

What Do You Need to Know and Do About Vascular Health and its Link to Brain Health

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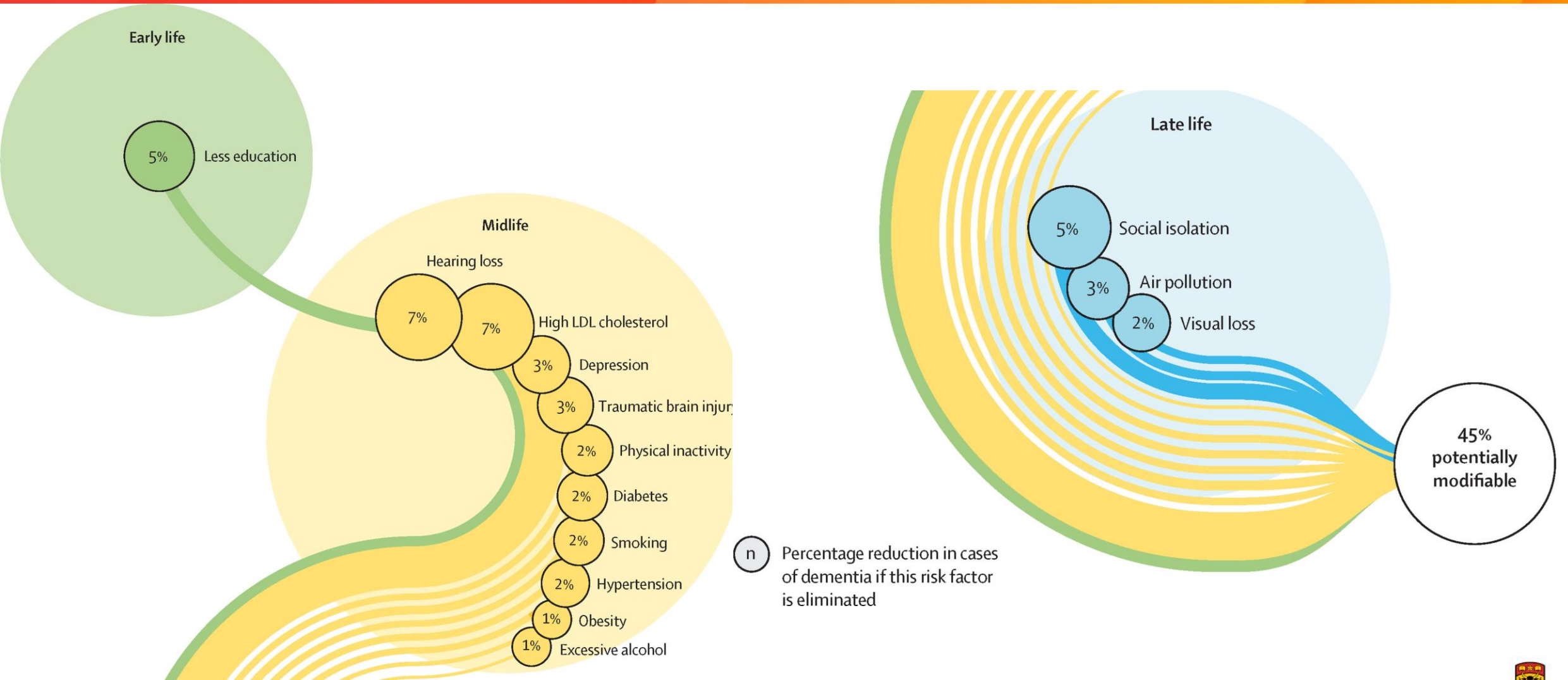
Disclosures

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- Deputy Editor, *Stroke*.

Outline

- Dementia risk factors.
- Scientific rationale for vascular disease as a contributor to dementia risk.
- Converting knowledge to action.

