

Healthy aging: An Icelandic Geriatrician's Perspective

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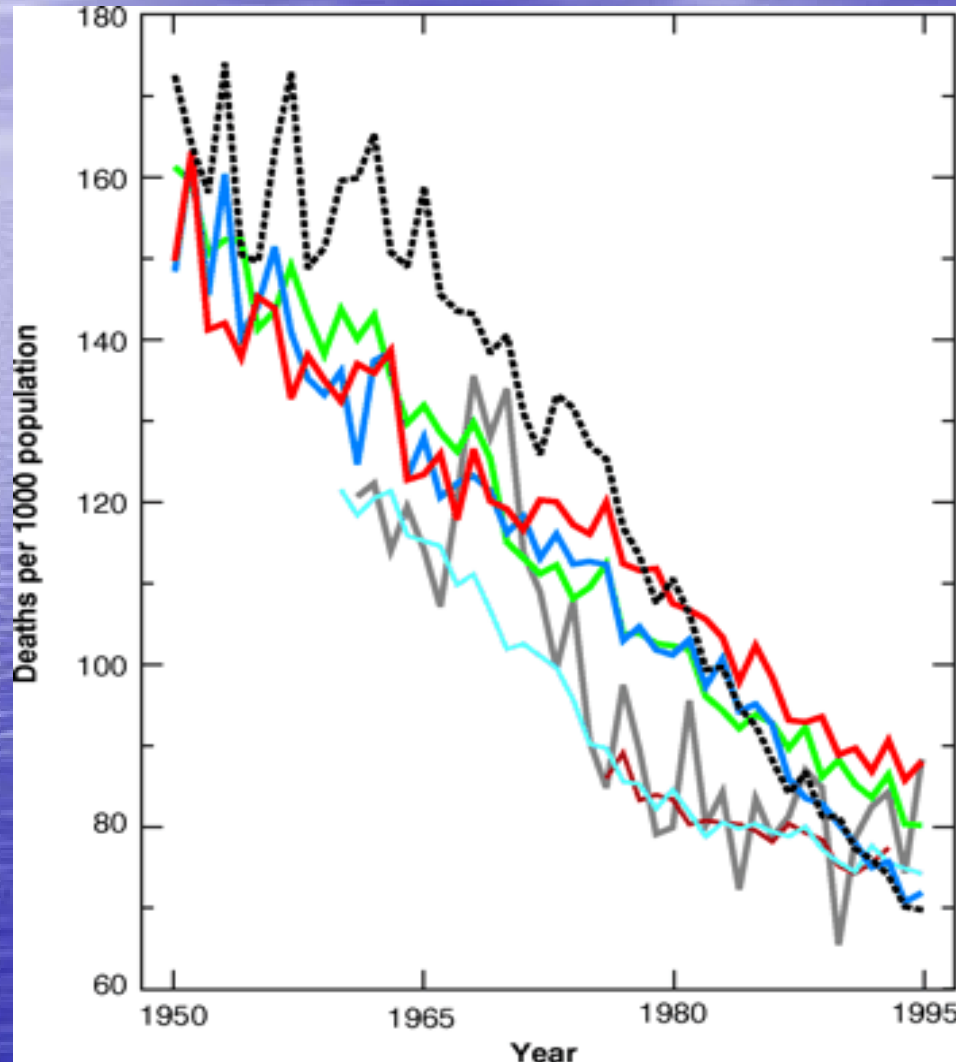
Definition of Healthy Aging

- The process of optimizing opportunities of physical, social and mental health to enable older people to take an active part in society without discrimination and to enjoy an independent and good quality of life
 - Relates to every aspect of life from birth to death!
 - Starts with care and opportunities for children including access to education.....

Aging of the Population

- Men have 30% excess mortality compared with women
- F:M ratio is 245:100 in 85+: feminization of the oldest old
- In Iceland, 11.5% older than 65
- Life expectancy in 2001-2
 - at birth, 82.6 years for females and 78.4 years for males
 - age 65, 20.7 years for females and 17.5 years for males
 - at age 80, 9.2 years for women and 7.7 years for males
 - The sex difference in life expectancy is obvious but still smaller in Iceland than most nations

