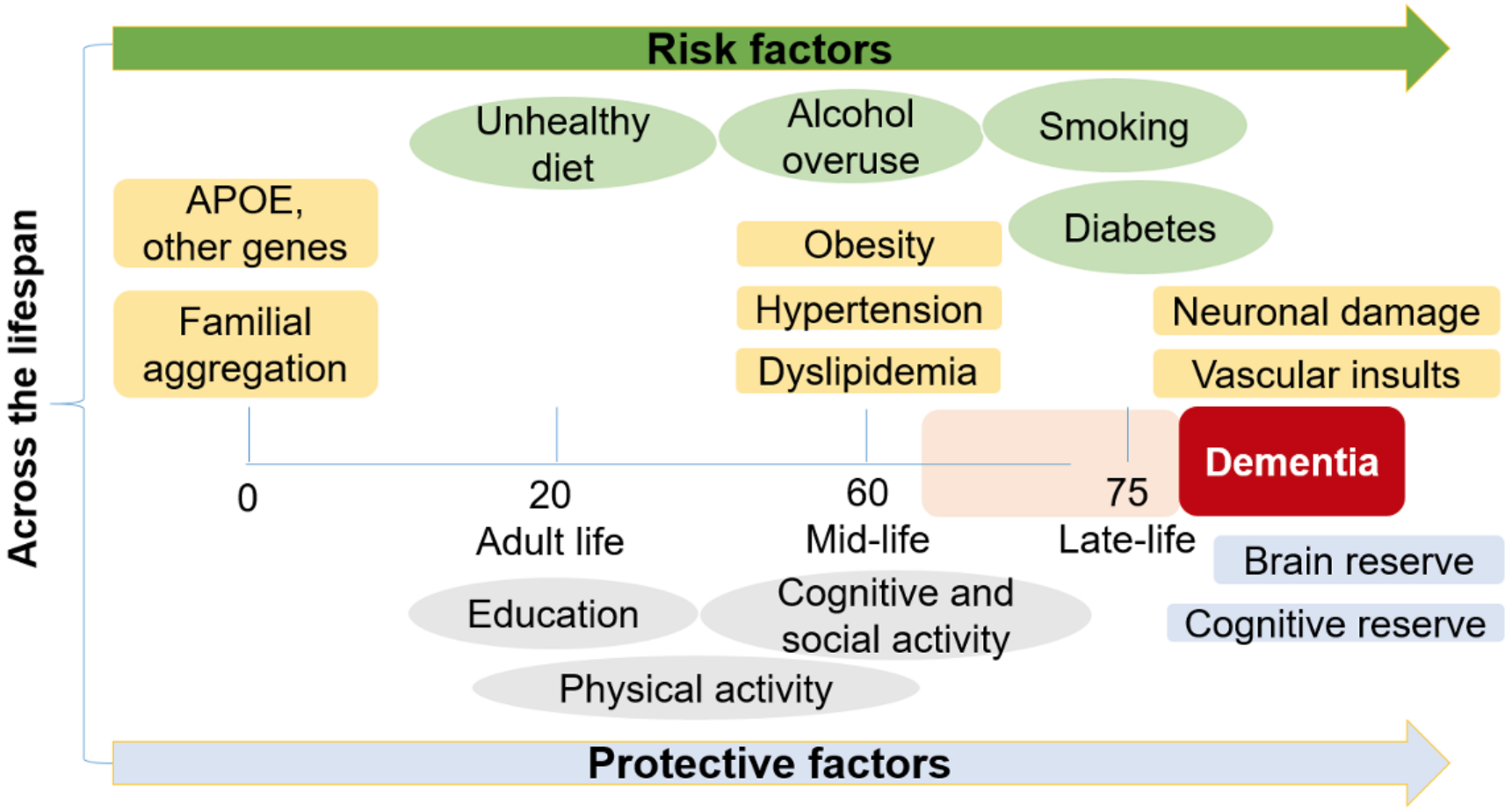
In the very near future we will have a clinical and research focus for people with much earlier stages of neurodegenerative brain disease…

Brain Health Scotland



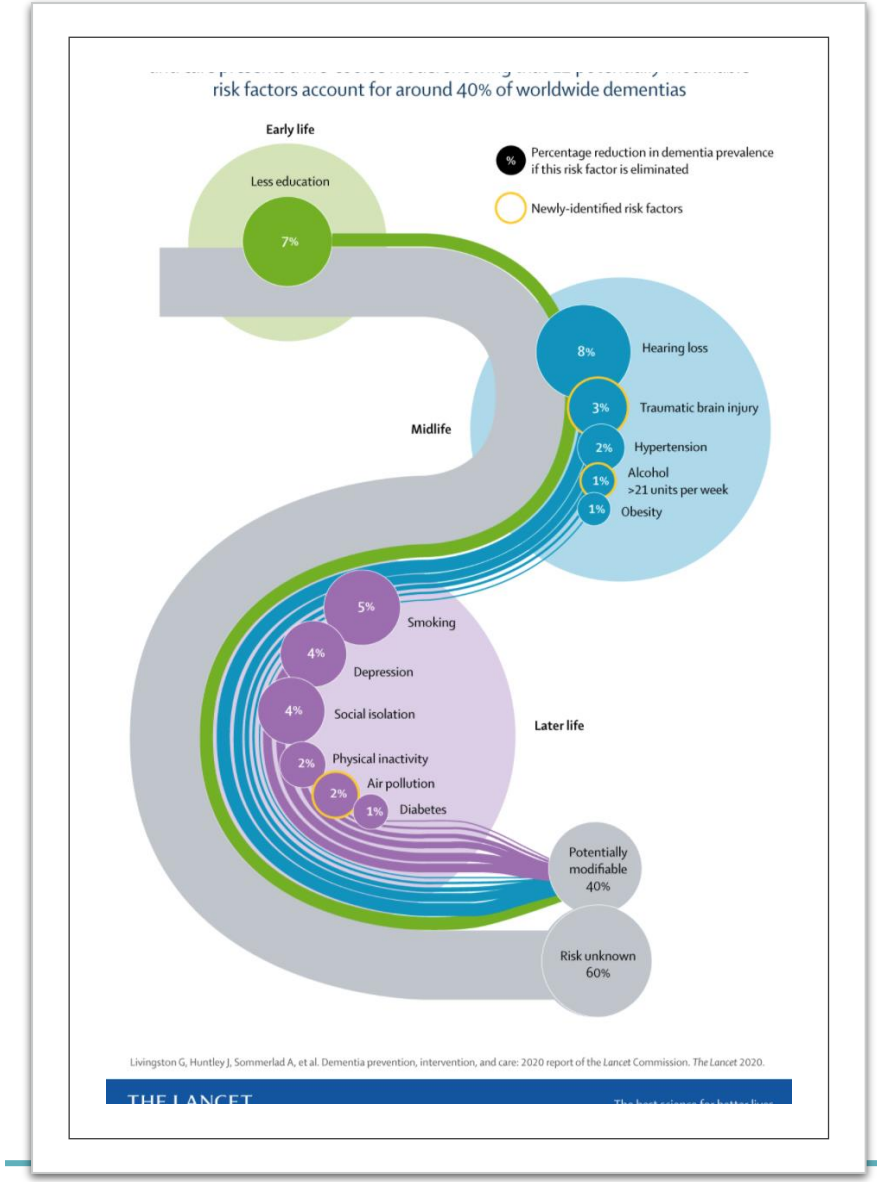
Behavioural, other cognitive & patient-related outcomes and **BIOMARKERS**

Complex interaction of risks



- **Fixed risks** (e.g. genetics)
- **Modifiable risks** (e.g. diet)
  - High potency acute risks (e.g. head injury)
  - Low potency chronic risks (e.g. obesity)
- **Critical period of risk on disease**
  - Precipitation
  - Perpetuation
  - Prevention

Figure adapted from Sindi S, *et al F1000Prime Rep*. 2015;7;50.



Brain Health Scotland

Lancet Commission Report sets epidemiological framework for risk factor interventions

Challenges:

Clinical:

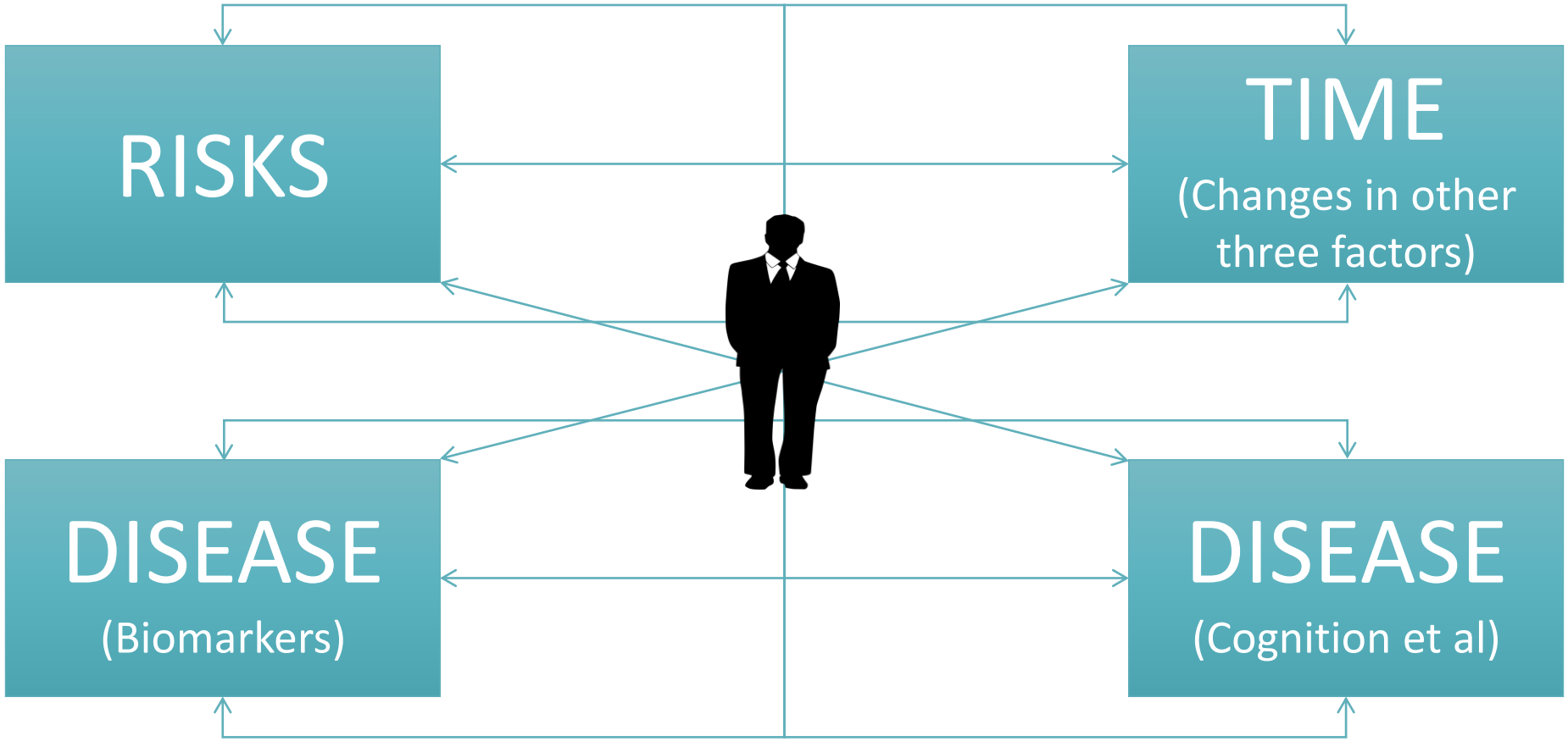
Turning epidemiological observations into actionable individual prevention plans and public health policy

Scientific:

Determining mechanistic underpinnings to observations

Four factor modeling
(Using Artificial Intelligence approaches)

Brain Health Scotland



The PREVENT Dementia Project

Population: n=700 aged 40-59 at baseline with up to 5 years of Follow Up in 5 Centers in UK and Ireland

Funded: Alzheimer's Society (UK) and Alzheimer's Association (US)

Objective: To identify risk/disease interactions in an at-risk population in mid-life

prevent dementia

UNIVERSITY OF CAMBRIDGE
Imperial College London
Inserm
THE UNIVERSITY of EDINBURGH
Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin
UNIVERSITY OF OXFORD

Risk Factor Assessment in PREVENT Dementia Programme

Domain	Risk	Measurement
Principal Risk Model	ApoE Genotype	
	Family History	
Genetic	ApoE and GWAS	
Environmental	Diet	Scottish Food Frequency Questionnaire
	Life-events	Life Stressor Checklist
	Sleep	Pittsburgh Sleep Evaluation
	Exercise	Study Proforma
Clinical	Head Injury	Brain Injury Screening Questionnaire
	Inflammation	Biomarkers
	Cardiovascular/Metabolic Syndrome	Biomarkers/ECG/History and Examination
	Depression	CED-D
	Respiratory	Spirometry/History and Examination
	Stress	Salivary Cortisol/Resilience Questionnaire
	Endocrine	Haematology/Biochemistry and History & Examination

Expression of Disease in PREVENT Dementia Programme

Domain	Modality	Measurement
Neuroimaging	MRI	fMRI with task, Magnetic Resonance Spectroscopy, Diffusion Tensor Imaging, vMRI, WML volume
	PET	PET-Tau and Amyloid Imaging (sub-studies)
Retinal Imaging		Fundus photography, OCT
Wet Lab Biomarkers	CSF	Crick
	Blood	Insulin
	Urine	
	Saliva	Cortisol
Cognition	Global	
	Binding Paradigms	
	Visuospatial	

Sub-studies

- AIP (Amyloid Imaging in PREVENT) Capacity n=300
- 7T MRI Study (Cambridge) n=50 (Scanned) and n=300 (VR)
- Retinal Imaging (Edinburgh Only) n=85 (95% agree) target 100+ (18 have year 2 Imaging)
- PET Tau (n=50)
- Language analysis
  - Dialogue (Edinburgh MRC Fellowship)
  - Syntax (Cardiff) n= 115
- Lab work (Edinburgh)
  - Global Screening Array (Edinburgh)
  - Mass Spec Proteomics (Crick Institute)
  - Salivary Cortisol (Edinburgh)
- Oral Health [Edinburgh]
- **PREVENT RFC**
  - **Edinburgh Site (n=50)**
- Intimate Partner Violence
  - Drake Foundation

prevent dementia

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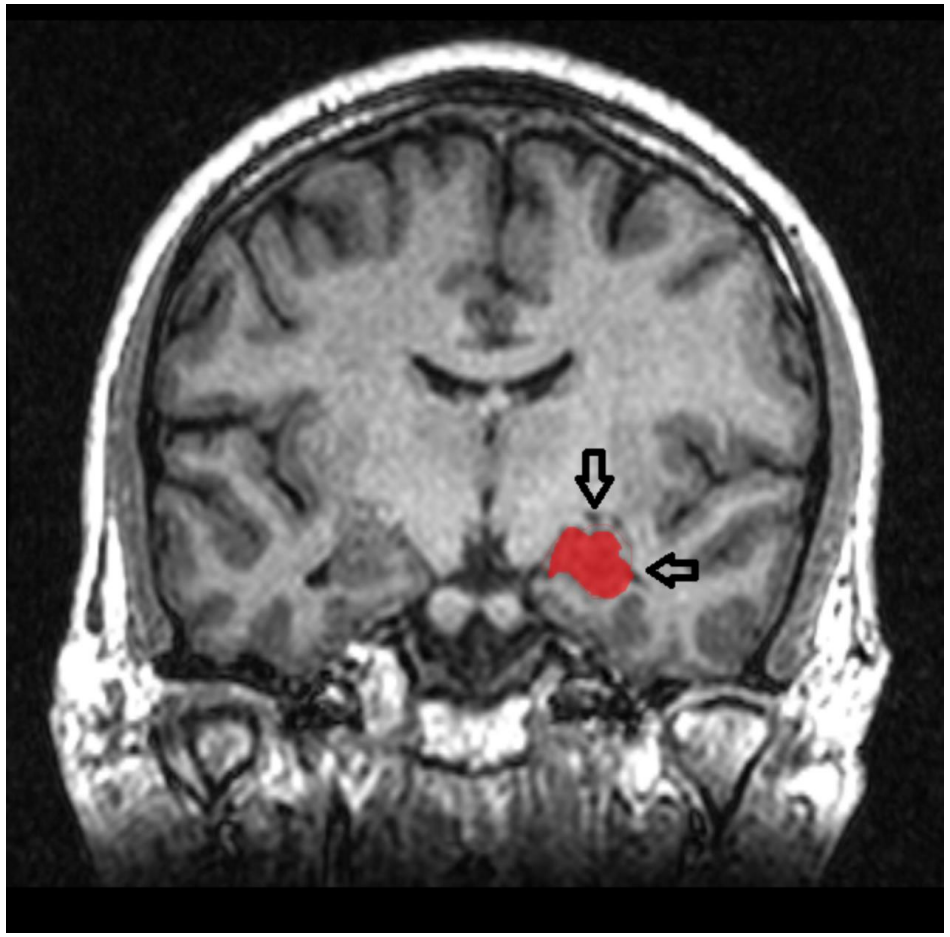
THE UNIVERSITY of EDINBURGH Trinity College Dublin Coláiste na Tríonóide, Baile Átha Cliath The University of Dublin UNIVERSITY OF OXFORD

Alzheimer's disease 'starts' in the Hippocampus

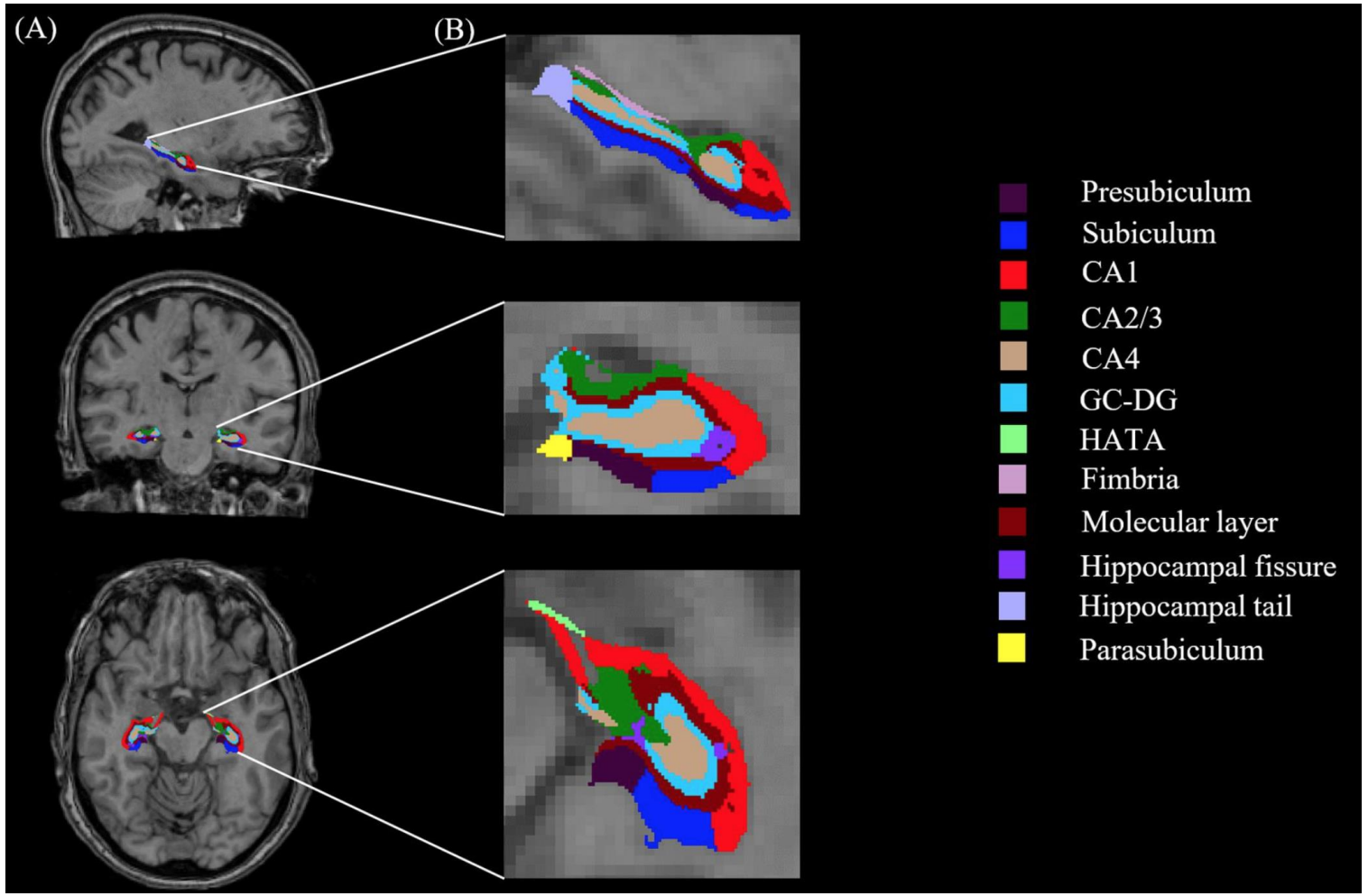
Testing the hippocampus….