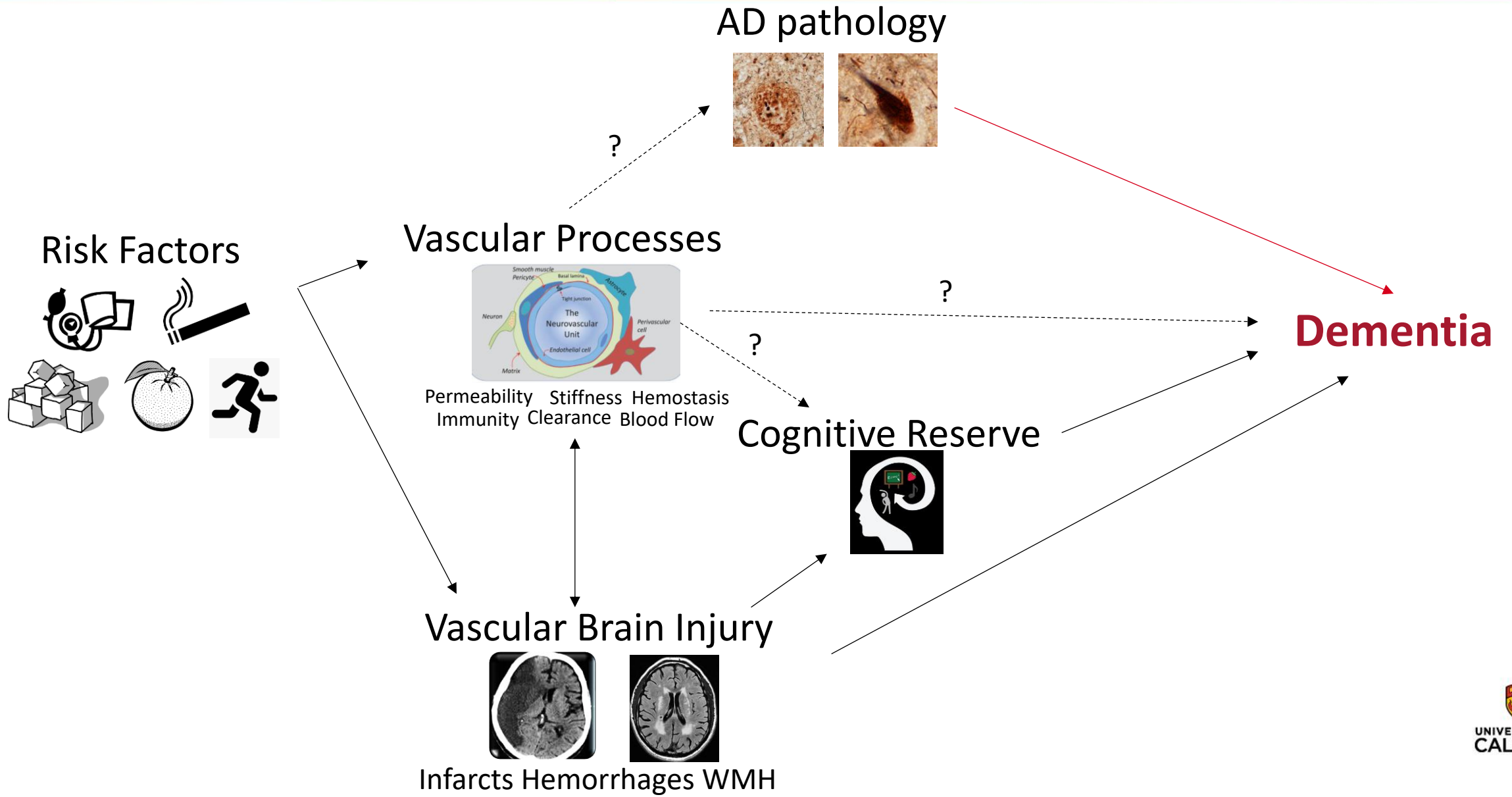
Lancet Commission: Risk Factors for Dementia



Overlap of Cardiovascular Risk with Dementia Risk

Also CV Risk Factors	Possible Caused by CV Disease	Unrelated
Education	Hearing loss	Traumatic brain injury
High LDL		Visual loss
Depression		
Physical inactivity		
Diabetes		
Smoking		
Hypertension		
Obesity		
Alcohol excess		
Social isolation		
Air pollution		