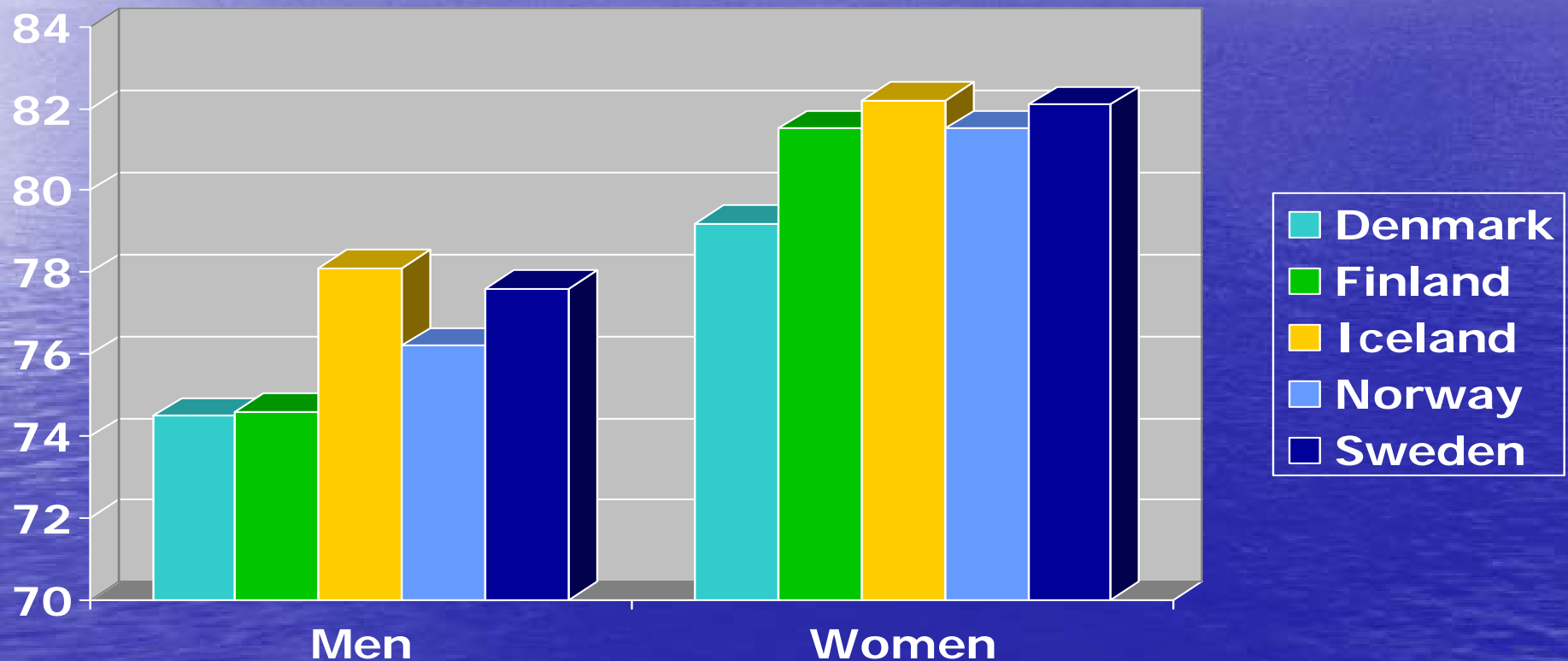
Death rate per 1000 women at ages 80-89 from 1950-1995



Japan: black
France: blue
Sweden: green
England: red
Iceland: gray
US: light blue