Alzheimer's disease 'starts' in the Hippocampus

Testing the hippocampus….

Hippocampal Subfields….



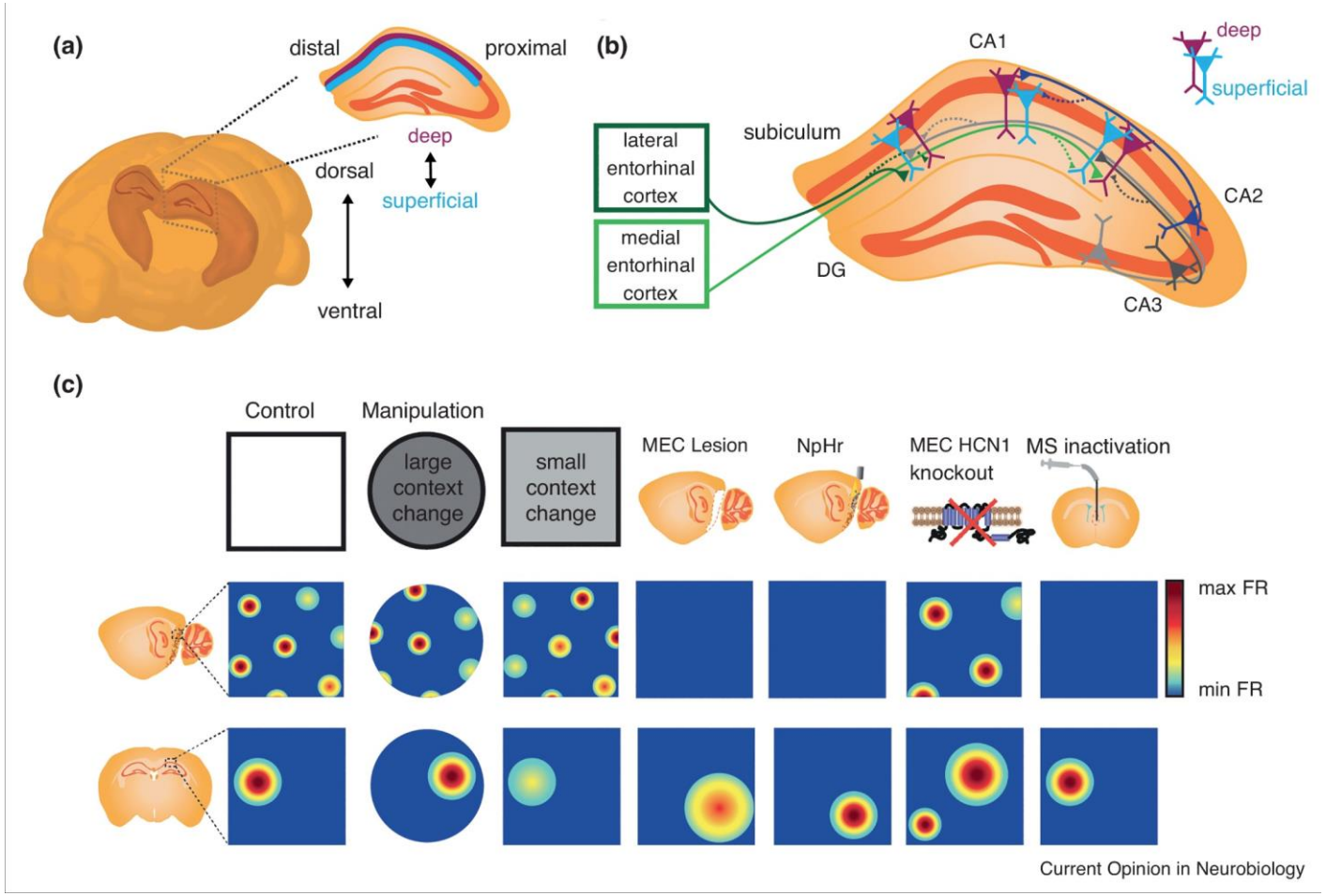
Can we detect neurodegenerative diseases at a stage their course can be impacted upon?

Alzheimer's disease 'starts' in the Hippocampus

Testing the hippocampus….

Hippocampal Subfields….

Hippocampal Place Cells….



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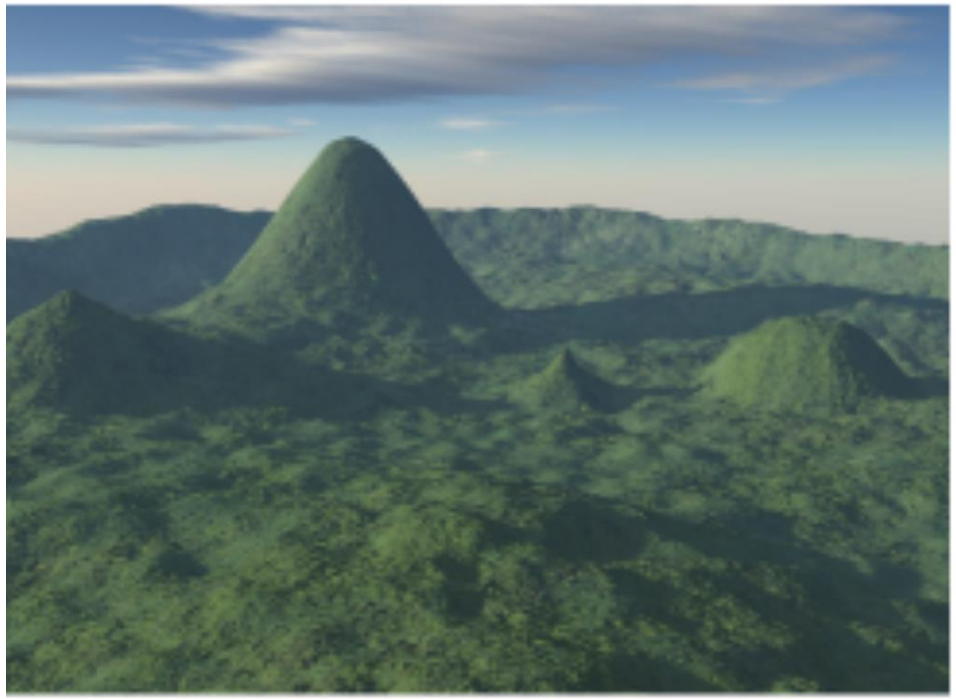

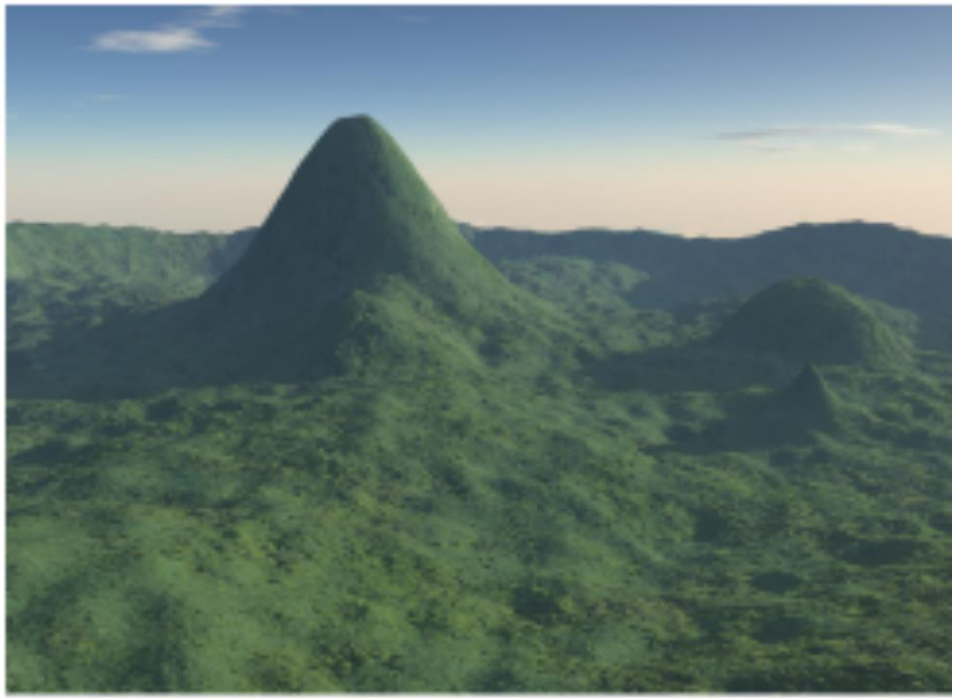

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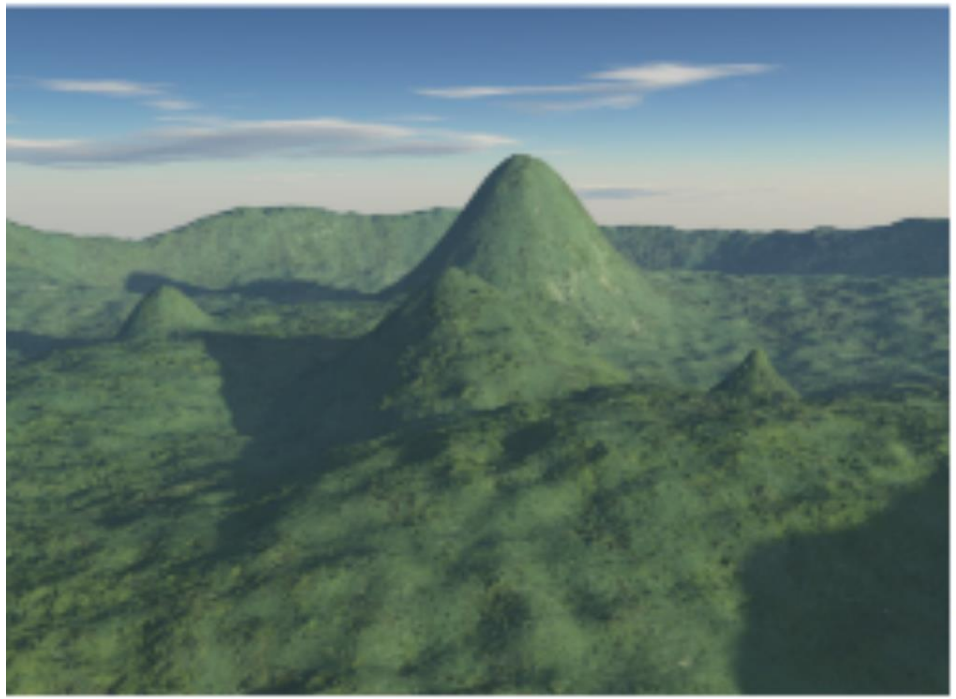

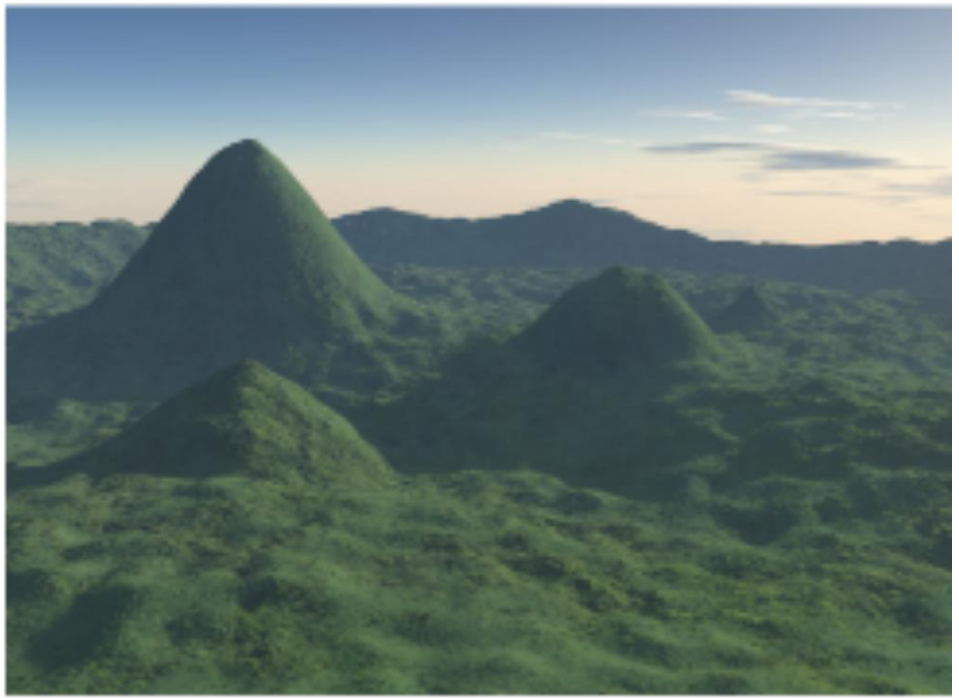

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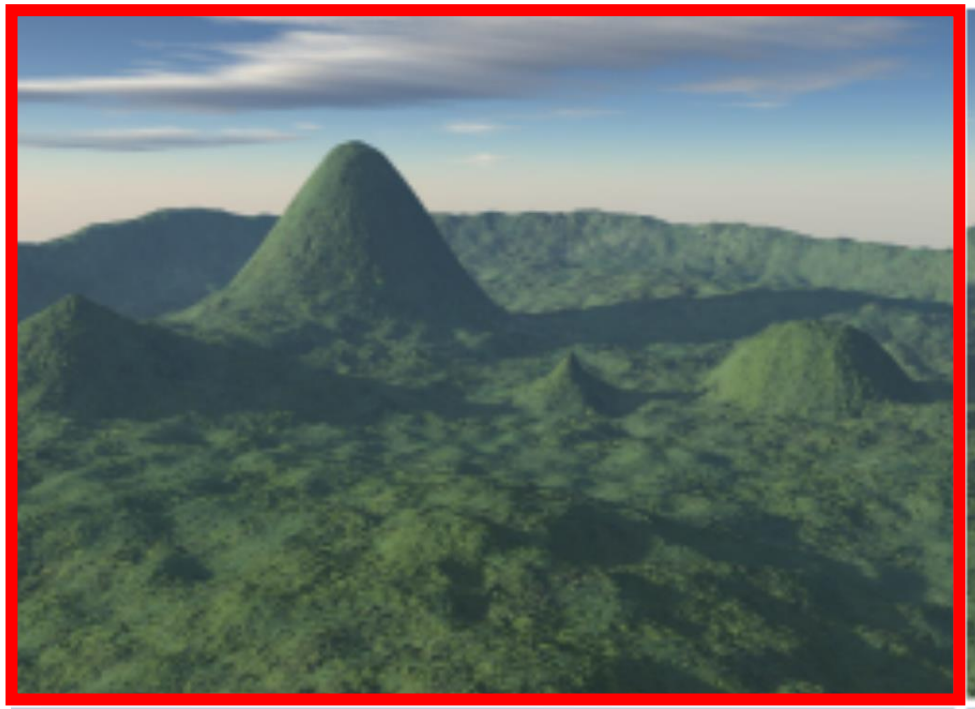

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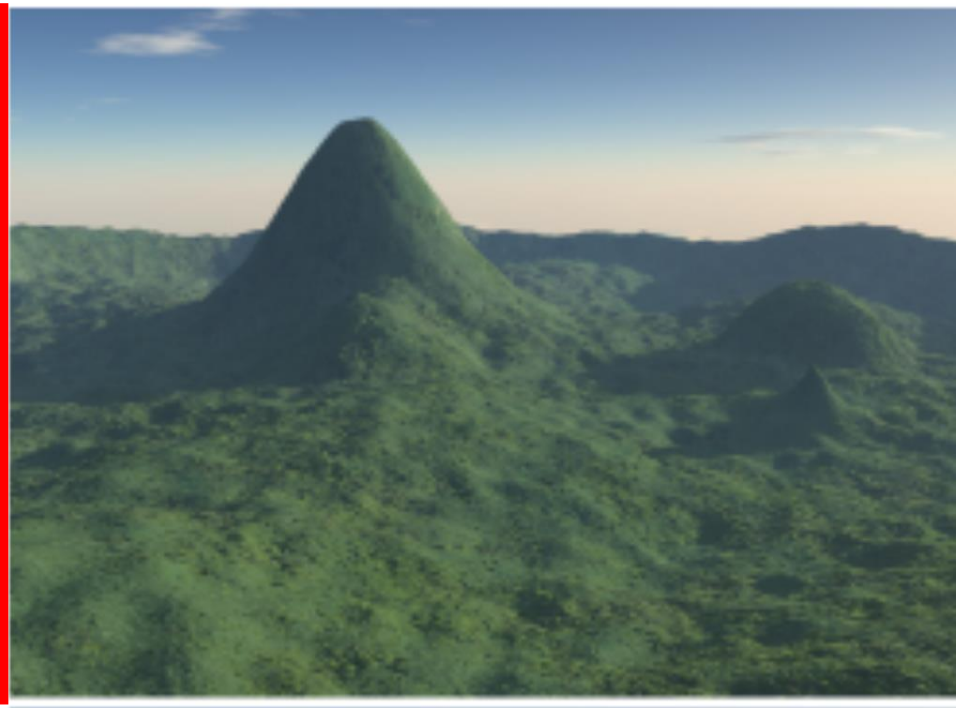

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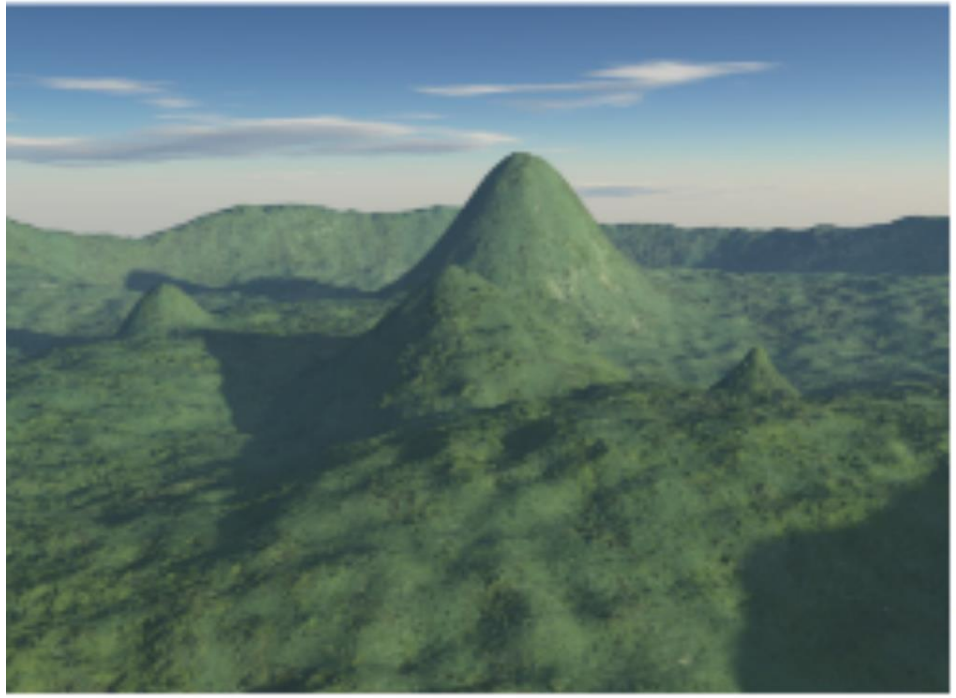


D

Can we detect neurodegenerative diseases at a stage their course can be impacted upon?