How Vascular Risk Could Influence Dementia Risk

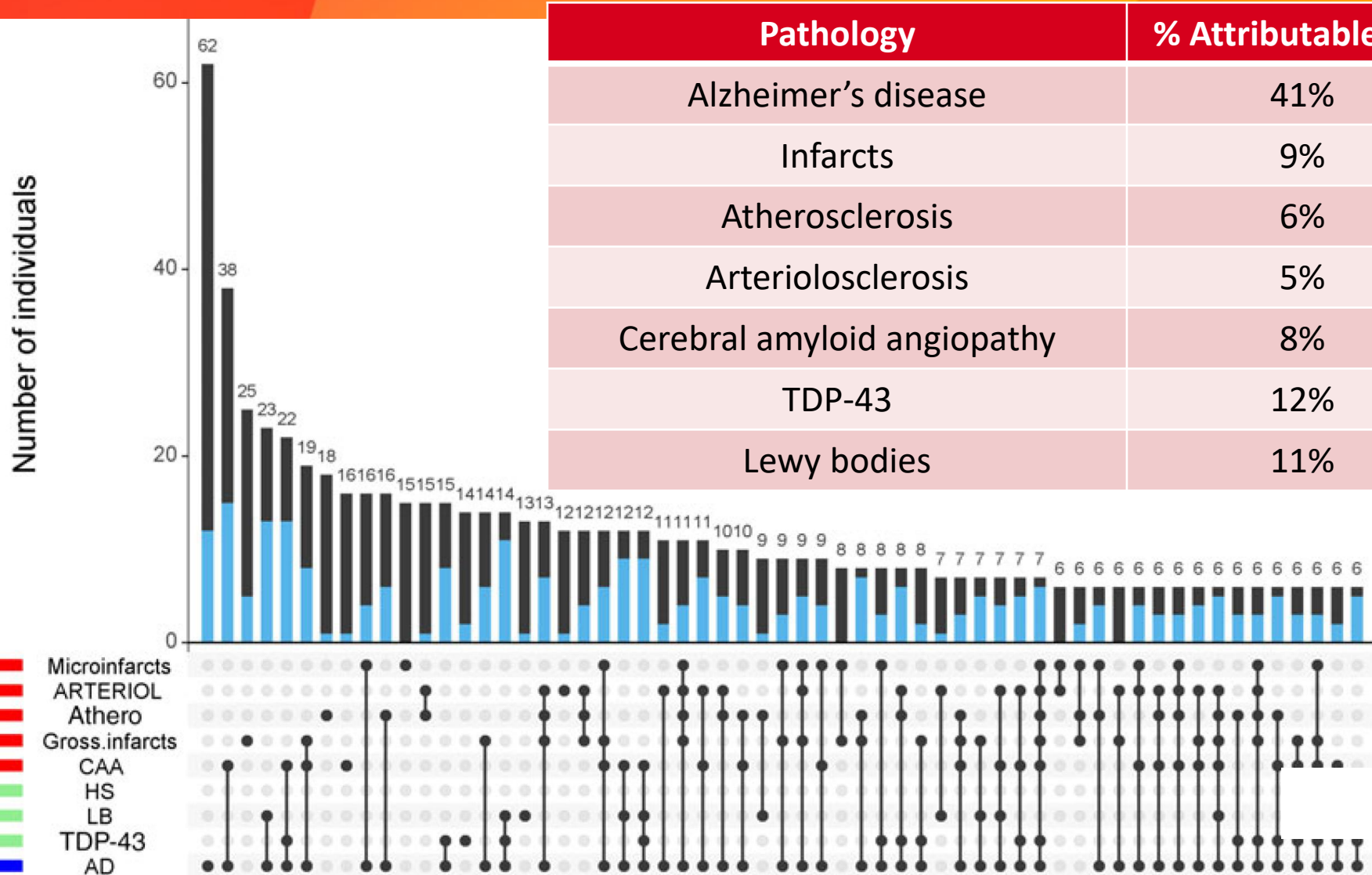
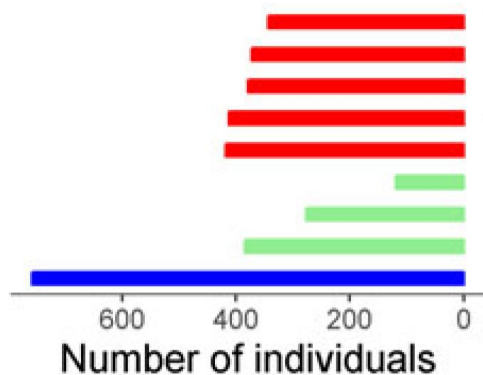


Dementia: Contribution of Vascular Disease

Blue=AD-dementia present
Black=AD-dementia absent

N=1161

512 had AD-dementia at death



Pathology	% Attributable Risk
Alzheimer's disease	41%
Infarcts	9%
Atherosclerosis	6%
Arteriolosclerosis	5%
Cerebral amyloid angiopathy	8%
TDP-43	12%
Lewy bodies	11%

Boyle PA, et al. Attributable risk of Alzheimer's dementia attributed to age-related neuropathologies. Ann Neurol 2019;85:114-124.