Vaupel JW et.al.
Science 1998

Average life expectancy at birth - 2001



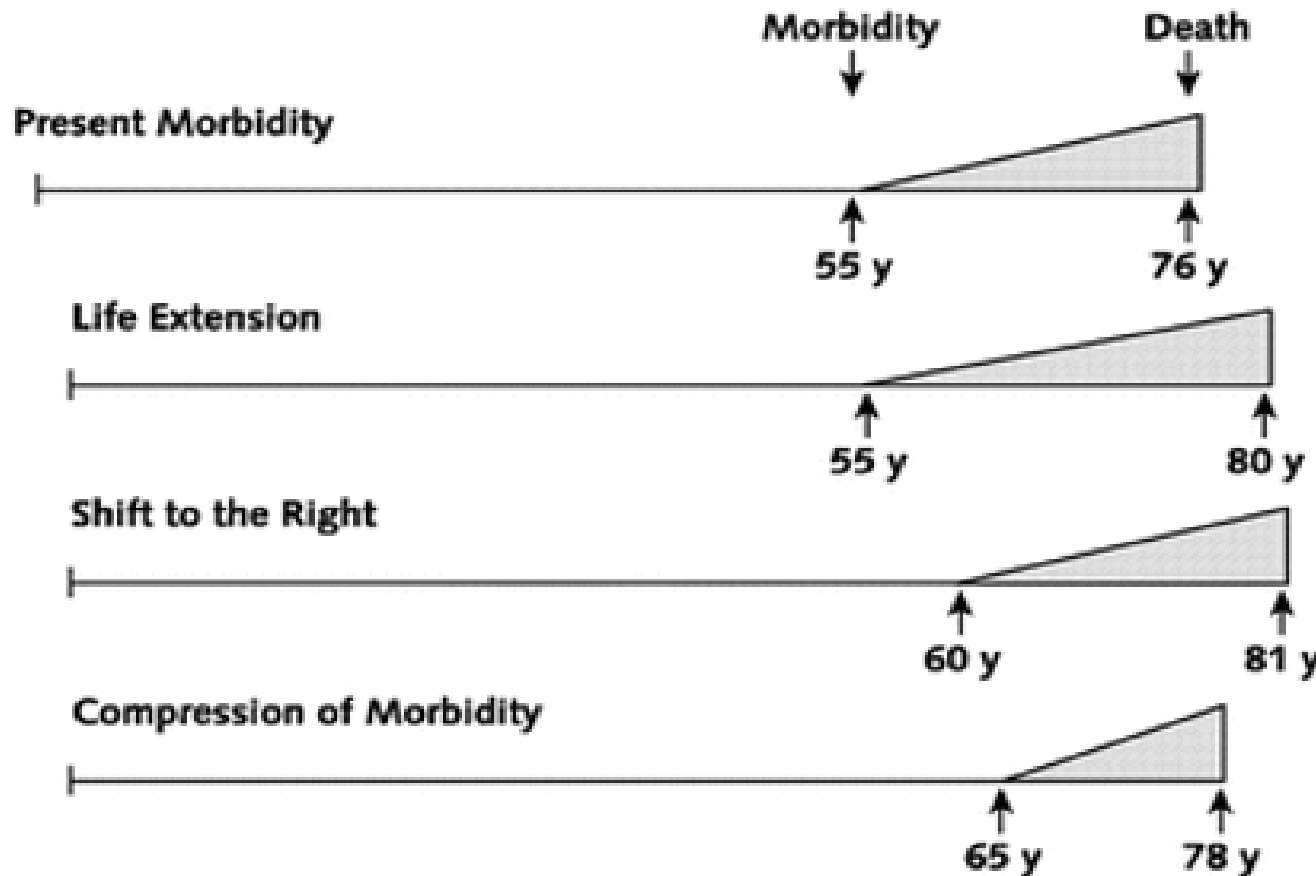
Highest both sexes: Iceland

Lowest both sexes: Denmark – difference 3 years for women, 4 years for men

The goal: Compression of Morbidity and Disability.

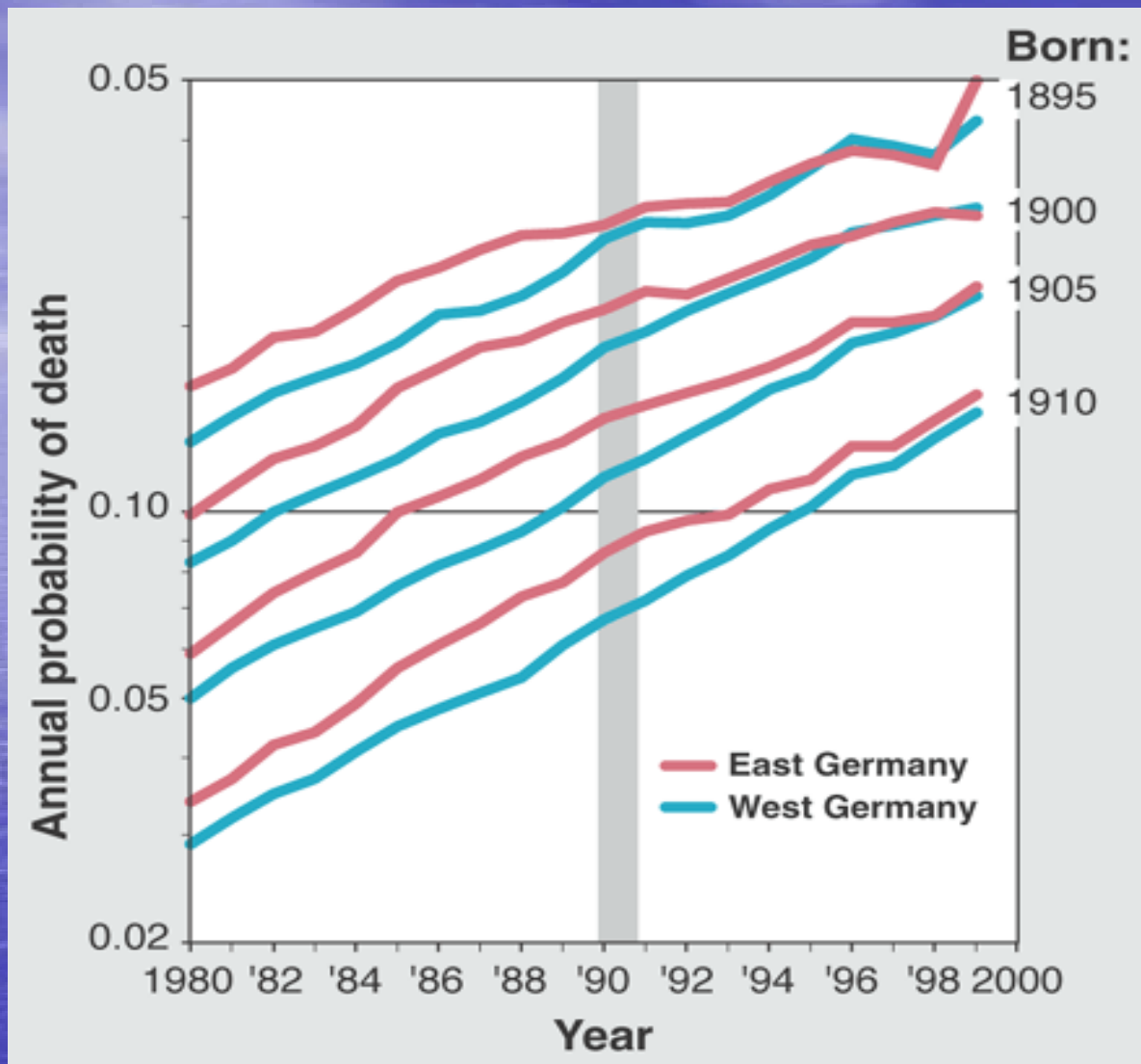
- The prevalence of chronic disease doubles every five years after 70 years of age.
- But, by delaying a disease for 5 years, the number of elderly with the condition at the age of 85 is reduced by 50%.
- One medication may affect multiple organs; such as ACE inhibitors, Estrogens, Statins.
- Current knowledge is not optimally used; Hypertension, Atherosclerosis, Atrial Fibrillation, Osteoporosis

Possible scenarios for future morbidity and longevity



Between 1982 and 1994 disability of people older than 65 in the US fell from 24,9% to 21,3%, according to Mantel et al....