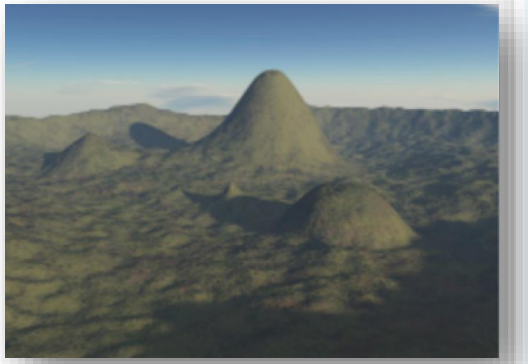
Alzheimer's disease starts in the Hippocampus

Ritchie K. et al., 2018

'A significant negative association was found between the DRS and 4MT (Spearman Correlation – 0.26, p=0.0006)'

CAIDE SCORE*

- Weight
- Age
- Sex
- Education
- ApoE
- Systolic Blood Pressure
- BMI
- Total Cholesterol
- Physical Activity



4 Kivipelto M, Ngandu T, Laatikainen T, *et al*. Risk score for the prediction of dementia risk in 20 years among middle aged people: a longitudinal, population-based study. *Lancet Neurol* 2006;5:735–41.

Allocentric and Egocentric Spatial Processing in Middle-Aged Adults at High Risk of Late-Onset Alzheimer's Disease: The PREVENT Dementia Study

Article type: Research Article

Authors: Ritchie, Karen[a; b; 1; *] | Carrière, Isabelle[a; b; 1] | Howett, David[c] | Su, Li[d] | Hornberger, Michael[e] | O'Brien, John T.[d] | Ritchie, Craig W.[b] | Chan, Dennis[c]

Affiliations: [a] INSERM, University of Montpellier, Neuropsychiatry: Epidemiological and Clinical Research, Montpellier, France | [b] Centre for Dementia Prevention, University of Edinburgh, UK | [c] Department of Clinical Neurosciences, University of Cambridge, UK | [d] Department of Psychiatry, University of Cambridge, Cambridge, UK | [e] Norwich Medical School, University of East Anglia, Norwich, UK

Correspondence: [*] Correspondence to: Karen Ritchie, Inserm Unit1061: Neuropsychiatry, La Colombière Hospital, 39 Ave Charles Flahault, 34093 Montpellier Cedex 5, France. E-mail: karen.ritchie@inserm.fr.

Note: [1] These authors contributed equally to this work.

Abstract: Impairments in spatial processing due to hippocampal degeneration have been observed in the years immediately preceding the diagnosis of Alzheimer's disease (AD) dementia. The demonstration of changes in spatial processing in preceding decades would provide a cognitive marker for pre-clinical AD and an outcome measure for early intervention trials. The present study examined allocentric and egocentric spatial processing in relation to future dementia risk in a middle-aged cohort. The CAIDE Dementia Risk Score (DRS) was calculated for 188 persons aged 40 to 59, of whom 94 had a parent with dementia. Participants underwent the Four Mountains Test (4MT) of allocentric spatial processing, the Virtual Reality Supermarket Trolley Task (VRSTT) of egocentric spatial processing, and 3T MRI scans. A significant negative association was found between the DRS and 4MT (Spearman correlation – 0.26, p=0.0006), but not with the VRSTT. The 4MT was also found to be a better predictor of risk than tests of episodic memory, verbal fluency, or executive functioning. The results suggest that allocentric rather than egocentric processing may be a potential indicator of risk for late-onset AD, consistent with the hypothesis that the earliest cognitive changes in AD are driven by tau-related degeneration in the medial temporal lobe rather than amyloid-only deposition in the medial parietal lobe.

Keywords: Alzheimer's disease, cognition, diagnosis, magnetic resonance imaging, neuropsychology, preclinical, prognosis, spatial memory

DOI: 10.3233/JAD-180432

Journal: Journal of Alzheimer's Disease, vol. 65, no. 3, pp. 885-896, 2018

Neurobiology of Aging 91 (2020) 36–44

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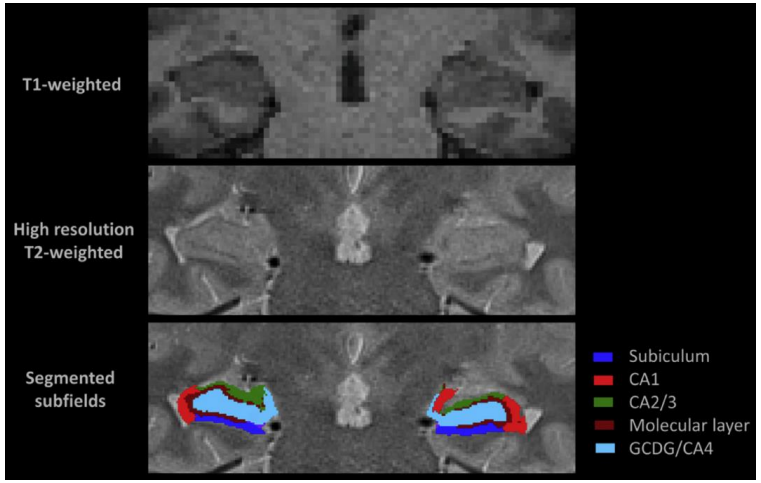
Neurobiology of Aging

journal homepage: www.elsevier.com/locate/neuaging

Volumetric alterations in the hippocampal subfields of subjects at increased risk of dementia

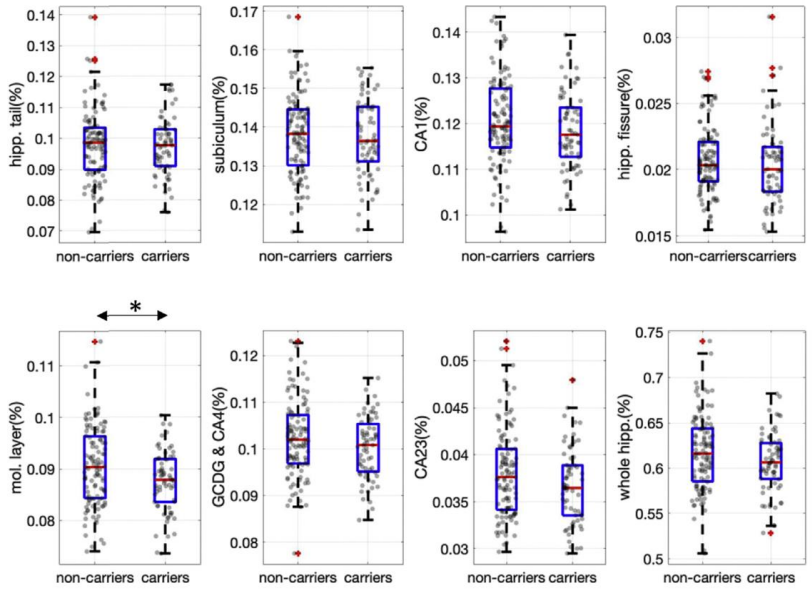
Maria-Eleni Dounavi[a], Elijah Mak[a], Katie Wells[b], Karen Ritchie[c,d], Craig W. Ritchie[d], Li Su[a,1,*], John T. O' Brien[a,1]

[a] Department of Psychiatry, School of Clinical Medicine, Addenbrooke's Hospital, University of Cambridge, UK
[b] The Centre for Psychiatry, Imperial College, London, UK
[c] INSERM, University of Montpellier, Neuropsychiatry: Epidemiological and Clinical Research, Montpellier, France
[d] Centre for Dementia Prevention, University of Edinburgh Centre for Clinical Brain Sciences, Edinburgh, UK

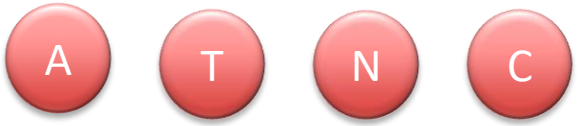


In PREVENT Dementia Cohort at Baseline (n=180) and 2-year FU (n=156): there was a significant association (p<0.05) between ApoEe4 status and atrophy of molecular layer of hippocampus. A region believed to be an early region for NFT build up (Braak and Braak, 1997l Thal, 2000)

APOE genotype



In terms of measuring outcomes – could these imaging biomarkers be a specific measure of disease related temporally to an early manifestation of (preclinical) disease. If downstream from amyloid aggregation and NFT deposition in a focal area of relevance (i.e. where 'total' measures of Aβ and Tau in e.g. CSF are not substantial enough to be notable), then possible outcome for both anti-amyloid and anti-tau strategies in high-risk populations



Not measurable in high-risk preclinical population in early 50's using traditional MRI and cognitive tests

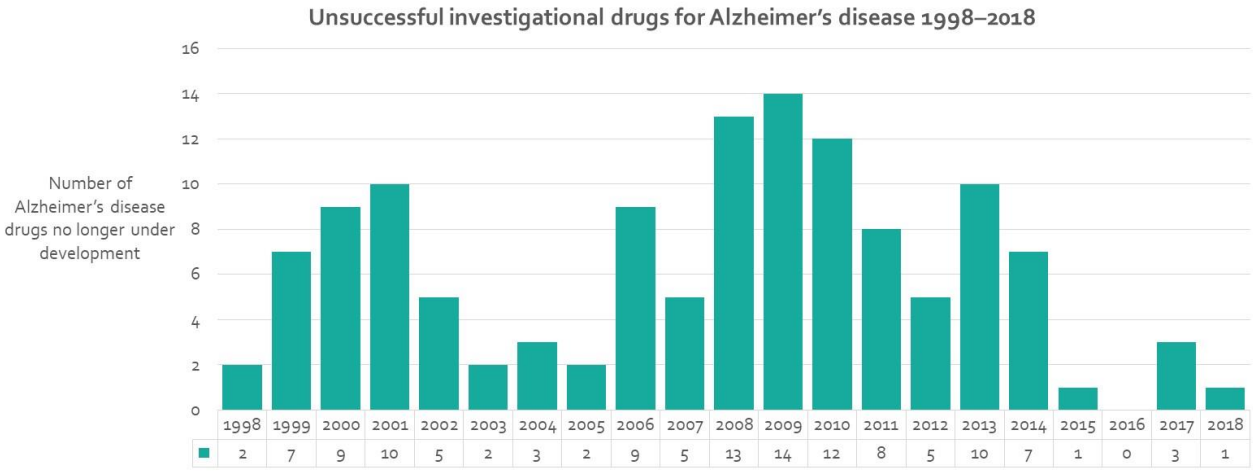
EPAD

European Prevention of
Alzheimer's Dementia Consortium

imi innovative medicines initiative

Why EPAD?

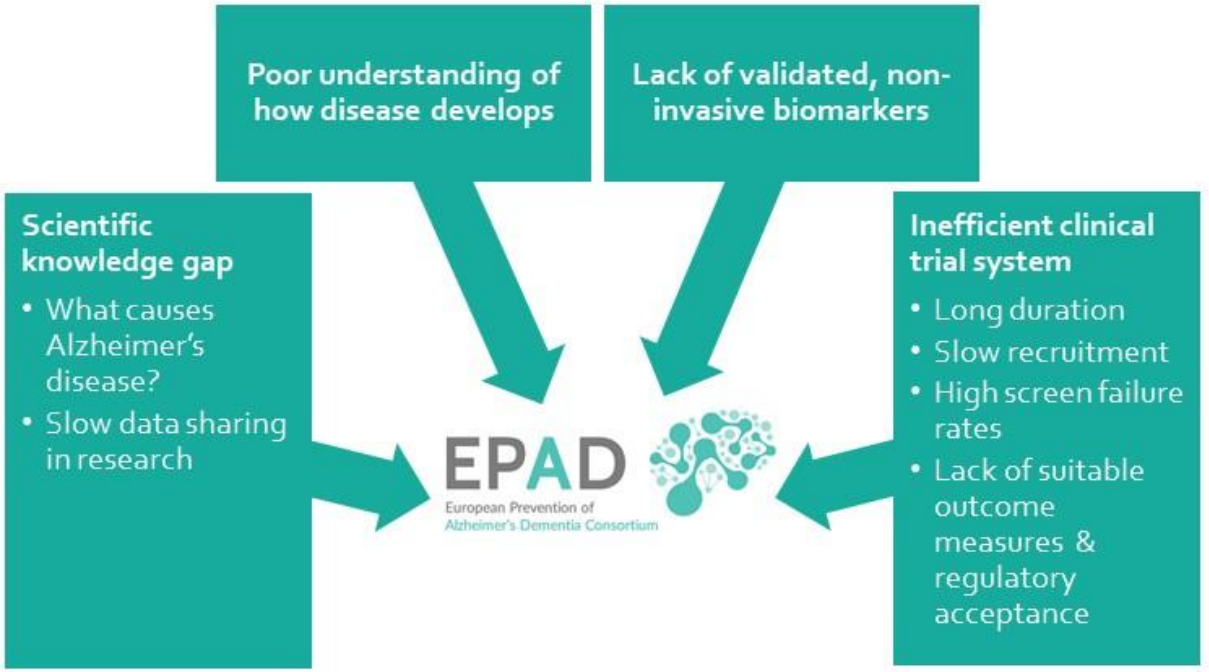
EPAD
European Prevention of Alzheimer's Dementia Consortium



€64M IMI Funded Project led from Edinburgh

39 Partners in largest ever AD Public Private Partnership

At peak 450 people working on the programme



EPAD aims to develop a platform that efficiently enables the undertaking of adaptive Proof of Concept studies for early and accurate decisions on the development of drug candidates or drug combinations for the prevention of Alzheimer's dementia

imi innovative medicines initiative

The EPAD Consortium

EPAD
European Prevention of Alzheimer's Dementia Consortium

Academia

THE UNIVERSITY of EDINBURGH
UNIVERSITY OF OXFORD
barcelonaβeta Brain Research Center
Karolinska Institutet
VUmc VU University Medical Center Amsterdam
UNIVERSITY OF CAMBRIDGE
MRC Biostatistics Unit
UNIVERSITÉ DE GENÈVE
Radboudumc
CARDIFF UNIVERSITY PRIFYSGOL CAERDYDD
Hôpitaux de Toulouse
Erasmus MC
Inserm
University of Leicester
Fraunhofer FHR

SMEs

SYNAPSE
Berry Consultants Statistical Innovation
aridhia
IXICO

Patient Organisation

Alzheimer Europe

Other industry

QUINTILES
Araclon Biotech GRIFOLS

www.ep-ad.org

EFPIA

janssen
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SANOFI
NOVARTIS
Boehringer Ingelheim
Lilly
Lundbeck
Takeda
Roche
AC IMMUNE
Biogen
AMGEN
Pfizer
Inspired by patients. Driven by science.