SPRINT MIND Substudy

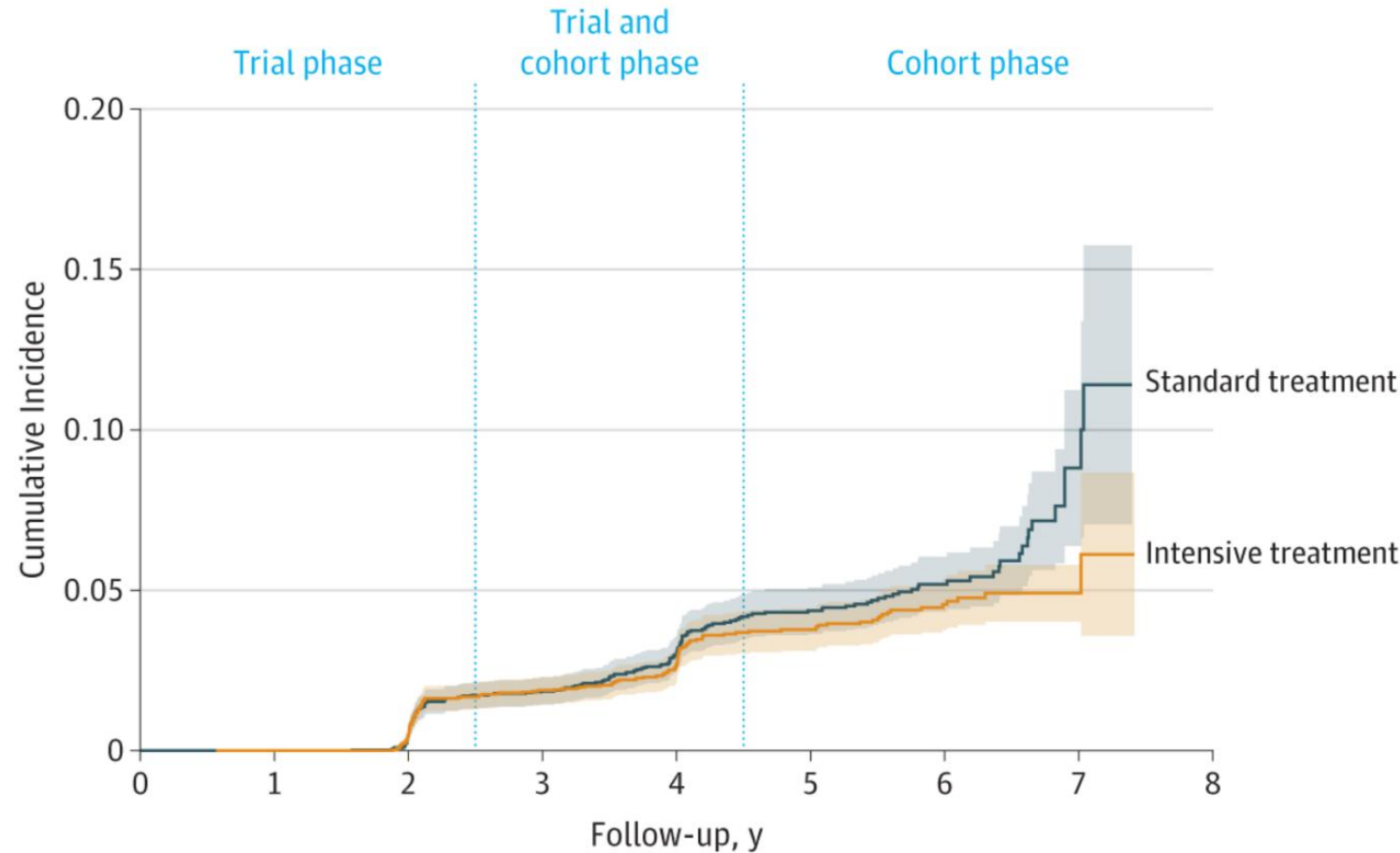
8500 age ≥ 50 with a cardiovascular risk factor randomized to goal SBP < 120 vs < 140

Dementia

HR, 0.83, 95% CI, 0.67-1.04, $p=.10$

Dementia or MCI

HR 0.85, 95% CI 0.74-0.97, $p=.01$



No. at risk	0	1	2	3	4	5	6	7	8
Standard treatment	4285	4282	4168	3886	2829	2107	989	87	0
Intensive treatment	4278	4277	4171	3917	2893	2189	1027	93	0