For Iceland it means that there were 1400 less disabled elderly than forecasts expected in 1982



It's Never Too Late
James W. Vaupel,
James R. Carey
and Kaare Christensen*

Science, Vol 301, Issue 5640,
1679-1681, 19 September 2003

East and West German death rates for cohorts born around 1900. The Berlin Wall fell on 9 November 1989 and formal unification of East and West Germany was completed on 3 October 1990 (gray column). Before 1989, the annual probability of death was considerably higher in East Germany compared with West Germany for cohorts born in 1895, 1900, 1905, and 1910. In 1990, people born in these years were in their 80s and 90s. Nonetheless, very old East Germans were able to benefit from medical, social, and economic improvements after unification. Consequently, their death rates converged toward those of West Germany.

Some Icelandic Initiatives of relevance to healthy aging

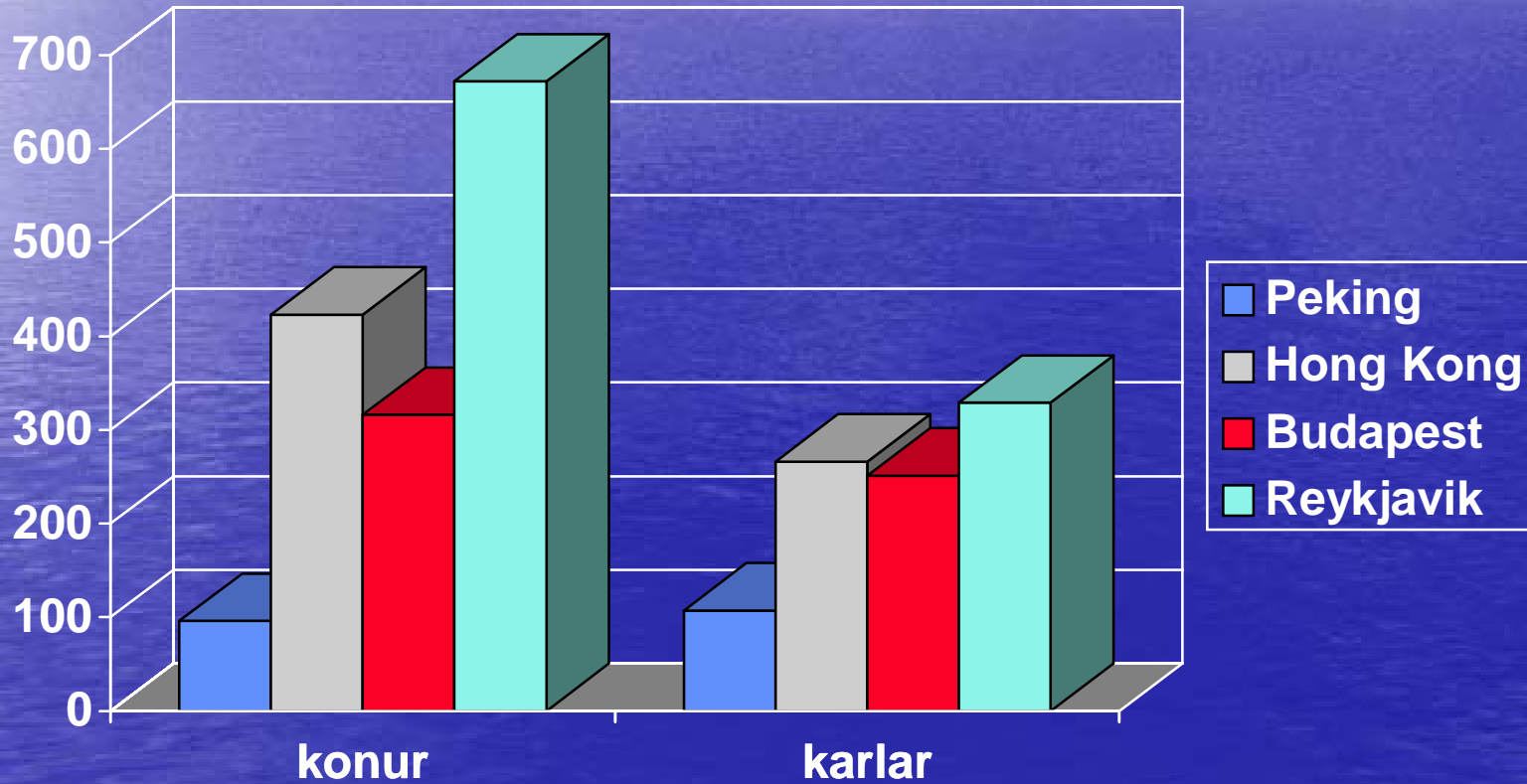
- The Policy of Icelandic Health Care to 2010.
- Clinical Guideline Development
- Policy report on issues relating to older people to the year 2015

Icelandic Health Policy to 2010.

Examples

- Reduce smoking among people 18-69 years of age from 27% in 1998 to 15% in 2010.
- Reduce cardiovascular deaths in the age group 25-74 years for men by 20% and women by 10%.
M=131 and F=76/100.000 1991-1995.
- Reduce strokes by 25%.
M=44.1 and F=30.4/100.000 1991-1995.
- Reduce number of hip and vertebral fractures by 25%.

Age adjusted incidence of hip fractures 50 +/100.000



Policy report on issues relating to older people to the year 2015

- Equality of age cohorts and sexes
- Prevention and healthcare issues
- Services to homes of older people
- Institutional care
- Finances and work participation
- Housing
- Management of issues relating to older people
- Research – Gerontological Research Institute

Prevention - triple strategy - simultaneously.