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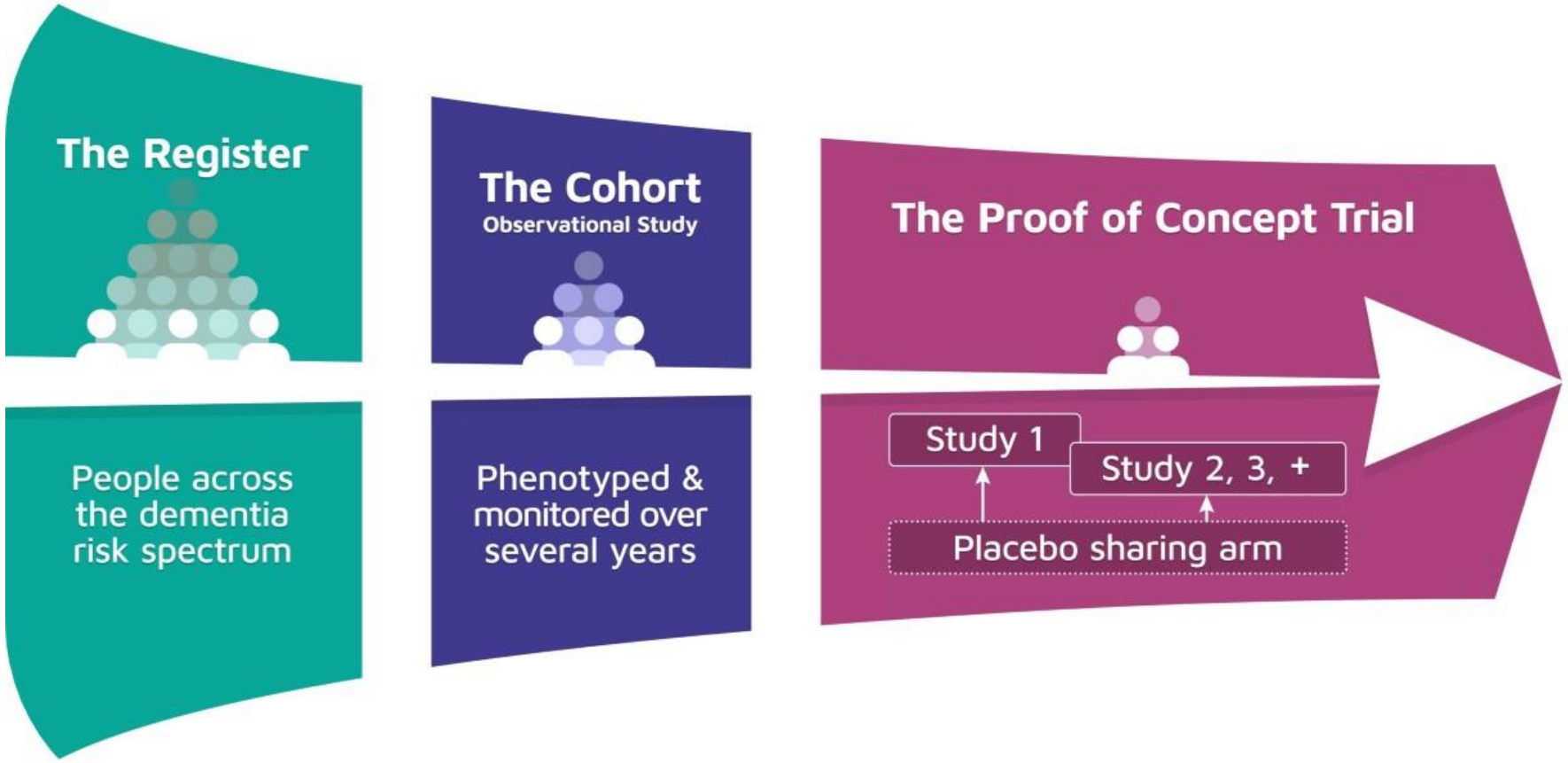
The EPAD Flow



EPAD LCS

- Ultimately 1,828 research
- participants were recruited across
- 29 sites in 8 countries.

- ADDI for data, images and samples
  - 157 Data Access Requests
  - Alchemab and Hummingbird samples shared*
    - (Both ADDF Funded)

- In Scotland, Barcelona and Amsterdam a proposal with DAC is ongoing to provide a full review of the 781 research participants (42.7%) from those centers in the TriBECA consortium
  - Hopefully act as catalyst for other centers to seek funding to follow up participants

Data Request Global Distribution

Country	Requests
UK	70
Netherlands	15
USA	17
Spain	10
Germany	13
Sweden	8
France	6
Belgium	6
Canada	3
Japan	3
Greece	3
Ireland	2
Australia	2
India	2
China	3
Italy	2
Pakistan	1
Brazil	1
Ecuador	1
Turkey	1
Israel	2
Luxembourg	1
Thailand	1
Switzerland	1
Denmark	2
Ukraine	1

Total data requests: 180

	V1	V3	V4	V5	Totals
Visits	1828	1188	396	89	3,501
CSF	1673	341	204	7	2225
MRI Scan	1800	609	255	6	2,670

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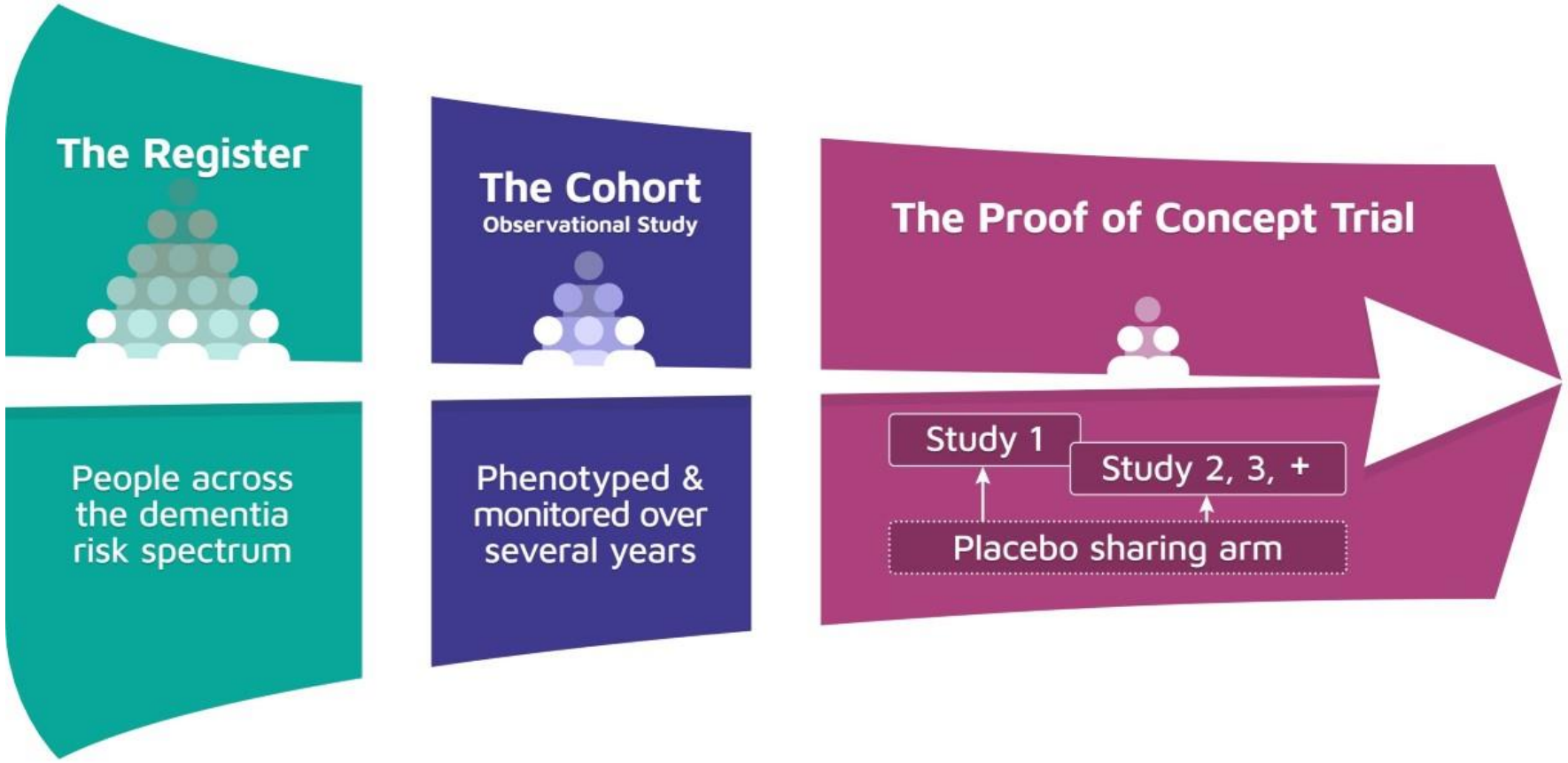
Davos Alzheimer's Collaborative

EPAD European Prevention of Alzheimer's Dementia Consortium

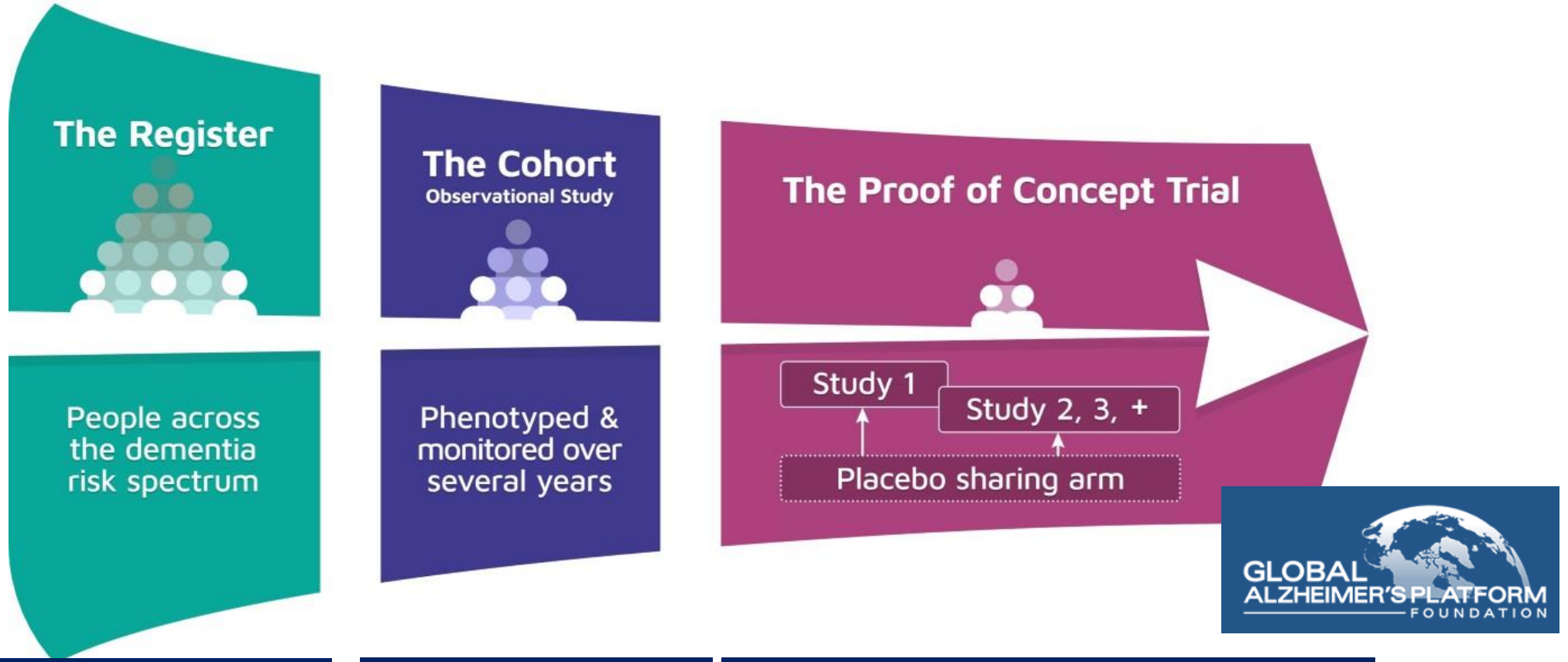
ADDI Alzheimer's Disease Data Initiative

The EPAD Flow



Translating EPAD Learnings and Knowledge in the design of a National Dementia Prevention Ecosystem

EPAD
European Prevention of Alzheimer's Dementia Consortium



Scottish Brain Health Register

Brain Health Clinics

A Scottish Trials Platform for Alzheimer's disease

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Brain Health Scotland

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Action on Dementia

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Brain Health Scotland

Research into practice

Your brain is amazing.
Let's keep it that way.

Anna Borthwick
Executive Lead
Brain Health Scotland

Craig Ritchie
Director
Brain Health Scotland
Prof of Psychiatry of Ageing
University of Edinburgh

Henry Simmons
Associate Director
Brain Health Scotland
CEO Alzheimer Scotland

Brain Health Scotland

Alzheimer Scotland
Action on Dementia

Scottish Government
Riaghaltas na h-Alba
gov.scot

Brain Health Scotland

Whole System Innovation

Your brain is amazing.
Let's keep it that way.

Anna Borthwick
Executive Lead
Brain Health Scotland

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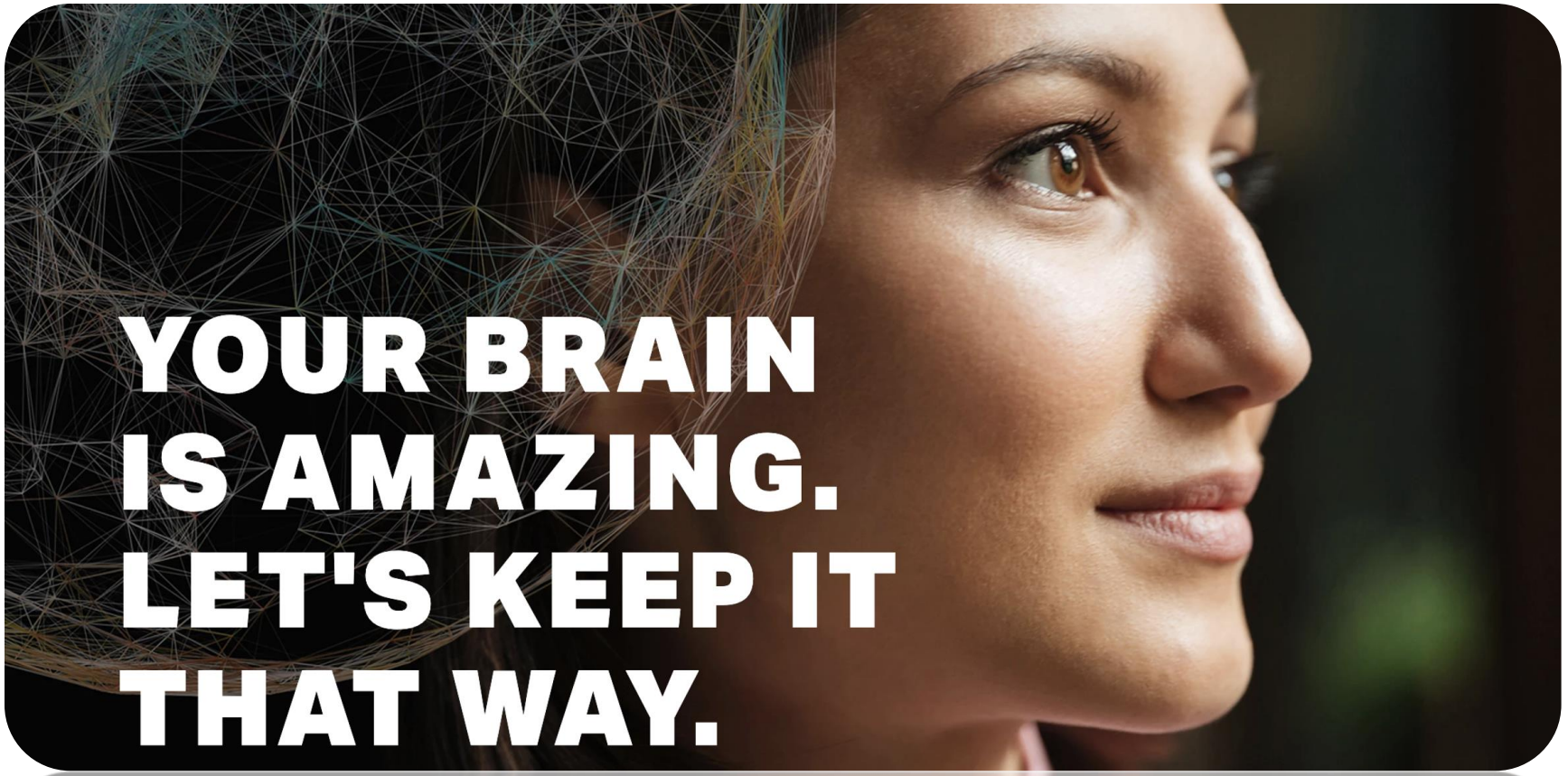


From 2020 **Brain Health Scotland** will deliver a reduction of incidence rates of dementia year-on-year so that we all benefit from the lowest rates in the world

Figure 1. Pyramid of approaches to reduce incident dementia in Scotland, from public health interventions for the Scottish population (bottom tier) to clinical Brain Health Services for the individual (top tier)