RCTs: Multi-Domain Interventions for Dementia Prevention

Study	N	Age Inclusion (mean)	Follow up (years)	Intervention	Cognitive outcome	Results
preDIVA Prevention of Dementia by Intensive Vascular Care ¹⁶¹	3,526	70-78 (75)	6.7	Usual care versus multidomain intervention (smoking habits, diet, physical activity, weight, blood pressure, diabetes mellitus and dyslipidemia)	Dementia (DSM-IV criteria)	No effect on dementia
FINGER Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability ¹⁴⁹	2,654	60-77 (69)	2	Usual care versus multidomain intervention (diet, physical exercise, cognitive training, and intensive vascular risk factor monitoring)	Neuropsychological test battery	Multidomain intervention reduced mean z score at 2 years from 0.20±0.02 to 0.16±0.51 (p=0.03)
MAPT Multidomain Alzheimer Preventive Trial ¹⁶⁰	1,680	≥60 (75)	3	Usual care versus multidomain intervention (cognitive training, diet, nutrition advice, and three preventive consultations ± omega 3 polyunsaturated fatty acids)	Free and Cued Selective Reminding test, ten Mini-Mental State Examination orientation items, Digit Symbol Substitution Test, and Category Naming Test	No effect of treatment on cognition

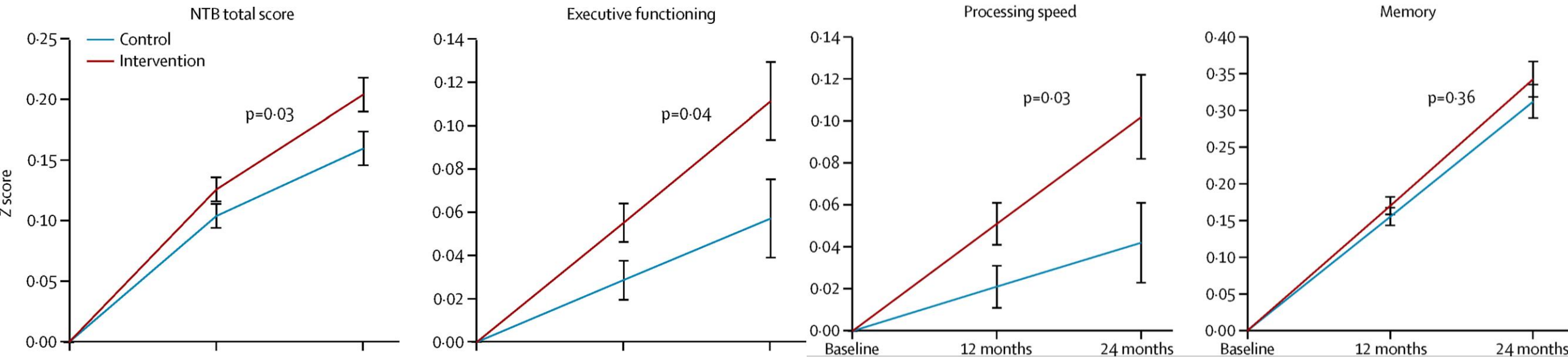
Gorelick PB, Furie KL, Iadecola C, **Smith EE**, et al. Defining optimal brain health in adults: A Presidential Advisory from the American Heart Association/American Stroke Association. *Stroke*. 2017;48:e284-e303.

FINGER Trial: Population and Intervention

- 1260 randomly assigned 1:1 to multi-domain intervention+ regular health advice vs. regular health advice alone.
- Criteria: 60-77, vascular risk factors, MMSE 26 or less or low memory score.
- 4 component multi-domain intervention.
 - Nutrition.
 - Physiotherapy led strength and exercise training.
 - Computer-based cognitive training.
 - Nurse-led vascular risk factor monitoring and modification.

Ngandu T, Lehtisalo J, Solomon A, Levalahti E, Ahtiluoto S, Antikainen R, . . . Kivipelto M. A 2 year multidomain intervention of diet, exercise, cognitive training, and vascular risk monitoring versus control to prevent cognitive decline in at-risk elderly people (FINGER): a randomised controlled trial. *Lancet*. 2015;385:2255-2263.

FINGER Trial: Results



- Groups were well balanced on baseline characteristics.
- Mean age 69, 46% women.
- Small improvements in executive function and processing speed over 24 months.

Lancet. 2015;385:2255-2263.

The FINGER Model: Is it Affordable?