- 1° Prevention: healthy food, exercising, immunizations, not to start smoking, prevention of accidents; Age 15 and for life.
- 2° Prevention: treat known risk factors: lower high BP, lower cholesterol, maintain bone mass; Age 40-50 and for life.
- 3° Prevention: treat disease, rehabilitate, geriatrics; Age 70+ and for life.

Roadblocks to Healthy Aging

- Individuals are uninformed about what may improve likelihood of good health.
- Ageism by professionals and societies.
- Physician's limited motivation to follow guidelines and patients noncompliance with advice.
- Politicians/Physicians take short term view instead of long term view in financing/delivery of health care and do not see the forest for the trees.

More research is needed

- Into the basic factors of disease (key points in common pathways for many tissues), that subsequently might be modified.
- Into targeting of preventive efforts, defining risk groups by genotyping?
- Into the human factors which guide behavior and may interfere with knowledge being put to use.
- To optimize data collection and management to inform decisions about elderly care.

The AGES study

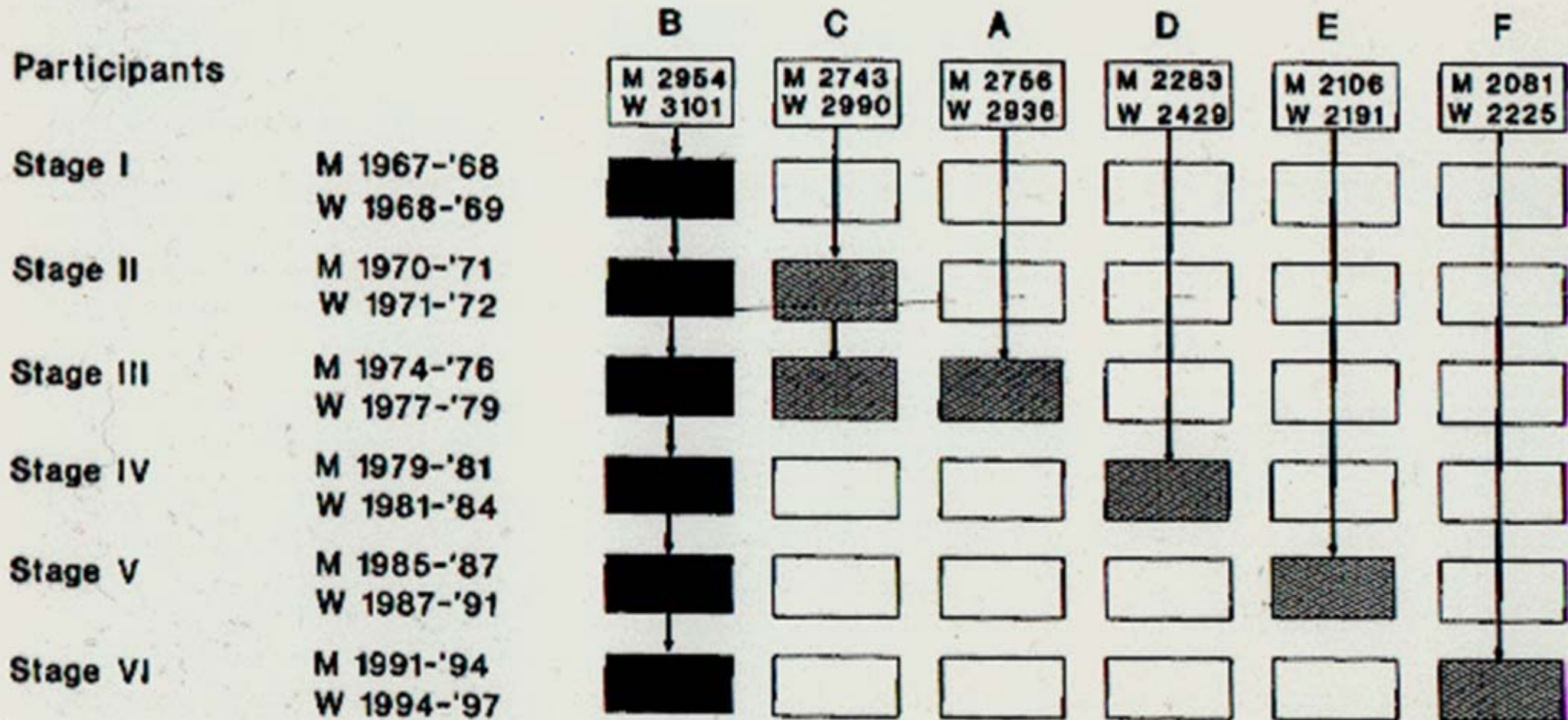
- A continuum of the Reykjavik Study
 - A collaborative project with National Institute on Aging, National Eye Institute, National Institute for Deafness and Communicative Disorders, National Heart, Lung and Blood Institute
- Participants aged between 67 and 95 years
- Examine around 6.000 individuals over a 5 years period

The Reykjavik Study

Study plan

In the beginning a typical CV Study

Men (M) / Women (W)



In stage 6 a geriatric component was added

Total group of men = 14.923

-

Total group of women = 15.872

The AGES-RS Study – Specific Research Questions

- Expression of genotype in old age is modified by endogeneous and exogeneous environmental factors that are likely to change over the life span.
 - Risk factors change over time in the long preclinical phase of disease