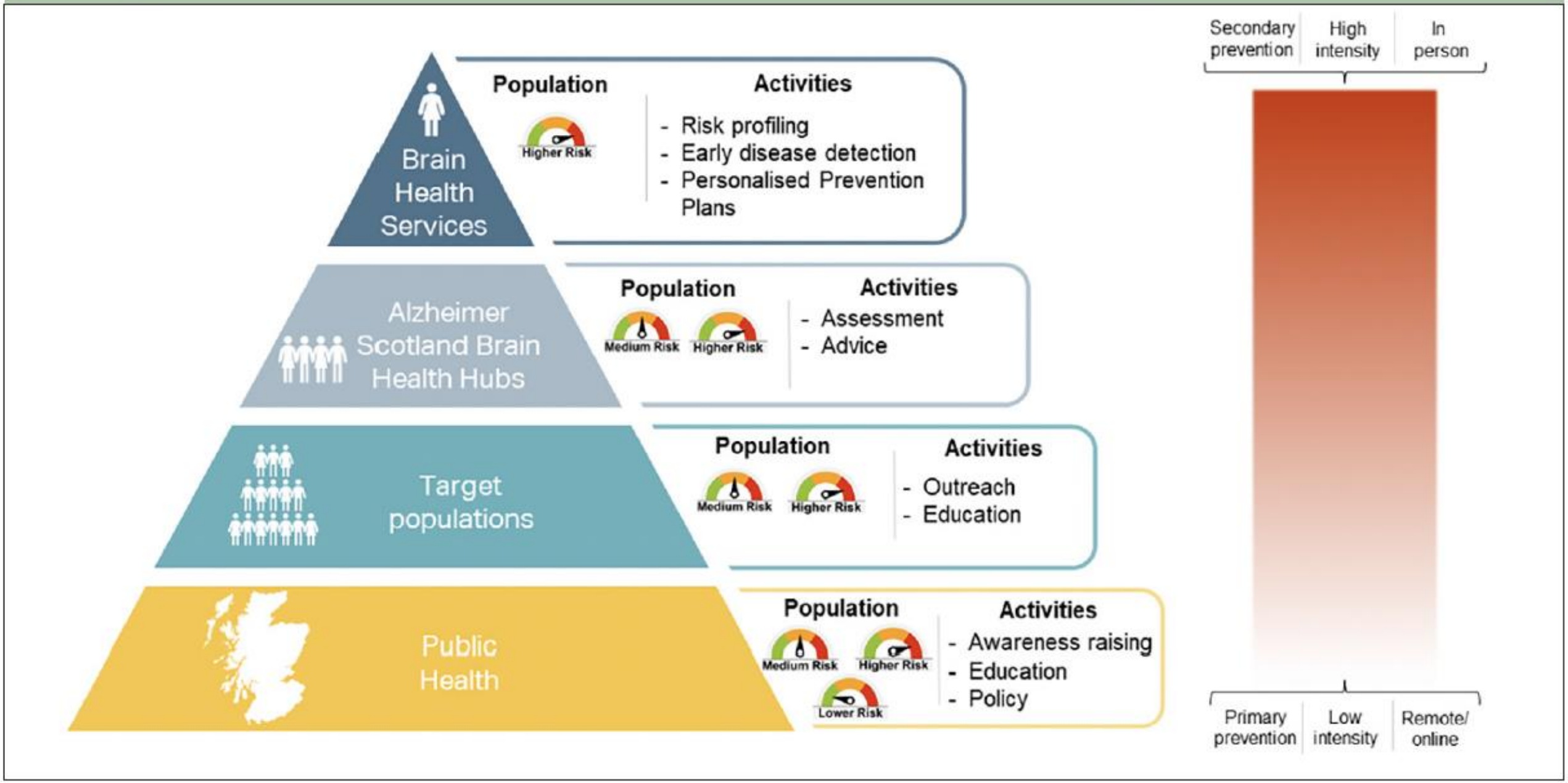
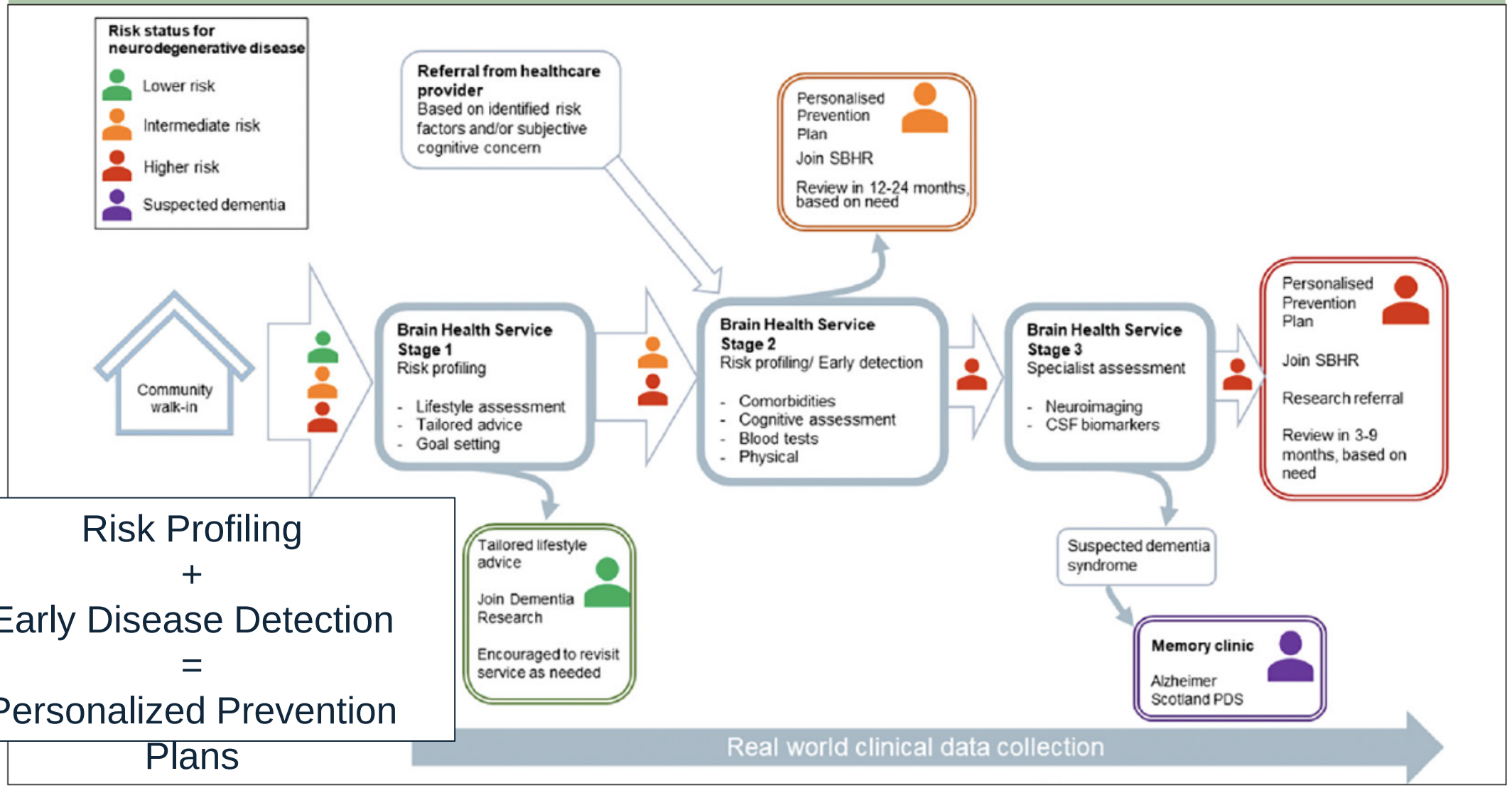
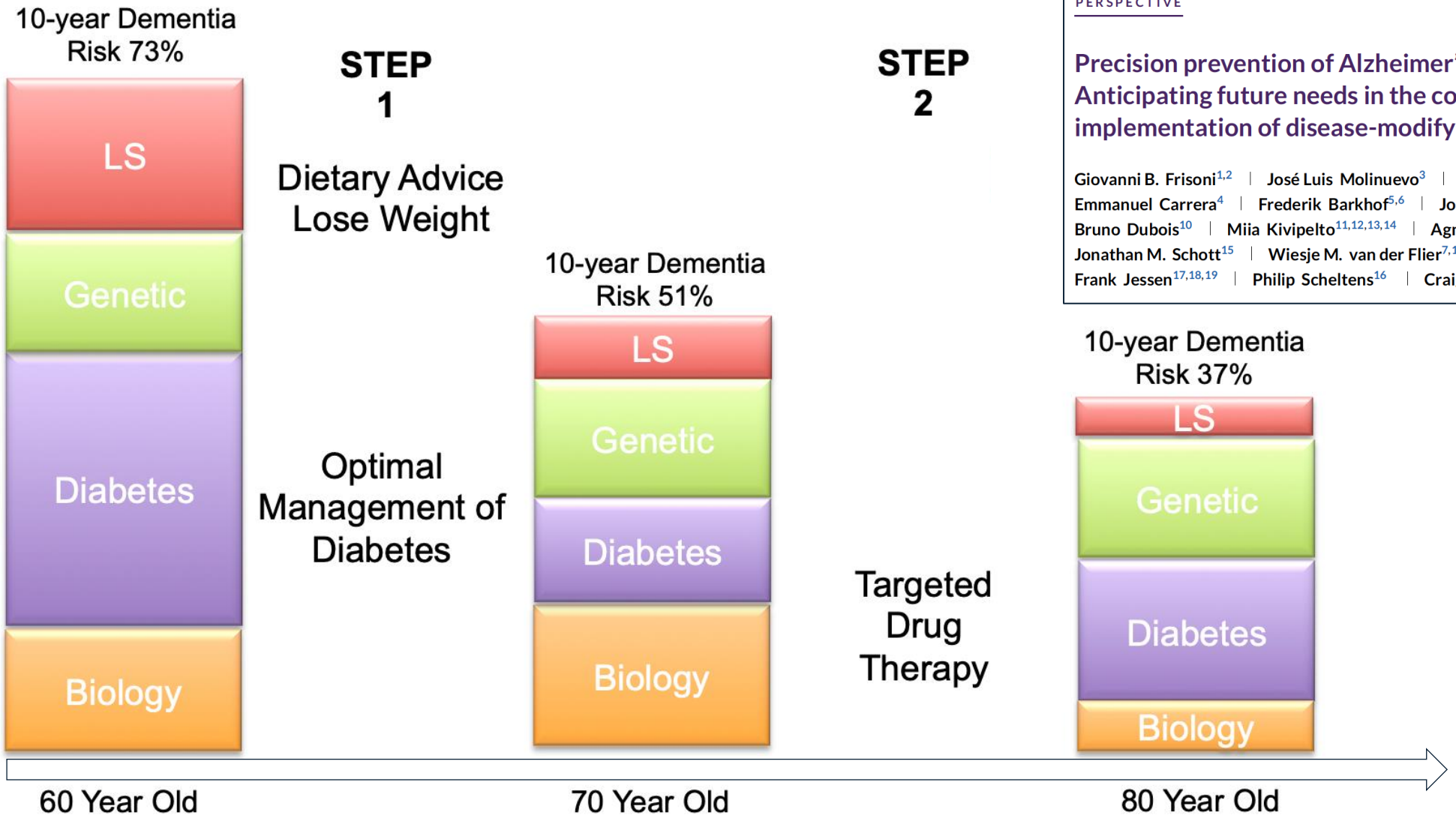


Figure 2. Care pathway for the Scottish model of Brain Health Services



Risk Profiling
+
Early Disease Detection
=
Personalized Prevention Plans

Stage 1: generic, non-clinical support (advice, light-touch lifestyle assessment, information and signposting). Stage 2: initial clinical service (risk profiling, early disease detection, personalised prevention. Parallel referral to external services for management of comorbidities where appropriate). Stage 3: specialised clinical service (brain biomarker assessment, personalised prevention and intervention. Outwards referral to memory clinic for those with an established clinical dementia syndrome unlikely to benefit from continued care in Brain Health Services, parallel referral to external services for comorbidity management where appropriate). SBHR – Scottish Brain Health Register; CSF – cerebrospinal fluid; PDS – Post Diagnostic Support



Received: 17 November 2019 | Revised: 2 May 2020 | Accepted: 19 May 2020
DOI: 10.1002/alz.12132
Alzheimer's & Dementia®
THE JOURNAL OF THE ALZHEIMER'S ASSOCIATION
PERSPECTIVE

Precision prevention of Alzheimer's and other dementias: Anticipating future needs in the control of risk factors and implementation of disease-modifying therapies

Giovanni B. Frisoni[1,2] | José Luis Molinuevo[3] | Daniele Altomare[1,2] | Emmanuel Carrera[4] | Frederik Barkhof[5,6] | Johannes Berkhof[7] | Julien Delrieu[8,9] | Bruno Dubois[10] | Miia Kivipelto[11,12,13,14] | Agneta Nordberg[11,12] | Jonathan M. Schott[15] | Wiesje M. van der Flier[7,16] | Bruno Vellas[8,9] | Frank Jessen[17,18,19] | Philip Scheltens[16] | Craig Ritchie[20]

Risk profiling + early disease detection = personalized prevention plan

LS=Lifestyle

The Scottish Brain Health Service Model

J Prev Alz Dis 2021;
Published online

Review

The Scottish Brain Health Service Model: Rationale and Scientific Basis for a National Care Pathway of Brain Health Services in Scotland

C.W. Ritchie[1,2,3], J.M.J. Waymont[2,4], C. Pennington[1,2,5], K. Draper[2], A. Borthwick[2], N. Fullerton[2], M. Chantler[6], M.E. Porteous[1,3], S.O. Danso[1], A. Green[1], L. McWhirter[1], G. Muniz Terrera[1], S. Simpson[7], G. Thompson[1], D. Trépel[8,9], T.J. Quinn[7], A. Kilgour[1,2]

1. University of Edinburgh, 2. Brain Health Scotland, 3. NHS Lothian, 4. University of Aberdeen, 5. NHS Forth Valley, 6. Herriot Watt University, 7. University of Glasgow, 8. University of Dublin Trinity College, 9. Global Brain Health Institute, United Kingdom

Corresponding Author: Prof. Craig Ritchie, University of Edinburgh, United Kingdom, craig.ritchie@ed.ac.uk

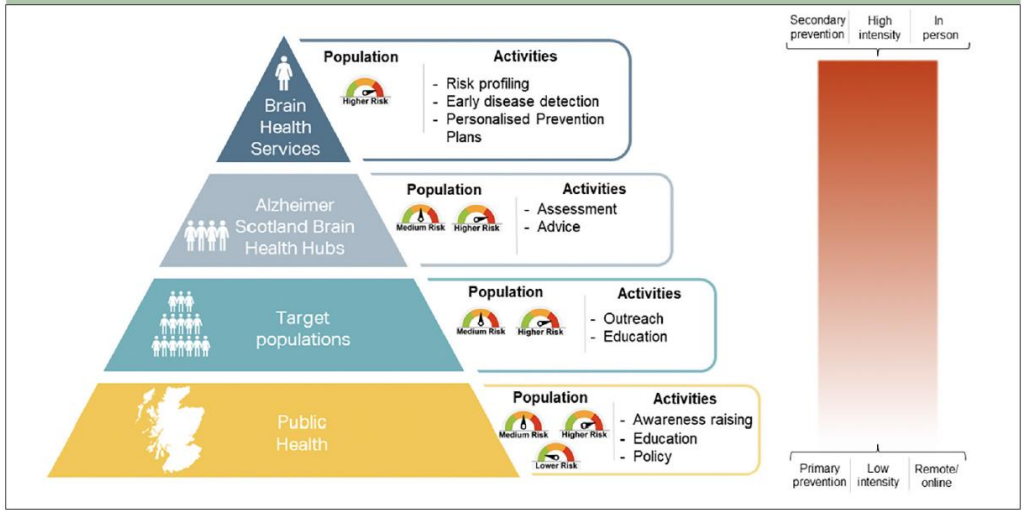
THE UNIVERSITY of EDINBURGH · Brain Health Scotland · NHS Lothian · UNIVERSITY OF ABERDEEN · NHS Forth Valley · HERIOT WATT UNIVERSITY · University of Glasgow · Trinity College Dublin, Coláiste na Tríonóide, Baile Átha Cliath, The University of Dublin · GLOBAL BRAIN HEALTH INSTITUTE

Overview

- The Scottish Model for Brain Health Services manuscript outlines our proposal for a novel, national clinical care pathway for early neurodegenerative disease detection and risk profiling. This clinical service accompanies a programme of public health and education programmes provided by Brain Health Scotland.

- The Scottish Model is built on three core foundations:
  1. Individual risk profiling
  2. Early disease detection
  3. Implementation of personalised prevention plans

Figure 1. Pyramid of approaches to reduce incident dementia in Scotland, from public health interventions for the Scottish population (bottom tier) to clinical Brain Health Services for the individual (top tier)



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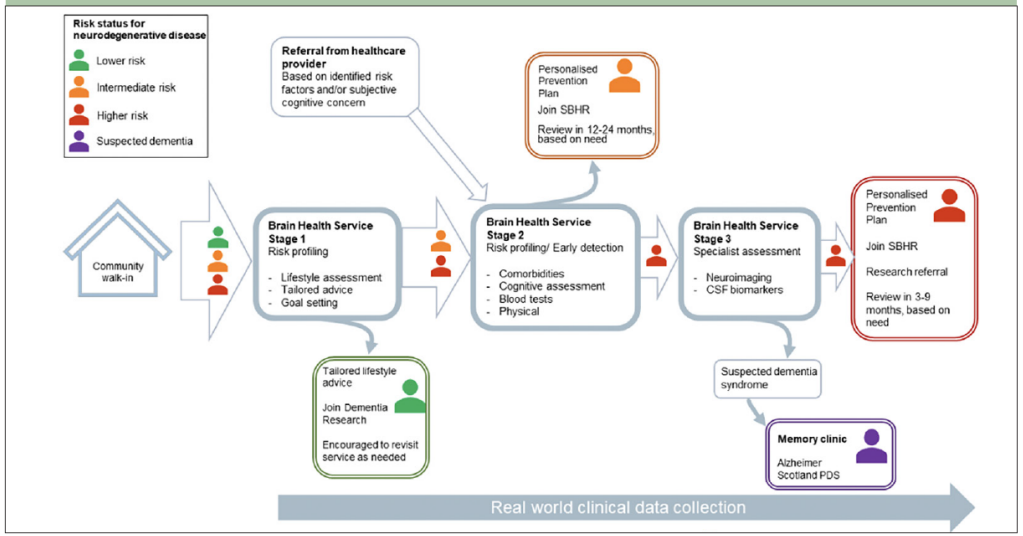

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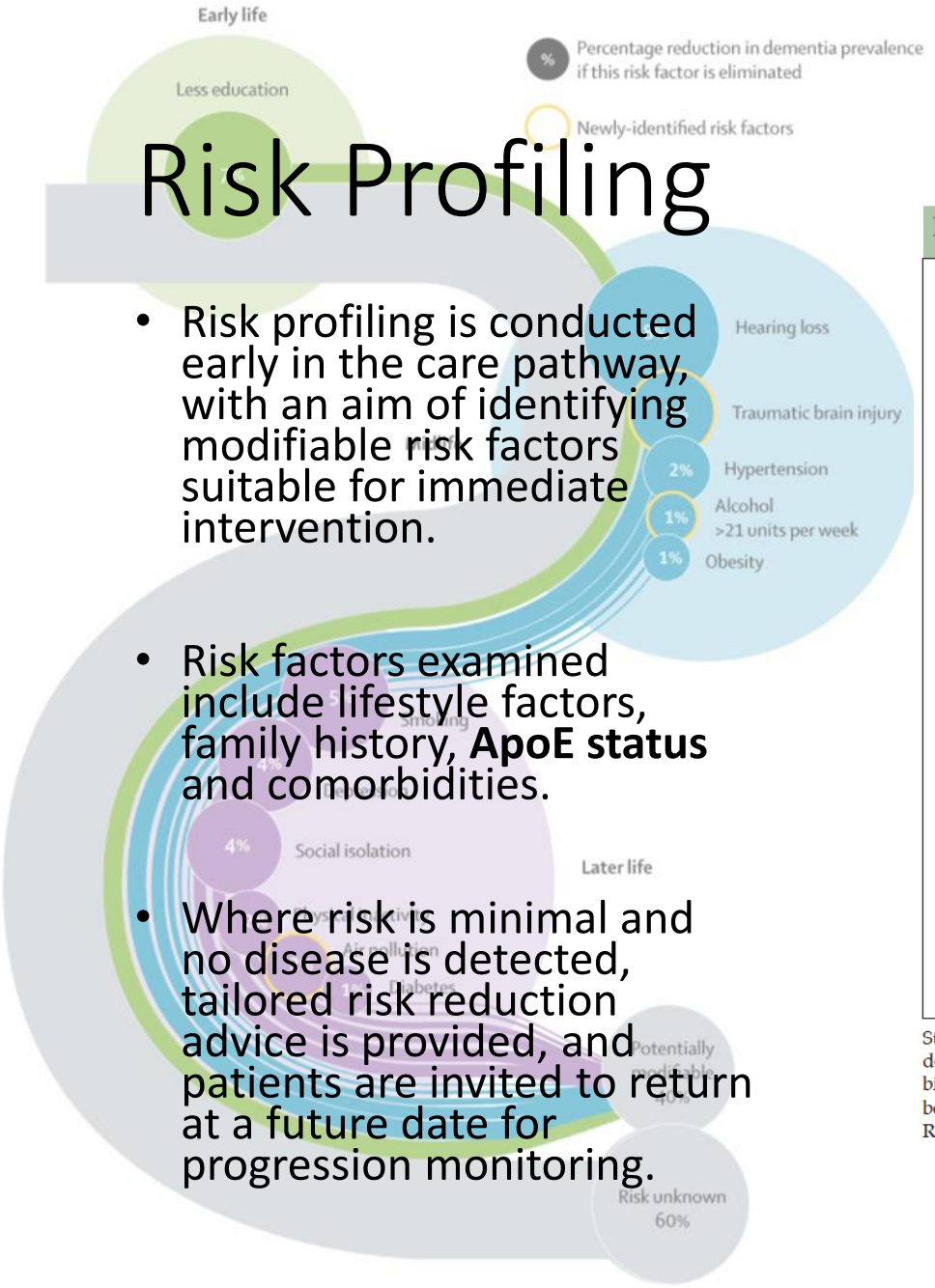
Risk Profiling

- Risk profiling is conducted early in the care pathway, with an aim of identifying modifiable risk factors suitable for immediate intervention.
- Risk factors examined include lifestyle factors, family history, **ApoE status** and comorbidities.
- Where risk is minimal and no disease is detected, tailored risk reduction advice is provided, and patients are invited to return at a future date for progression monitoring.