- Estimated gain of 0.043 quality-adjusted life years per person, at a savings of \$16,928 per person.
- Estimated 1,632 dementia cases avoided per 100,000.
- Major caveats
 - “the FINGER trial does not have data on conversion to dementia”
 - “The intervention effects on the conversion risk to dementia in FINGER have not yet been analyzed due to the relatively short follow-up period and small number of dementia cases accumulated. Therefore, the CAIDE risk score was calculated at baseline and at 2 years for both the control and intervention arm. The relative risk reduction corresponding to this score was calculated in several steps using the CAIDE risk model¹⁶ and was estimated to be 6.44%”.

World-Wide FINGERS

World-Wide FINGERS



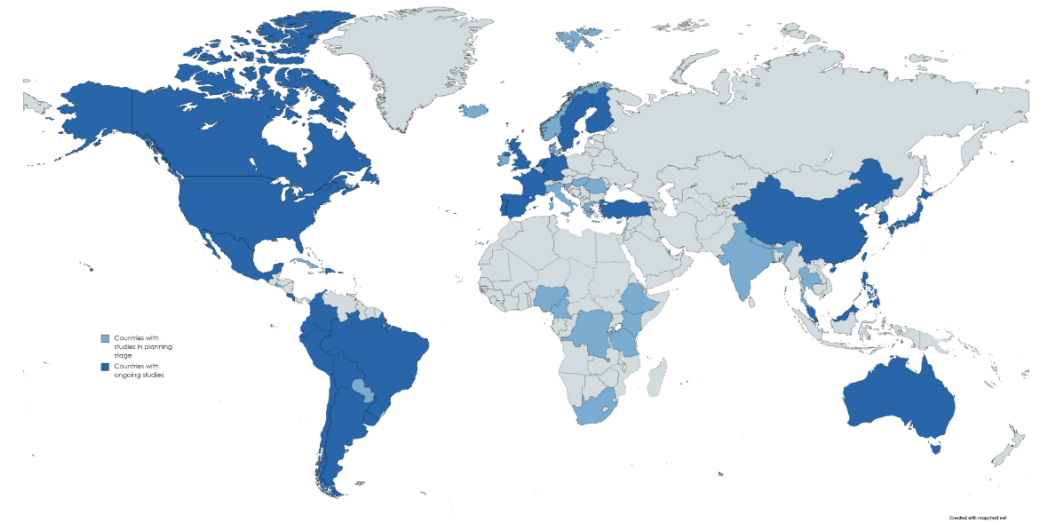
A GLOBAL NETWORK of research teams

To expand on the results of the FINGER study, in 2017, Professor Miia Kivipelto initiated World-Wide FINGERS, the first global network of multidomain intervention trials for risk reduction and prevention of cognitive decline and dementia.

The objectives of the network are to adapt, test, and further develop the FINGER model in different geographical, cultural, and economic settings. This includes joint analyses and harmonization of data and methods across studies to generate robust evidence that feeds into dementia prevention strategies globally.

The World-Wide FINGERS network now includes research teams in 70 countries (December 2024), including several low and middle income countries.

Professor Miia Kivipelto is the scientific leader of the network, which is co-administered by the Alzheimer's Association.



Brain Health Pro

Social & Psychological Health

Knowledge: Having a large and diverse social network with regular interactions supports your brain health.

Action: Reconnect with older friends, pursue your hobbies, exercise with your friends and family, and take on volunteer or mentorship roles.

Cognitive Engagement

Knowledge: Engaging in new cognitively stimulating activities increases your cognitive capacities.

Action: It is never too late to improve your cognition and your memory, so start now! Begin by learning new skills and by learning and applying memory strategies.

Sleep

Knowledge: Sleeping well strengthens your immune system, helps maintain your overall health, and improves your memory and cognition.

Action: If you are having trouble sleeping, do not resort to medications right away. Begin by practising relaxation techniques before bed, and adopt a good sleep hygiene.



Vision & Hearing

Knowledge: Sensory loss, such as loss of hearing and/or vision, is common among older adults, and it increases with age. Communication relies on the senses and is necessary for a socially, mentally and physically active life.

Action: Check your hearing and vision and have them treated if needed. It will make social communication easier and more enjoyable, and you will remember information better.

Vascular Health

Knowledge: High blood pressure is the most important risk factor for heart disease and stroke. A healthy blood pressure can prevent a stroke, heart attack, and dementia.

Action: Increase your physical activity, improve your diet, and talk to your doctor about blood pressure.

Physical Activity

Knowledge: Physical activity like jogging, swimming, cycling, or walking can improve brain function.

Action: Incorporate physical activity into your day and your week.

Nutrition

Knowledge: Good nutrition includes eating vegetables every day which is known to lower your risk of Alzheimer's disease, heart disease, diabetes, and cancer.