The AGES-RS Study Design Features

- Four physiologic systems
 - Cardiovascular
 - Musculoskeletal
 - Neurocognitive
 - Endocrine
- For each of the systems, a set of quantitative traits are defined as endophenotypes

The AGES-RS Study Design Features

- a Systems Biology Perspective

- Physiologic systems are included that are hypothesized to share common molecular mechanisms
 - For example inflammation contributes to atherosclerosis, but has also been associated with diabetes, smoking-related disease, dementia and osteoporosis
- Will develop a network of linkages between and among the endophenotypes defined in the study

The AGES-RS Study Design Features

- Emphasis on Imaging Techniques and Biochemical measures

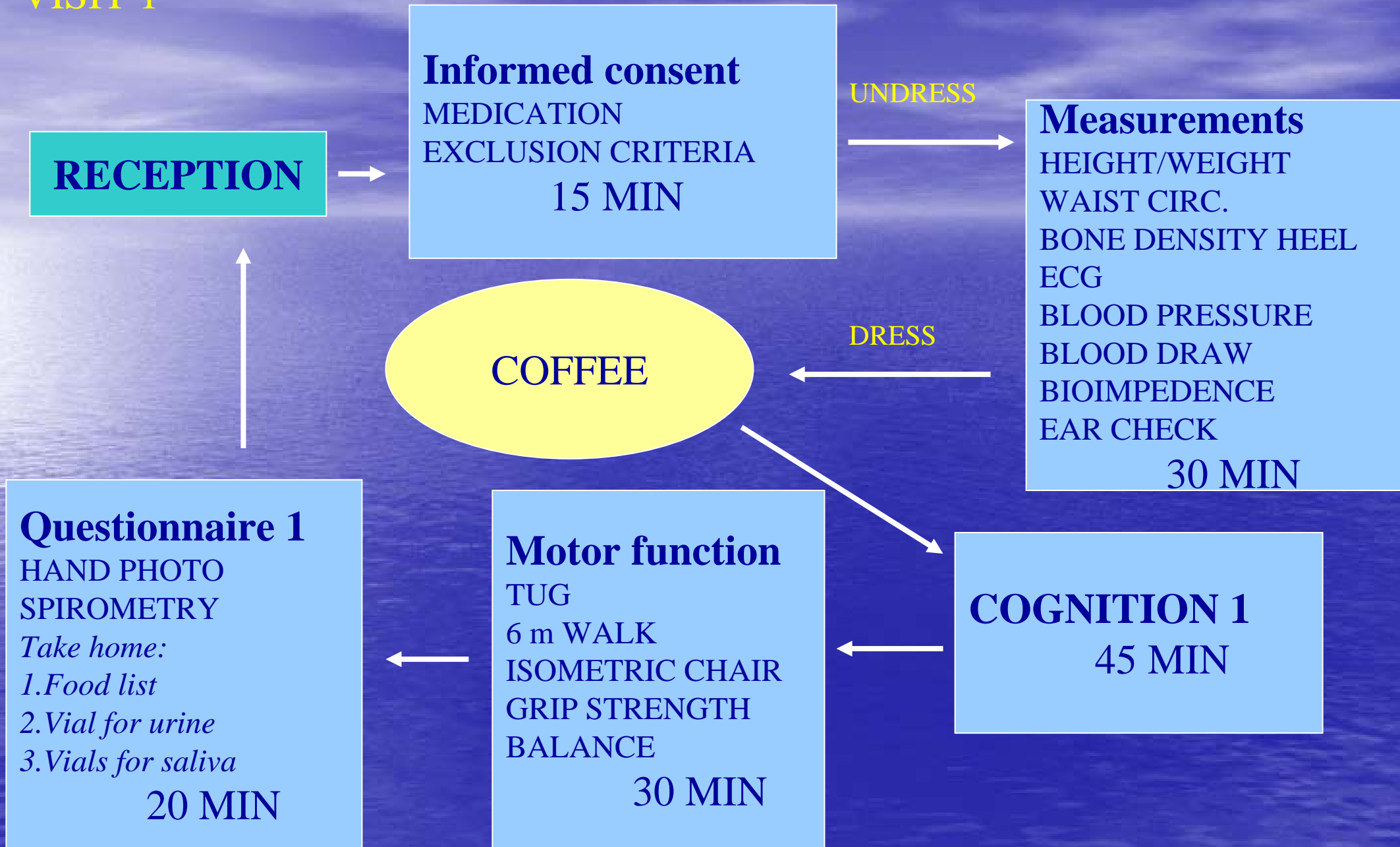
- Imaging is an effective way of understanding subclinical disease
 - Atherosclerosis
 - Osteoporosis
 - Brain structures
 - CT of the abdomen to quantify visceral and subcutaneous fat
- Cells for DNA