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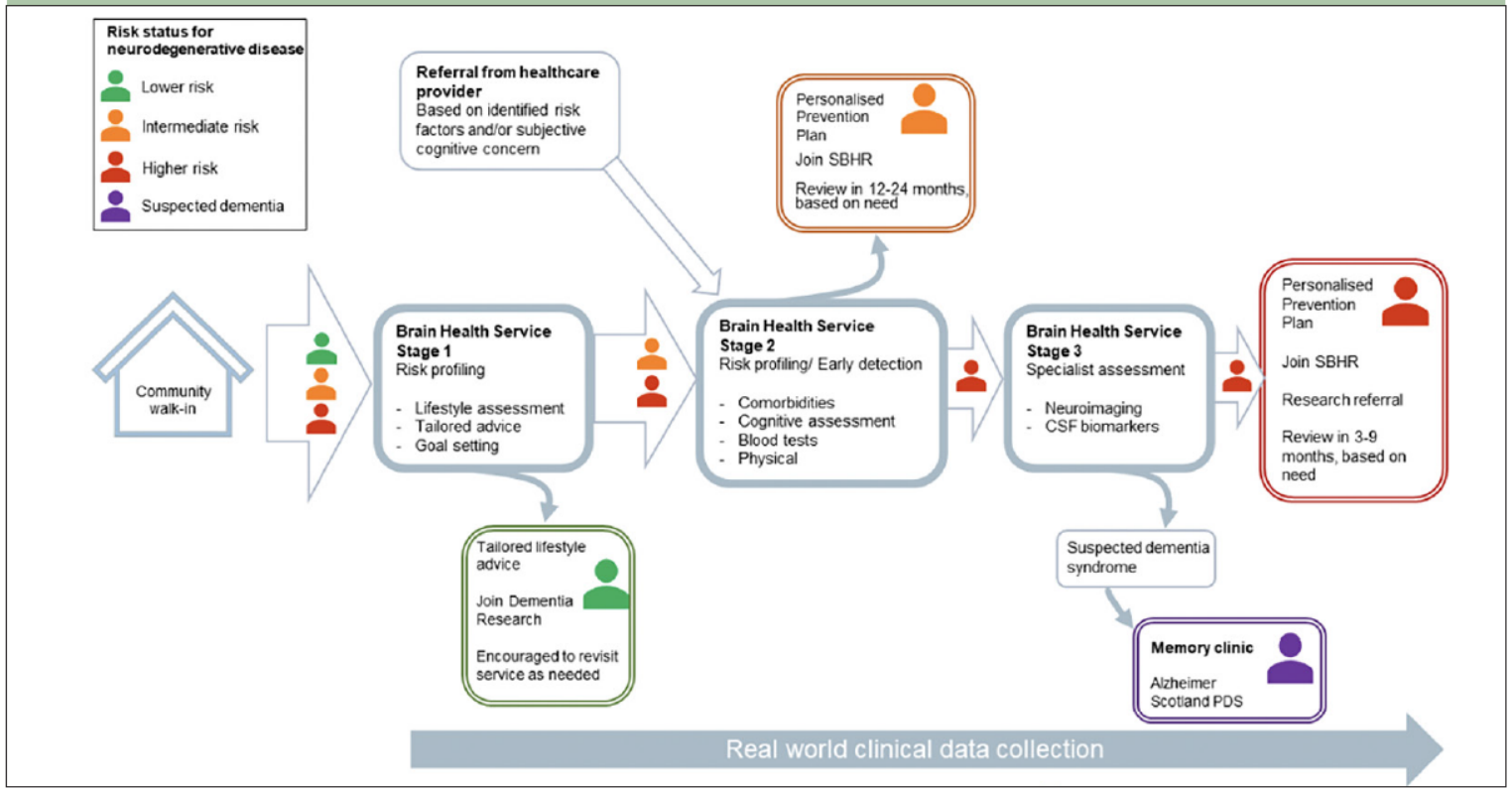

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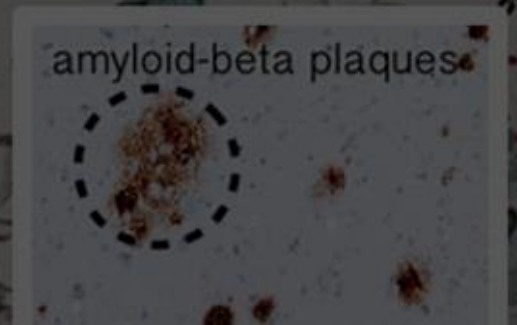
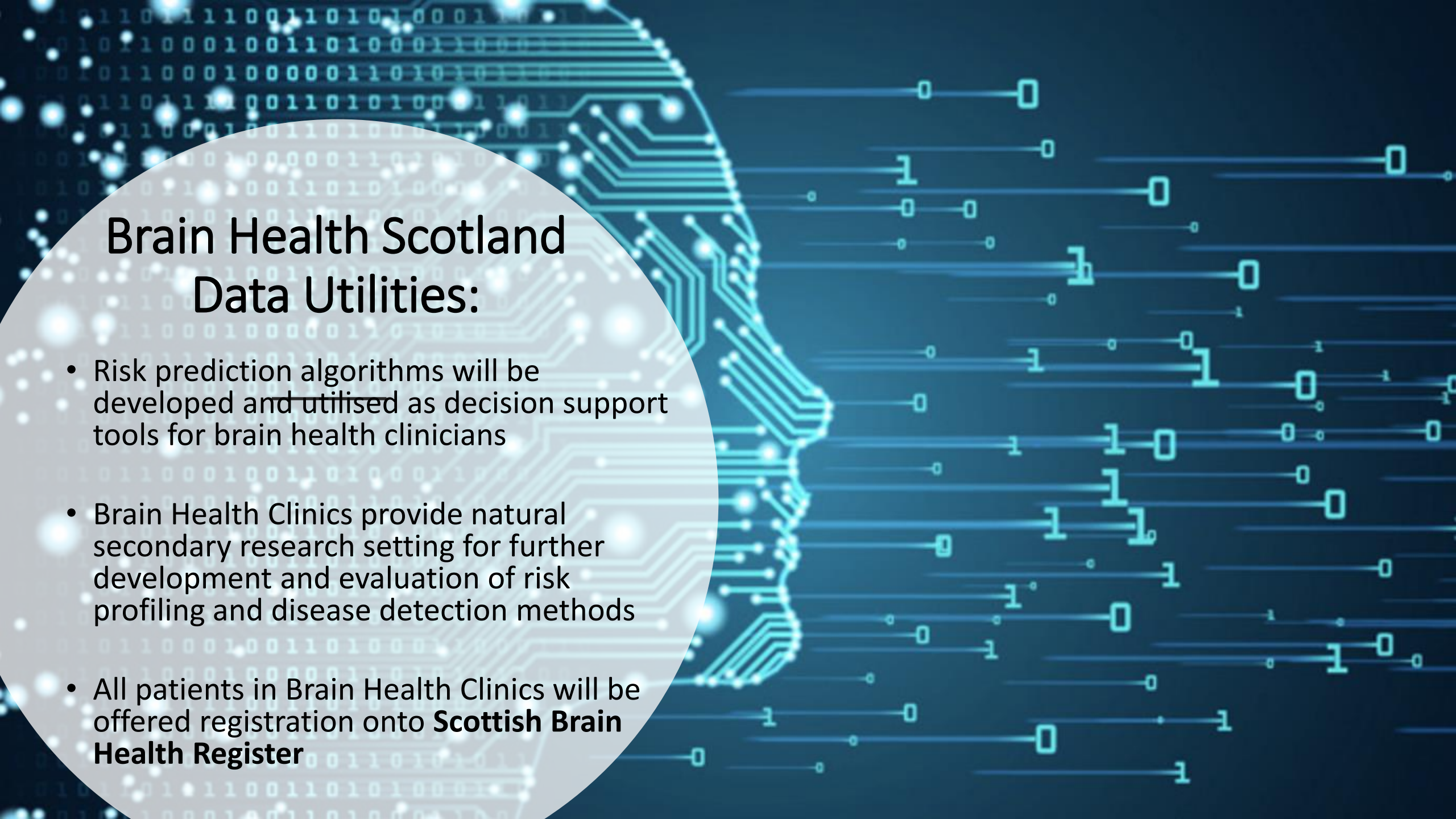
Livingston G, Huntley J, Sommerlad A, et al. Dementia prevention, intervention, and care: 2020 report of the *Lancet* Commission. *The Lancet* 2020.

Early Disease Detection and Expression **Routine Clinical Care**

- Risk profiling may reveal early stages of neurodegenerative disease.
- Those at higher risk will be assessed for biomarkers of neurodegenerative disease (disease detection)
  - Neuroimaging, cerebrospinal fluid, and blood biomarkers for **Aβ** and p-tau
- Assessment for early disease expression will consist of
  - Cognitive assessment sensitive to *early* disease
  - Behavioural and neuropsychiatric evaluation
  - Gait/power and autonomic instability
- Brain Health Services will incorporate validated emerging technologies for early disease detection





Brain Health Scotland Data Utilities:

- Risk prediction algorithms will be developed and utilised as decision support tools for brain health clinicians
- Brain Health Clinics provide natural secondary research setting for further development and evaluation of risk profiling and disease detection methods
- All patients in Brain Health Clinics will be offered registration onto **Scottish Brain Health Register**

Ritchie et al. Alzheimer's Research & Therapy (2017) 9:85
DOI 10.1186/s13195-017-0312-4

Alzheimer's Research & Therapy

COMMENTARY Open Access

The Edinburgh Consensus: preparing for the advent of disease-modifying therapies for Alzheimer's disease

Craig W. Ritchie[1,2*†], Tom C. Russ[1,2,3,4†], Sube Banerjee[5], Bob Barber[6], Andrew Boaden[7], Nick C. Fox[8], Clive Holmes[9], Jeremy D. Isaacs[10], Ira Leroi[11], Simon Lovestone[12], Matt Norton[13], John O'Brien[14], Jim Pearson[15], Richard Perry[16], James Pickett[7], Adam D. Waldman[18], Wai Lup Wong[17], Martin N. Rossor[8†] and Alistair Burns[11†]

Abstract

Context: This commentary discusses the implications of disease-modifying treatments for Alzheimer's disease which seem likely to appear in the next few years and results from a meeting of British experts in neurodegenerative diseases in Edinburgh. The availability of such treatments would help change public and professional attitudes and accelerate engagement with the prodromal and preclinical populations who might benefit from them. However, this would require an updated understanding of Alzheimer's disease, namely the important distinction between Alzheimer's disease and Alzheimer's dementia.

Consensus: Since treatments are likely to be most effective in the early stages, identification of clinically relevant brain changes (for example, amyloid burden using imaging or cerebrospinal fluid biomarkers) will be crucial. While current biomarkers could be useful in identifying eligibility for new therapies, trial data are not available to aid decisions about stopping or continuing treatment in clinical practice. Therefore, effective monitoring of safety and effectiveness when these treatments are introduced into clinical practice will be necessary to inform wide-scale use. Equity of access is key but there is a tension between universal access for everyone with a diagnosis of Alzheimer's disease and specifying an eligible population most likely to respond. We propose the resources necessary for an optimal care pathway as well as the necessary education and training for primary and secondary care.

Conclusion: The majority of current services in the UK and elsewhere would not be able to accommodate the specialist investigations required to select patients and prescribe these therapies. Therefore, a stepped approach would be necessary: from innovating sentinel clinical-academic centres that already have capacity to deliver the necessary phase IV trials, through early adoption in a hub and spoke model, to nationwide adoption for true equity of access. The optimism generated by recent and anticipated developments in the understanding and treatment of Alzheimer's disease presents a great opportunity to innovate and adapt our services to incorporate the next exciting development in the field of dementia.

Keywords: Dementia, Alzheimer's disease, Therapeutics, Disease-modification, Service redesign, Clinical trials

Brain Health Scotland

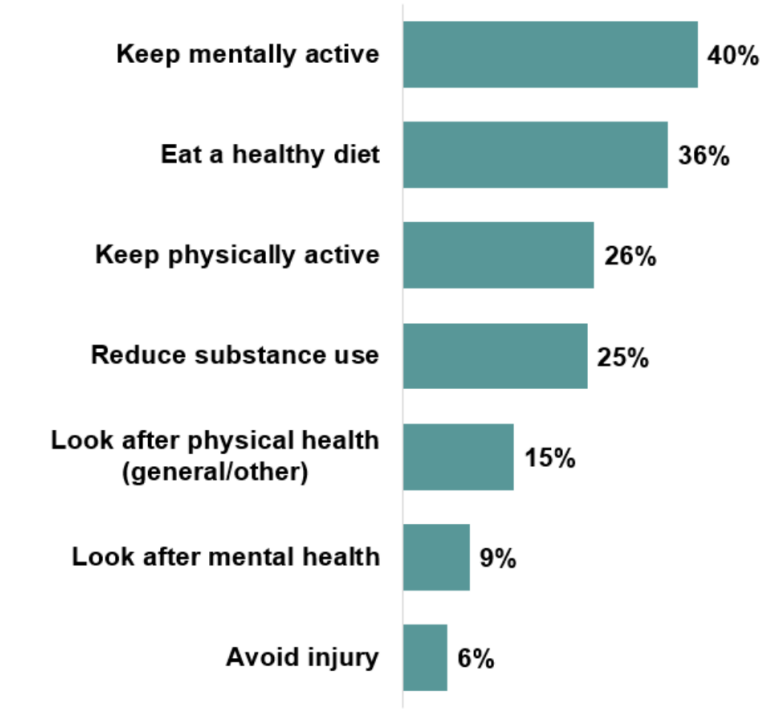
4th September 2020

Brain Health Survey 2020

Ipsos MORI on behalf of Brain Health Scotland

Catriona Millar
Lorraine Murray

Figure 4 - There are several things that people can do (or avoid doing) to help protect their brain health in the future. Can you name any?



Your brain is amazing.
Let's keep it that way.

https://d6a732ea-0222-4f4e-bec4-6ac629ae59bc.filesusr.com/ugd/a3f95c_8826599c29c04d66b4eb266d5d887f22.pdf

Brain Health Scotland

REST

Long term stress can be toxic for the brain and can make it difficult to keep on top of other things that are important for our brain health. So it's really important to make time for yourself, and the things that help you relax and switch off.

We also need to protect our sleep time. Your brain cleans itself while you sleep, flushing out waste products that build up through the day.

We should aim for a good quality 7-9 hours sleep every night. Not getting enough sleep can affect memory and thinking abilities in the short and the long term.

access practical advice and tips for improving your sleep routine. See **thesleepcharity.org.uk**

MEDICAL FITNESS

There are lots of medical conditions which can also have knock-on effects for the health of our brains. Such as those which affect the blood supply like high blood pressure, atrial fibrillation and diabetes. As well as conditions that can leave us more socially isolated such as hearing loss and depression.

So it's really important to keep on top of your overall health by attending regular check ups, picking up on any concerns early and following medical advice closely, including taking any medications as prescribed.

SOCIALISING & LEARNING

Your brain craves company and benefits from the stimulation of social interaction. We also know that if we continue to learn and challenge our brains throughout life we can build resilience to brain disease.

Try to pick up new skills and hobbies, things you haven't tried before. Be creative - learning a new language or a musical instrument can be a great way to keep sharp. Why not take up a new activity in a group or with a friend to keep motivated while also getting that added social benefit.

HARMS

Smoking causes damage to the blood vessels that supply the brain, interrupting the delivery of vital oxygen and nutrients. Stopping smoking, even later on in life, has been shown to reduce the risk of developing dementia.

Get help to stop smoking at **quityourway.scot**

You don't need to avoid alcohol completely. But exceeding recommended weekly limits for alcohol can damage the structure of the brain and increase our risks.

Calculate your weekly units at **cont14.scot**

EXERCISE

Being physically active is one of the best things you can do for your brain. Regular exercise helps maintain a good blood supply to the brain, improves mental wellbeing and promotes good quality sleep.

There are lots of different ways you can choose to get more active. Whatever works for you, aim to get at least 3-4 hours of moderate intensity exercise a week.

What counts as 'moderate exercise'?

BRISK WALKING GARDENING
RIDING A BIKE DANCING

FOOD

What you eat is crucial for supplying your brain with all the nutrients it needs .

Your diet is also very important for maintaining a healthy weight and avoiding conditions like high blood pressure and diabetes which can damage the brain.

Following a Mediterranean-style diet has been particularly linked to good brain health. This is a diet that uses olive oil as the main source of fat and includes:

LOTS OF: vegetables, fruit, beans & pulses, fish and wholegrains
NOT TOO MUCH: meat and sweet, sugary foods

Scan here & Discover more

Your brain is amazing.
Let's keep it that way.

Step 1: Health Literacy

Step 2: Personal Pledges

Step 3: Review and observe positive feedback*

MY BRAIN HEALTH GOALS

You can use the topics covered in this guide, or other areas relevant to your brain health, to establish a series of goals.

Set goals which are realistic, timely and measurable. Completing goals along with someone else can also help keep aims fun and keep us motivated and on target.

Sharing your goals and your progress towards reaching them with others has also been shown to help!

I WILL improve my diet

HOW by swapping meat for fish

WHEN three times a week

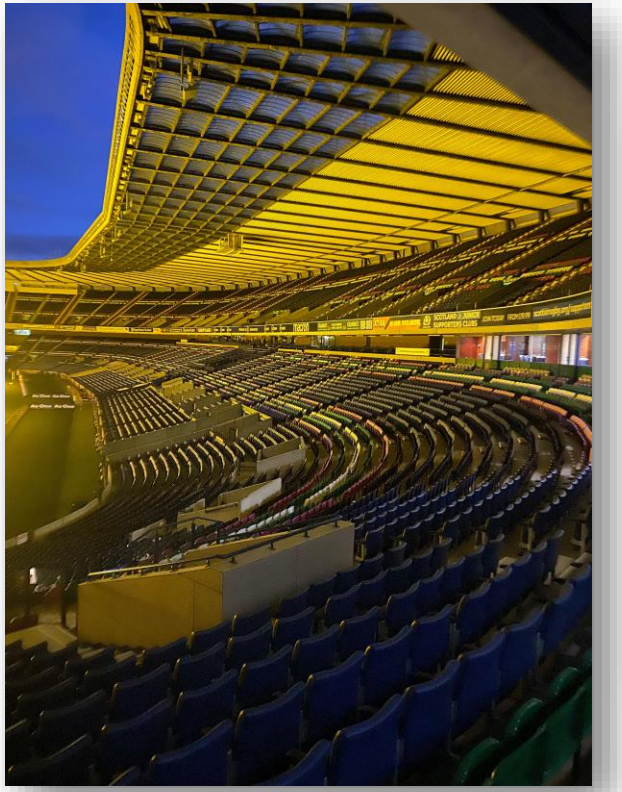
WHERE at home

WHO WITH my husband, John

Where do these actions take place?