Action: Explore new healthy foods and try them with your friends and family! Think about the types of foods recommended in Canada's Food Guide and the Brain Health Food Guide.

Brain Health Pro: Vascular Health



Knowledge

- **Cardiovascular disease** (disease of the heart and blood vessels) is related to cognitive impairment and is the second most common cause of dementia.
- **Stroke** is the second most common cause of death, and it is a leading cause of disability.
- **High blood pressure** is the most important risk factor for heart disease and stroke. A healthy blood pressure can reduce the risk of stroke and heart attack. A healthy blood pressure should be below 130/80.
- **Drugs and alcohol** can have negative effects on your brain and vascular health. You are at increased risk of type 2.

You are at an increased risk of type 2 diabetes if you are **over 40**, have **a parent or sibling with diabetes**, have **high blood pressure** or **cholesterol**, or are **overweight**.

Managing cardiovascular health (blood pressure and cholesterol) can help reduce the risk of heart disease, cognitive problems, and dementia.

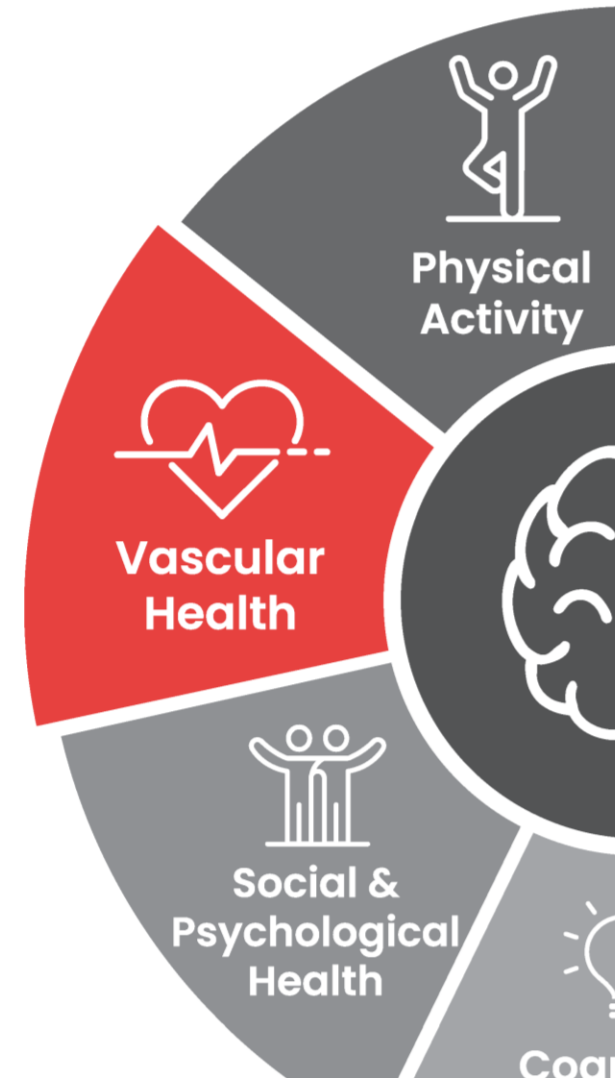


Action

Increase your **physical activity**, **improve your diet**, and if prescribed by your doctor, **take the necessary medication** to reduce your risk of stroke or diabetes.