The AGES-RS Study Design Features

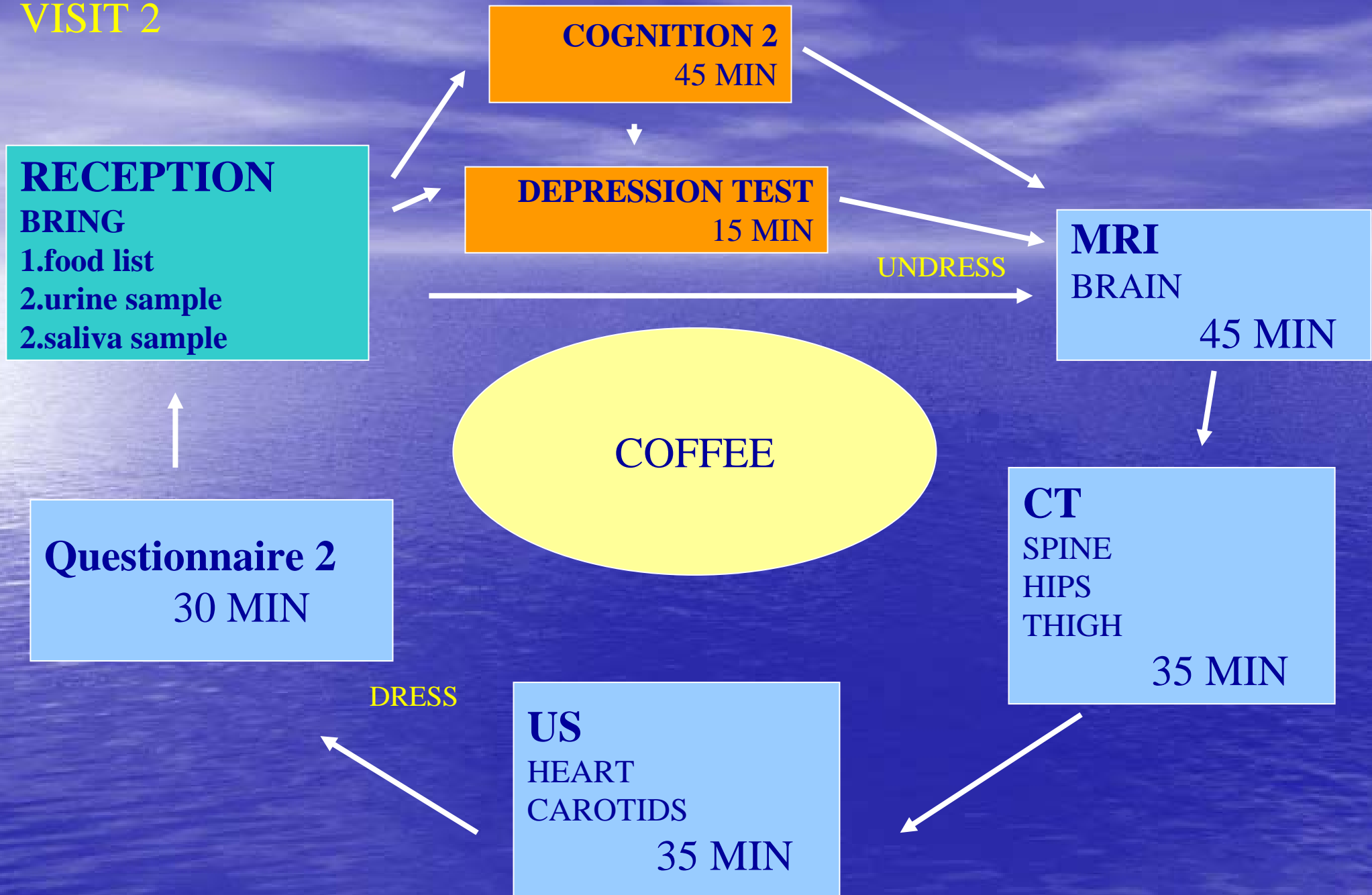
- Available Information on The Study Population

- Phenotypes from earlier stages are available
- Archived early life data will help better define phenotypes based on trajectories of the risk factors
- Genealogy information 6-8 generations back and relative homogeneity of the population