Brain Health Scotland

- On-line
- Community Pharmacies
- Libraries
- Shopping Centers
- Football/Rugby Stadiums
- Workplaces
- Schools



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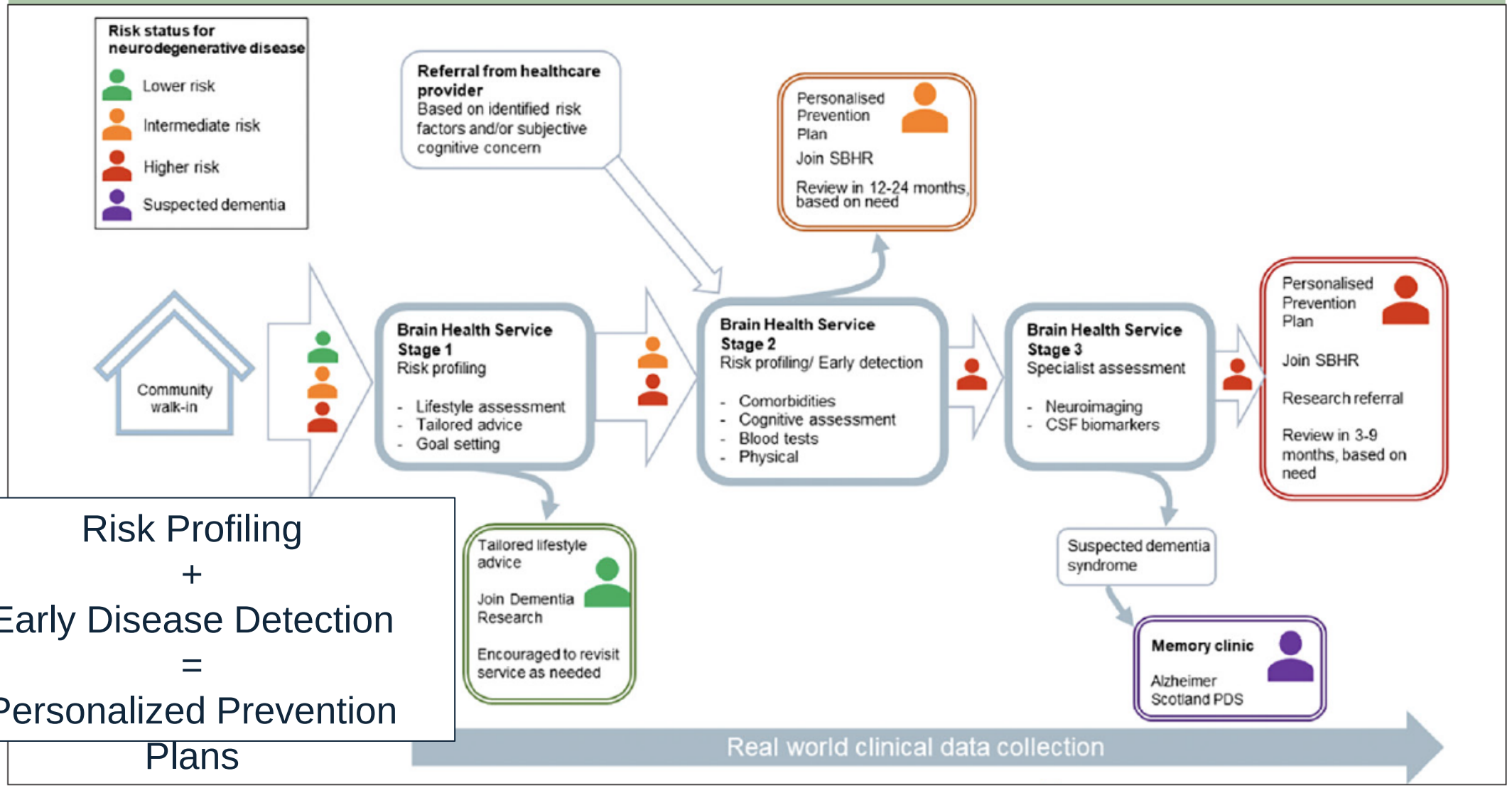

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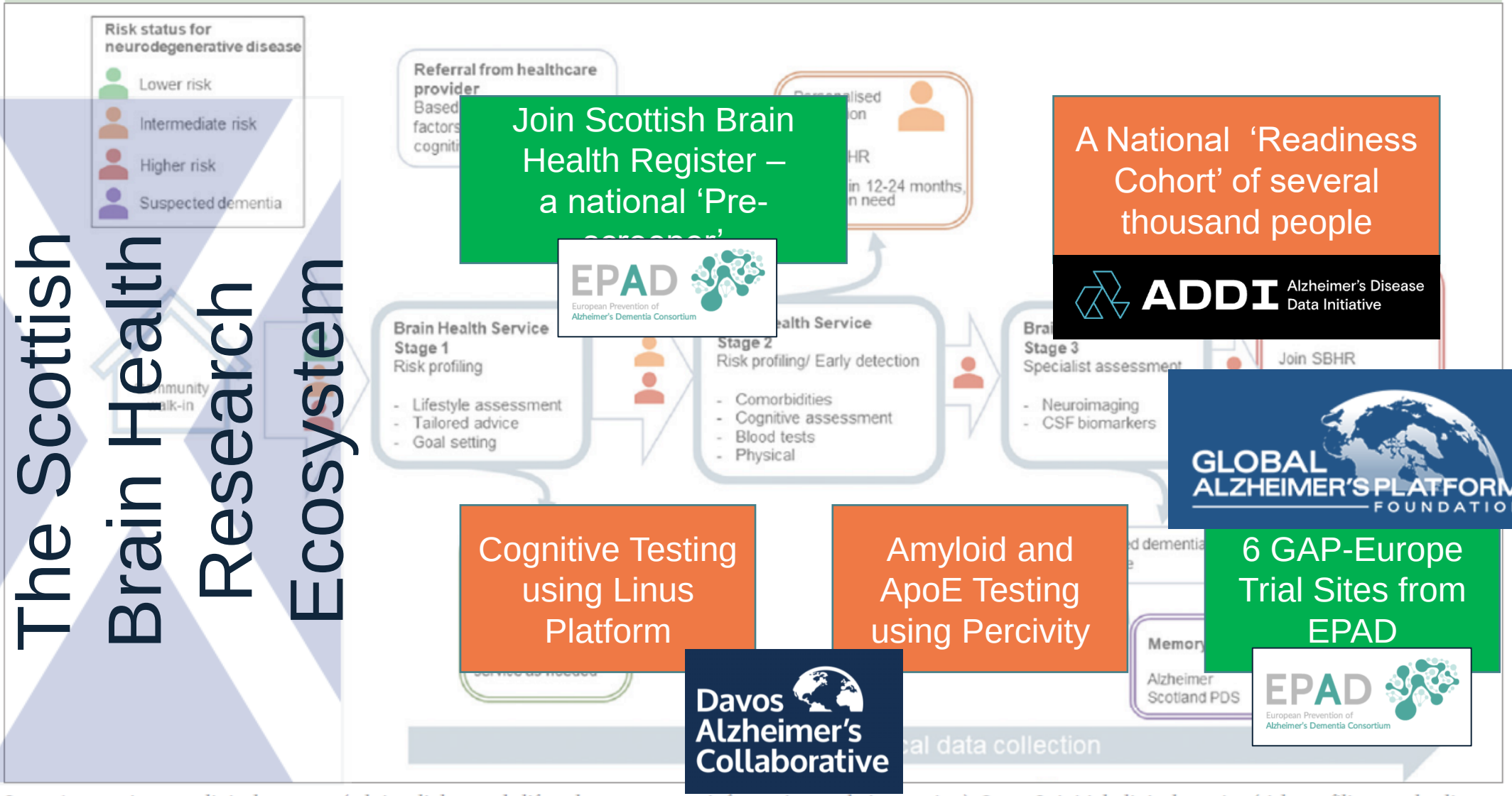

The Scottish Brain Health Research Ecosystem

Join Scottish Brain Health Register – a national 'Pre-screener'

EPAD European Prevention of Alzheimer's Dementia Consortium

A National 'Readiness Cohort' of several thousand people

ADDI Alzheimer's Disease Data Initiative

GLOBAL ALZHEIMER'S PLATFORM FOUNDATION

6 GAP-Europe Trial Sites from EPAD

EPAD European Prevention of Alzheimer's Dementia Consortium

Cognitive Testing using Linus Platform

Amyloid and ApoE Testing using Percivity

Davos Alzheimer's Collaborative

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Brain Health Scotland

Davos Alzheimer's Collaborative

Cohorts

Trials

Health Care Readiness

EPAD European Prevention of Alzheimer's Dementia Consortium

prevent dementia

GLOBAL ALZHEIMER'S PLATFORM FOUNDATION

Brain Health Scotland

SBHR

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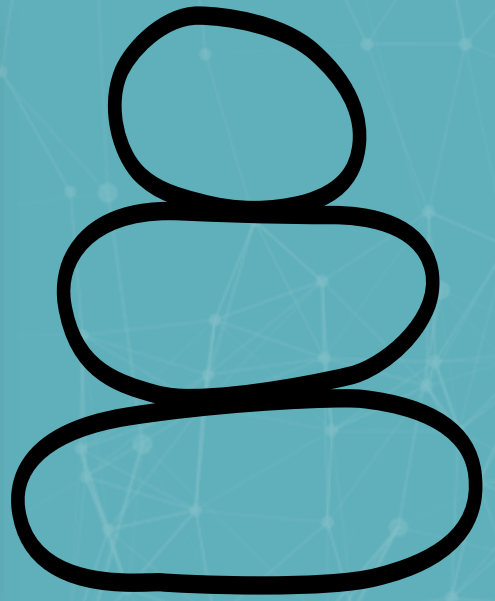


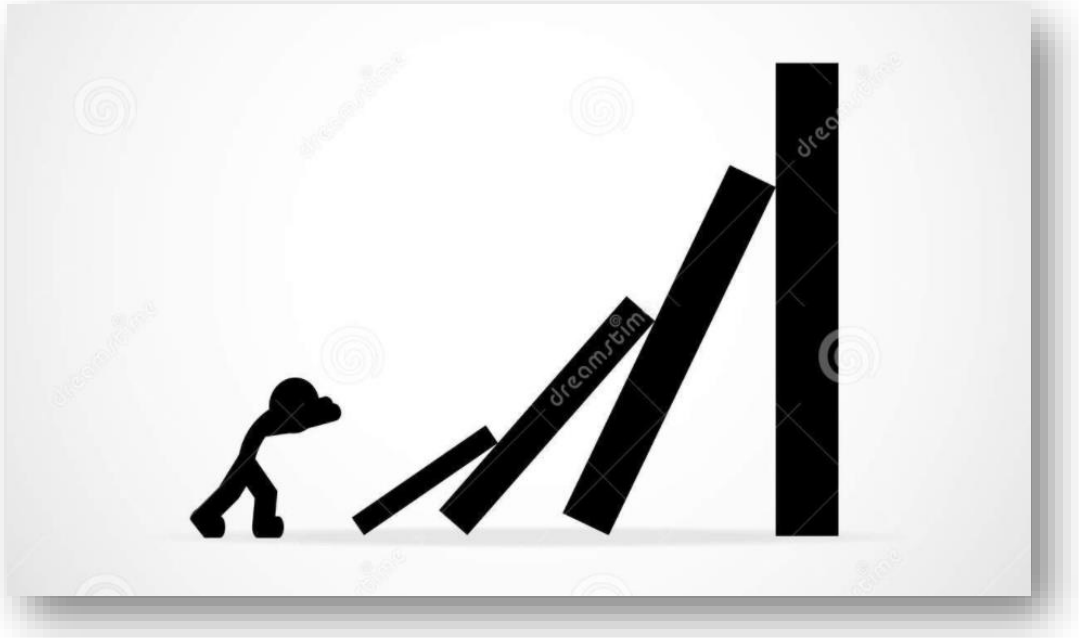
Scotland is the only country in the world providing the 'Triple Stack' in partnership with DAC

Your brain is amazing.
Let's keep it that way.

Summary of presentation

Brain Health Scotland

- **Disease before dementia**
  - The research and now practice direction
- **The Empirical Basis and Leadership**
  - PREVENT Dementia
  - European Prevention of Alzheimer's Dementia
- **Brain Health Scotland**
  - Framework for clinical pathway
  - Setting for trials and future DMTs
  - Data for disease modelling
  - The 'Triple Stack' for Davos
  - The 'First Little Domino'



Thank you

Refreshment break

Partner update

Scottish Enterprise

Health for Wealth

National Programme

28/02/22

Dr. N. Peyret
Team Leader, Health and Wellbeing
Strategic Lead, Health for Wealth Programme

Scottish Enterprise

Scottish Enterprise's National Programmes

Opportunity	Objective	Programme
Digital	Accelerating digital and data driven economy opportunities	Digital Scale Up Level Up
Health	Leveraging health and care economy opportunities	Health for Wealth
Manufacturing	Advancing modern manufacturing economy opportunities	Scotland in Space Future Healthcare Manufacturing
Climate	Developing sustainable low carbon economy opportunities	Zero Emissions HDV Decarbonising Heat Hydrogen Economy

Health for Wealth Opportunity

- Underpinned by the **need and desire** to improve the sustainability and effectiveness of health and care globally.
- Generation of wealth (economic development) by providing new solutions, processes and paradigm shifts to satisfy local and global health and care needs.
- Wealth created at several levels through:
  - growing the Scottish company base as it develops and sell solutions;
  - generating savings in the economy by increasing the efficiency, sustainability and efficacy of the Scottish health and care system as it contributes to develop and implement these solutions;
  - in turn, improving the health and wellbeing of the Scottish population leading to further savings in the economy (reduction of worklessness and sickness absence, etc.)

Health and Care Challenges

Economic sustainability is a global Challenge

- NHS Scotland budget for 2018/2019 is £13.4bn 42% of Scottish Government's total budget [1]
- Without reform, £1.8 bn shortfall in the projected 23/24 NHS Scotland funding of £18.8bn [1]

The underlying financial deficit of NHS hospital trusts at the end of 2018–19 was £5 billion, compared to £4.3 billion in 2017–19 [2]

12% of hospitals in Germany are in financial distress [2]

China's medical insurance funds' expenditure growth exceeded income growth in 2018 [2]

Without action, a typical $2 billion US health care provider will likely see operating margin degradation to negative 3.5% by 2023[2]

Outcomes need improvement

Only 1 in 3 people who would benefit from treatment for a mental illness currently receive it [3]

The premature mortality rate in the most deprived areas in Scotland is 4 times higher than in the least deprived (2018) [4]

The NHS in Scotland met two of the eight key national waiting times standards in 2018/19 [1]

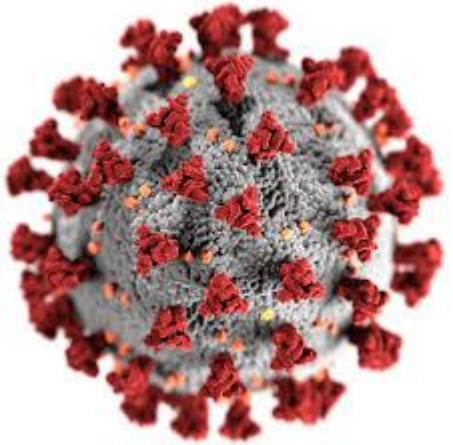
12 million significant misdiagnoses a year in the US [6]

Percentage of the patient population for which a particular drug in a class is ineffective, varies on average from 38 to 75% depending on the class [7]

[1] *NHS in Scotland*, Audit Scotland, 2019
[2] *2020 global health care outlook,* Deloitte Insights
[3] *Mental Health Strategy 2017-2027*, Scottish Government
[4] *Long Term Monitoring of Health Inequalities*, Jan 2020, Scottish Government
[6] BMJ Qual Saf 2014. 23(9):727-731
[7] J. Clinical application of pharmacogenetics. Trends in Molecular Medicine. 2001;7(5): 201-204

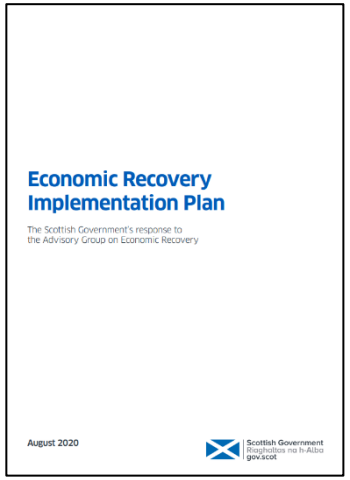
Scottish Enterprise

The Time Is Now!



The Covid-19 crisis has:

- Highlighted inefficiencies and increased demand for better health and care solutions;
- Put a renewed emphasis on digital solutions, accelerating the digital transformation;
- Demonstrated a step change in rapid adoption of technologies and new ways of working;
- **Aligned all the key players in Scotland** to focus on the major health and wealth opportunity of an NHS enabled innovation ecosystem associated with digital health and data transformation.



"As the world confronts the pandemic, it has a once-in-a-generation opportunity (…) to advance broad-based health and prosperity dramatically." [1]

[1] *How prioritizing health could help rebuild economies*, McKinsey Global Institute, July 8 2020

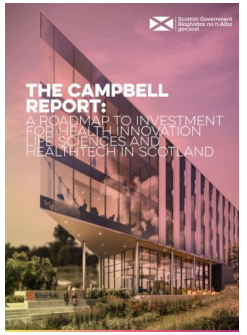
Programme Vision

To make Scotland a world leader in the health & care economy while enabling our citizens to live longer, healthier, lives.