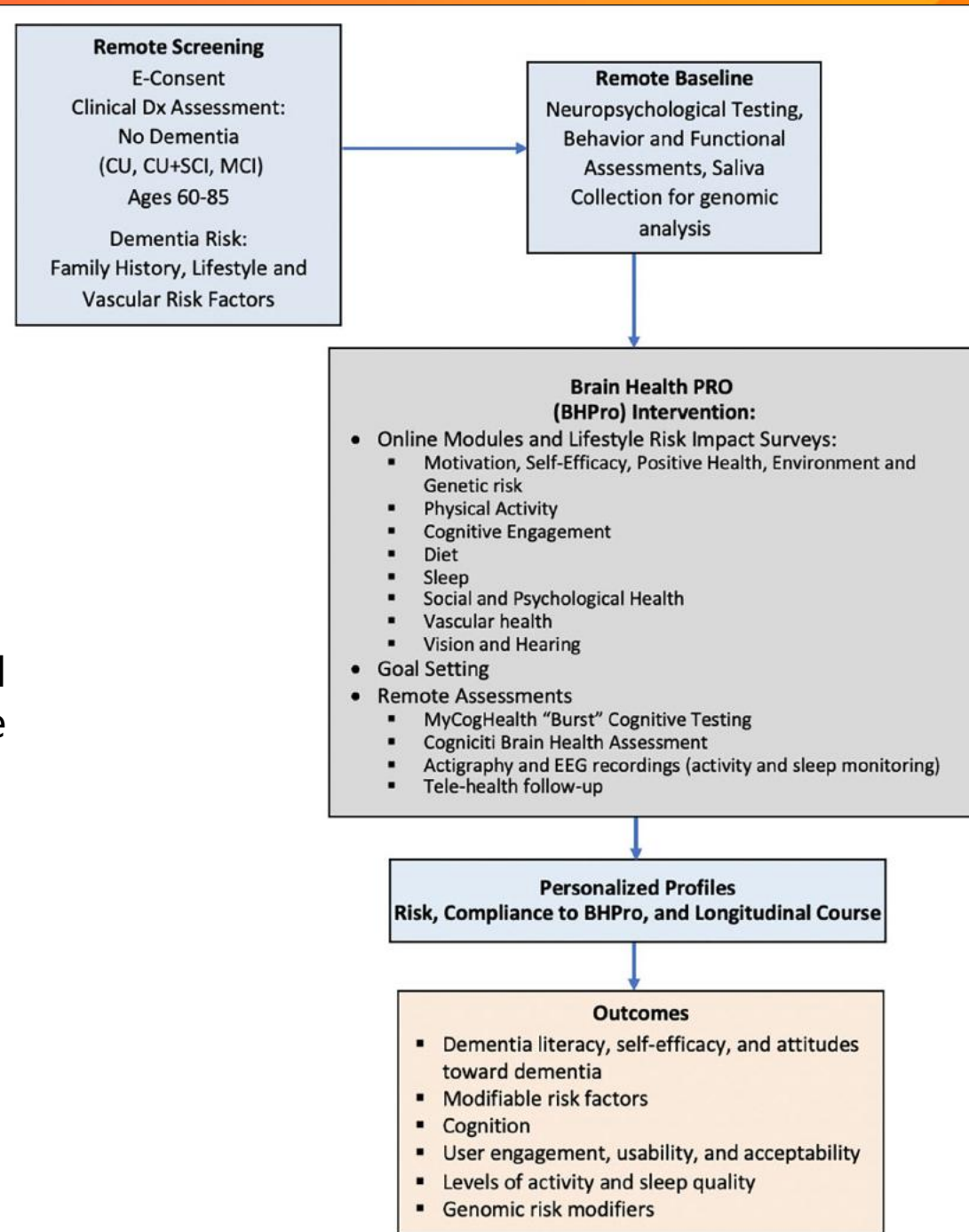
- **Regularly check your blood pressure** at your doctor's or at a local pharmacy, or purchase a blood pressure monitor to use at home.
- Consult your doctor immediately if your blood pressure exceeds 180/120.
- **Exercise** on your own, with friends and family, or in group fitness classes, and receive guidance from a trainer, a physiotherapist, or an occupational therapist if necessary.

Make lifestyle changes to reduce the risk of cardiovascular disease and cognitive impairment or dementia, such as **managing your diet**, **engaging in physical activity**, **managing stress**, drinking **alcohol in moderation**, and reducing or **quitting smoking**.



BHPro: Evaluation

Feldman HH, Belleville S,, . . . Chertkow H. Protocol for the Brain Health Support Program Study of the Canadian Therapeutic Platform Trial for Multidomain Interventions to Prevent Dementia (CAN-THUMBS UP): A Prospective 12-Month Intervention Study. *J Prev Alzheimers Dis.* 2023;10:875-885.



Conclusions

- Almost half of dementia cases can be predicted using known risk factors.
- Each risk factor accounts for a small portion of the risk.
- With only a few exceptions, risk factors for dementia overlap with risk factors for cardiovascular disease.
- The evidence that controlling vascular risk factors prevents dementia is modest, and clinical trials are generally lacking.
- Intensive multidomain interventions may improve cognitive function, but the cost effectiveness is uncertain.
- Personalized online interventions may be a more affordable alternative to deliver precision prevention for persons at risk for dementia.

Acknowledgements

Univ of Calgary VCI Research Group

<https://cumming.ucalgary.ca/labs/smith-research>



BH Pro Summary



CCNV
Consortium canadien en
neurodégénérescence
associée au vieillissement

Société Alzheimer Society
CANADA



Fondation
Brain Canada
Foundation