Strategic Aims

SE will work with partners (Industry, NHS, academia, Government and Academia) to realise this opportunity through a focus on two synergistic strategic aims:

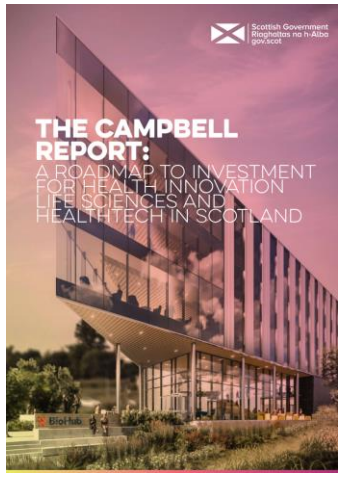
Strategic aim 1: Build a world leading health and care innovation ecosystem that optimally links the triple helix of NHS, academia and industry and is optimised by a “once for Scotland” approach within the NHS;



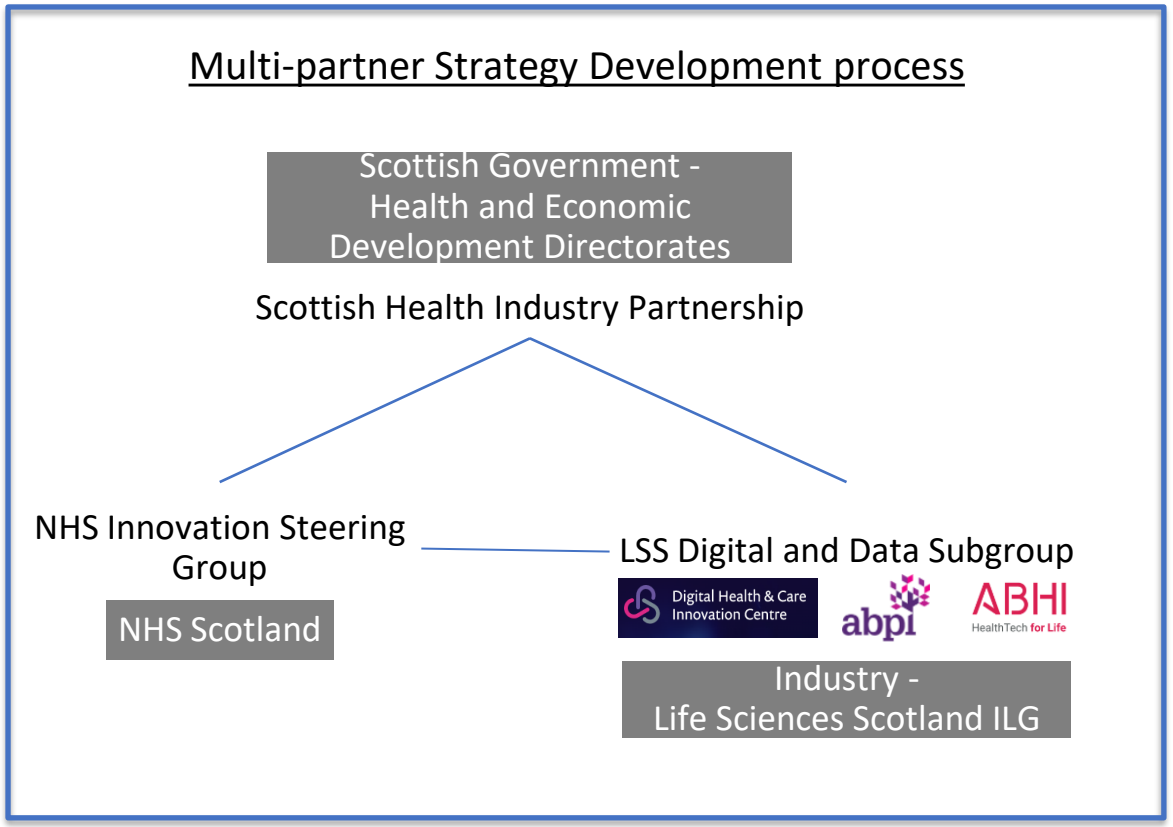
Strategic aim 2: Fully exploiting the potential of digital technologies and data to transform health and care.

Programme Stage and Projects

- Formative/Development stage
- Working with partners on defining strategic priorities and associated projects



- Small but growing number of active projects



Strategic Collaboration with DHI

- Creation of Life Sciences Scotland ILG Data and Digital Subgroup (ILGDD)
- Life Sciences Scotland ILG Trustech report on data and digital priorities
- Subsequent action plan
- => Future roadmap for Health for Wealth programme projects

Health for Wealth and Healthy Ageing

- Care is an integral part of the programme
- As is prevention
- Integration of health and care data

- Aging2.0's Grand Challenges

Digital technologies can play an important role in many of these areas

Several projects being scoped

Impacts

- Significant **expansion of Scottish health & care and digital industry** through indigenous growth including increased exports and attraction of inward investors resulting in additional high value jobs GVA and increased R&D levels.
- **Substantial savings** from a more effective, efficient and sustainable health and care system (Currently 42% of Scottish Government's budget).
- **Significantly improved health and wellbeing of the Scottish population**, leading to a healthier and more productive workforce and improved social inclusion through impact on deprived areas and scarcely populated ones;
- **Contribution to growth of several local clusters** (*e.g.* Clinical Innovation Zone in Glasgow, Edinburgh BioQuarter, Dundee Tay Cities Deal projects, etc…) and **improving delivery of health and care in deprived areas and sparsely populated areas** with limited local health and care services.
- **Carbon reductions through reduced transportation and wastage** (Currently health and care is responsible for around 6% of emissions) contributing to our net zero ambitions;

Thank You

Health for Wealth

UKRI Healthy Ageing Challenge Update

Julia Glenn

UK Research and Innovation

Designed for Ageing Competition

Provisional Updates & Innovation Landscape February 2022

Healthy Ageing Challenge

UK Research and Innovation

Designed for Ageing: Some Key Points

- Launched September 2021, closed November 2021
- Circa 150 applications, projects £500k - £2m
- Two rounds of interviews – 41 projects - to accommodate quality long-list (Jan/Feb 22)
- Projects start by 01 May 22

julia.glenn@innovateuk.ukri.org
Design Innovation Lead,
Healthy Ageing Challenge

UK Research and Innovation

Designed for Ageing - The Competition Profile

Scope:

- Service-led innovation that enables **self-care** and new models of care for independent living.
- Service-led innovation that encourages **sustaining physical activity** for people aged 50+, including for instance, active travel.
- Service-led innovation that improves mental health and/or addresses the ‘common complaints’ of ageing (such as incontinence, pain, mobility, hearing and eyesight).

Applicant Profile:

- Business-led
- Service innovation
- Solutions must address inequalities in healthy ageing
- Able to be shaped for market readiness by Design Stage Gate

Bid Assessment: Written and Interview

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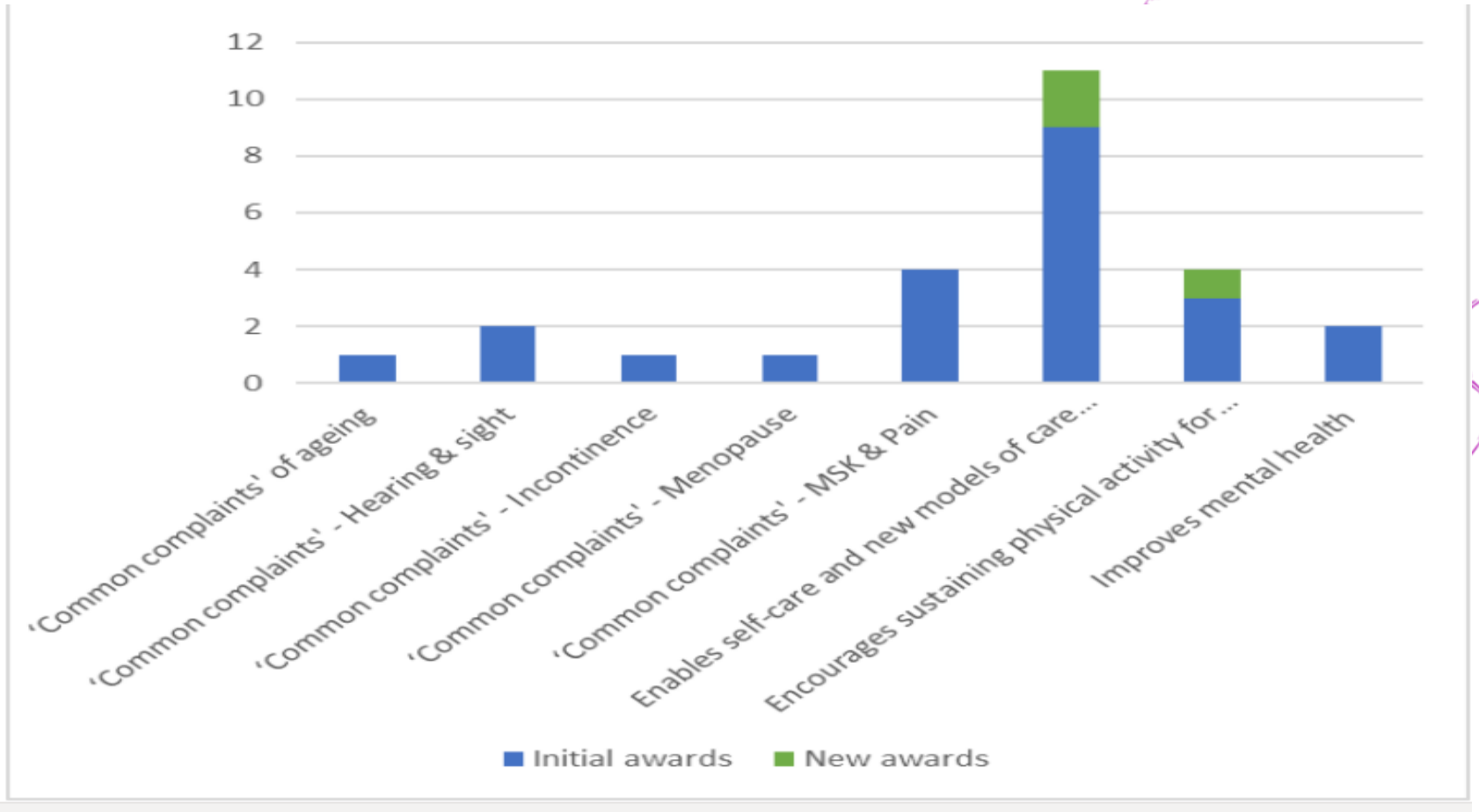
Designed for Ageing – Successful Projects by Theme



Healthy Ageing Challenge

All projects are conditionally accepted at this time and will only proceed subject to IUK due diligence

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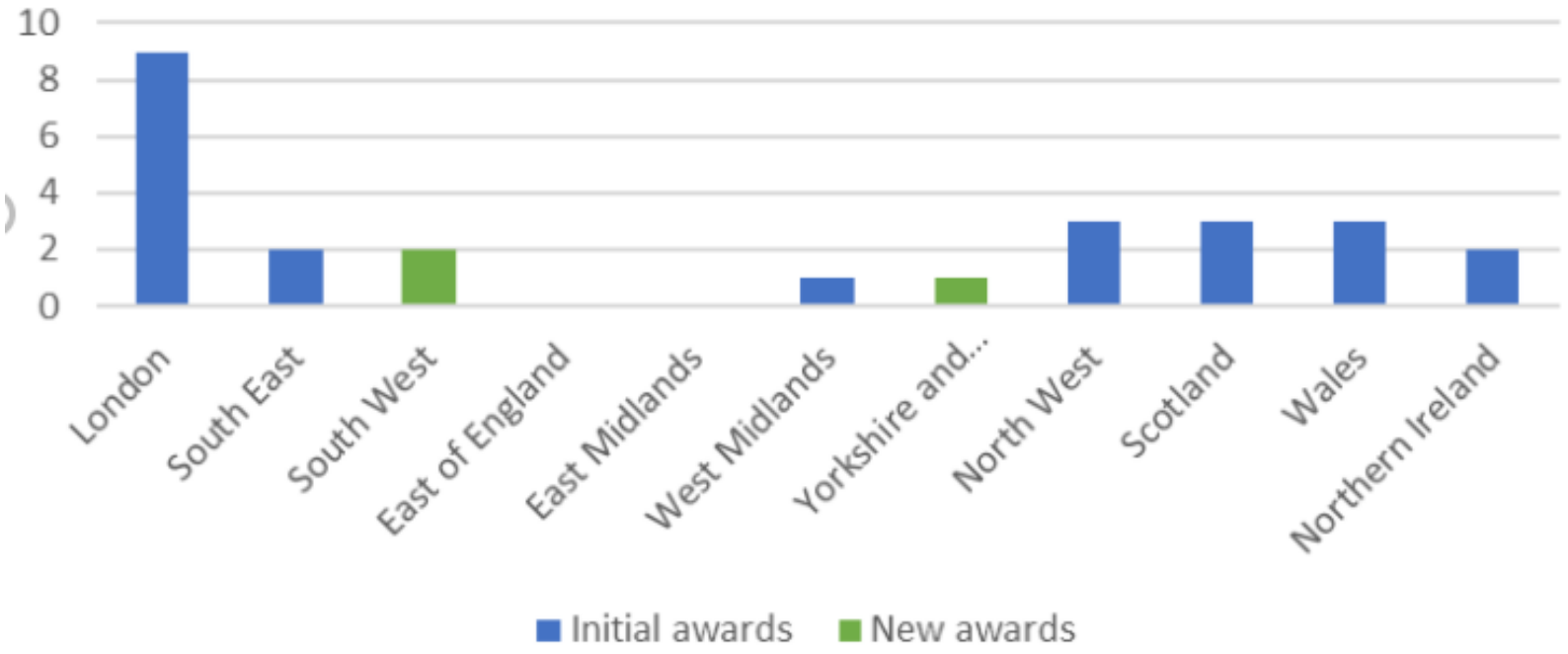
Designed for Ageing – Successful Projects, Regional Spread



All projects are conditionally accepted at this time and will only proceed subject to IUK due diligence

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Designed for Ageing – Innovation Landscape

- Increasingly we see data driven innovations enter our competitions to inform the design of services that enable greater independence and autonomy as we age.

- Proliferation of open API sources: innovators are able to draw inferences and conclusions re behaviour and needs like never before

- Our challenge: how do we ensure that data spawns service design decisions that are useful, relevant and equitable

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Innovation Landscape - Some Data/Design Hazards

- Does the dimension that you are measuring add value to a user outcome?
- **Technology: measuring because it can be measured**
- Technology: deploying AI/machine learning/data harvesting out of context – ie could a less tech-embedded approach bring about a better insight or outcome?
- **Easy to assume correlation/causation across dimensions to infer value**
- Objectivity/subjectivity - administrative data versus self-reported data

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Design Stage Gate – Aim: Services Are Useful, Relevant, Equitable

Gate	Criteria
1	User Engagement
2	People-Centred Design
3	Take Up & Acceptance Within Practice Community
4	Augmented Proof of Market Statistics
5	Updated Business Plan: Fair View

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Healthy Ageing Challenge: Potential Upcoming Competitions - 2022

- **SBRI – Social Ventures**
- **New Catalyst Wave**
- **Competition with larger organisations**

UK Research and Innovation

Centre for Ageing Better
Action today for all our tomorrows

UKRI's Healthy Ageing Challenge Community of Practice:
Delivered by the Centre for Ageing Better

Join our Healthy Ageing Challenge Community of Practice

The Healthy Ageing Challenge Community of Practice is a learning community that brings together organisations with an interest in developing solutions that support people to age well. It is a space for members to collaborate, problem-solve and share their expertise, learnings and insights. The Community is run by the Centre for Ageing Better on behalf of UKRI.

The Community of Practice has been working to support projects funded through UKRI's Healthy Ageing Challenge, providing peer-to-peer support and space for shared problem solving, in addition to learning and development opportunities, events, and resources. This includes a specially curated resource library with over 300 reports, articles and blogs centred around the themes of the Healthy Ageing framework.

please sign up here.

UK Research and Innovation

Thank You

If you have any questions, please contact julia.glenn@innovateuk.ukri.org

Healthy Ageing Challenge

Dementia Open Innovation Challenge

Suzanne Graham, Scottish Health Industry Partnership (SHIP)

Scottish Health and Industry Partnership (SHIP)

Suzanne Graham

Scottish Government
Riaghaltas na h-Alba
gov.scot

Overview

- The Scottish Health and Industry Partnership (SHIP) Initiative
- Dementia Medicines Open Innovation Challenge

The Scottish Health & Industry Partnership (SHIP)

SHIP is an initiative hosted by the Chief Scientist Office (CSO) of the Chief Medical Officer Directorate and the Enterprise and Innovation Division of the Economic Development Directorate.

It is aimed towards strengthening Scotland's innovation activities in health and social care to solve real problems & improve quality, efficiency & sustainability of healthcare.

SHIP will support Scotland's economy through activities that strengthen its life sciences sector, attract investment into Scotland, develop large scale innovation projects and support the growth of robust businesses.

SHIP Mission

Grow the Economy – Strengthening Scotland's Life Science sector.

Support Remobilisation - Accelerating the Adoption of Innovation into the NHS and Social Care.

Dementia Medicines Open Innovation Challenge

SHIP
SCOTTISH HEALTH AND INDUSTRY PARTNERSHIP

Governance

- Sponsored by Alison Strath, Chief Pharmacist & Euan Dick, Head of CSO.
- Led by Ewan Morrison, SHIP Pharmacy Director.

Focus

- Medicines support/usage in early dementia.
- New tools for use in clinical practice to support patients (not creating new medicines).

Process

- Discovery phase (near completion).
- Stakeholder workshop (8th March) to agree challenge statement & patient cohort.
- Pre-commercial funding call via SHIP funding (timing tbc).
- Successful projects hosted via Regional Test Bed(s) for co-creation of solutions.

Contact

Suzanne Graham
Programme Manager Innovation Collaboration

SHIP@gov.scot
Suzanne.Graham@gov.scot

Commercial industry pre-recorded showcase videos

After Cloud

- A tech for good company, who build apps for societal need, positive purposeful impact and work with partners, who provide compassionate, person-centred care, support and services to individuals in residential social care, hospice or community settings
- Contact: Darren Evans darren@dylogic.co.uk

Viarama C.I.C: Virtual Reality for good

- Viarama is a small but world-leading Scottish social enterprise that has used VR to benefit thousands of children and senior citizens across Scotland since 2015. Since the pandemic started in 2020, Viarama has been unable to deliver sessions or generate any income to keep the social enterprise going, and as such our work is gravely threatened.
- Contact: Billy Agnew billyagnew@viarama.co.uk

Final comments

Joanne Boyle, Digital Health & Care Innovation Centre

Final comments

- Thank you to all our speakers today
- So much information - all recorded and presentations will be made available for further reference on our website

Funding Opportunities

- All our current funding opportunities are available on the HAIC webpage: https://www.dhi-scotland.com/innovation/innovation-clusters/healthy-ageing/

SHIP

- Suzanne Graham

Next HAIC event

- April 2022

Take our post event survey

- Scan the QR code →

Or

- Enter:

https://www.surveymonkey.co.uk/r/Post_HAIC_Event_Survey

Join our digital health and care network

- Scan the QR code →

Or

- Enter:

www.dhi-scotland.com/join-our-network

Visit our HAIC webpage

- Scan the QR code →

Or

- Enter:

www.dhi-scotland.com/innovation/innovation-clusters/healthy-ageing/

Join our private LinkedIn HAIC Group

- Scan the QR code →

Or

- Enter:

www.linkedin.com/groups/12496744/