VISIT 1



VISIT 2



VISIT 3

Eyes

- a. Acuity
- b. Tonometry
- c. Retinal photo

Hearing

45 MIN

Physician counseling

20 MIN

Memory Clinic

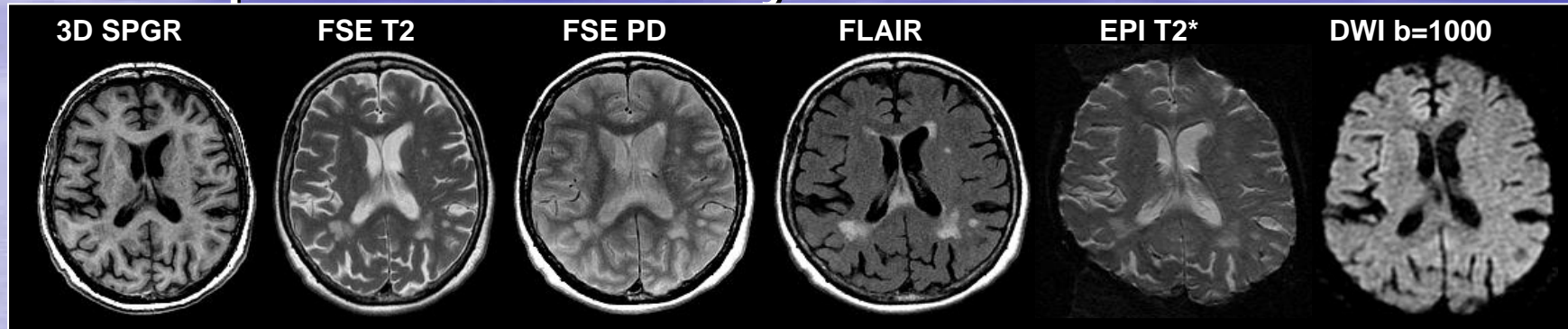
NEUROLOGIST

PROXY INTERVIEW

45 MIN

MRI of the brain

- Semi-quantitative analysis



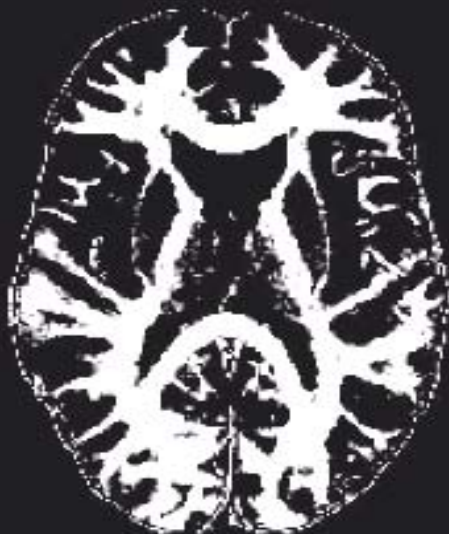
- All white matter lesions and parenchyma defects are counted, located and measured



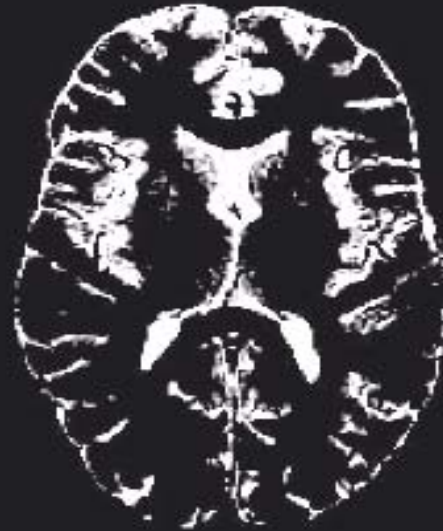
Segmentation



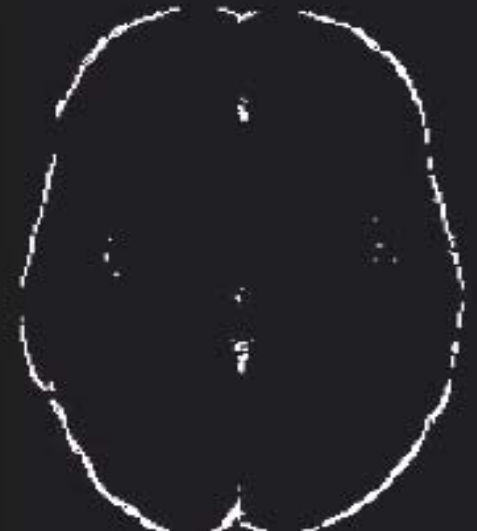
Grey matter



White matter

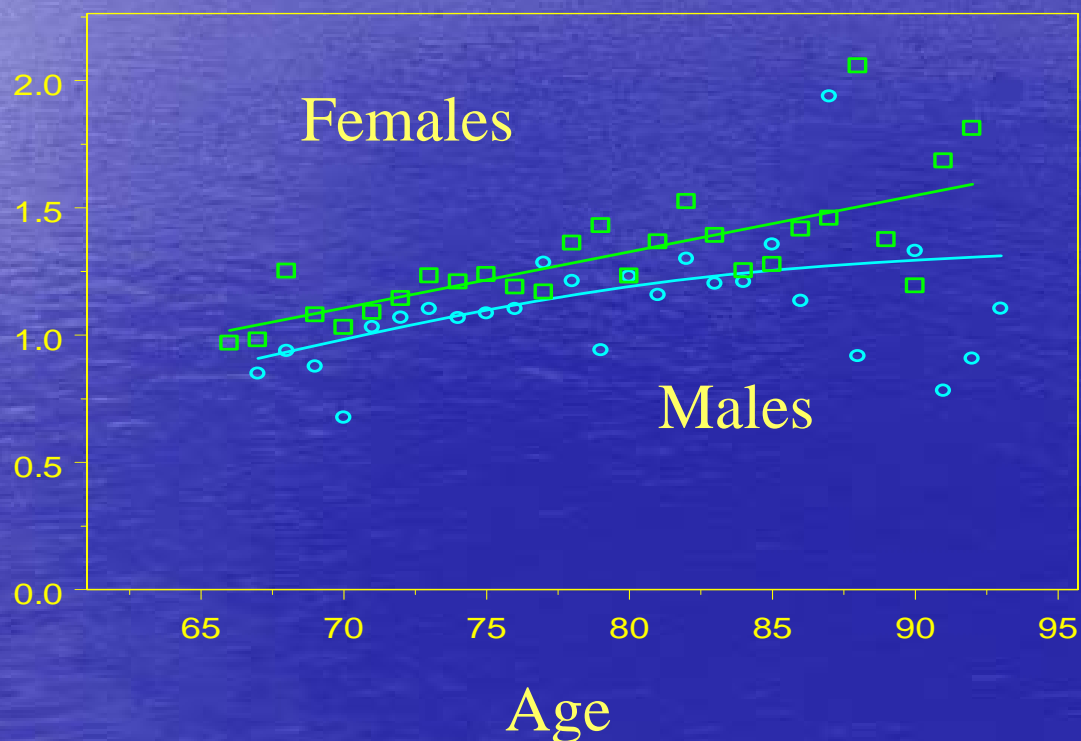


CSF



Blood vessels and meninges

Brain White Matter Lesions by Age-



Age

$p < 0.001$

Females
vs

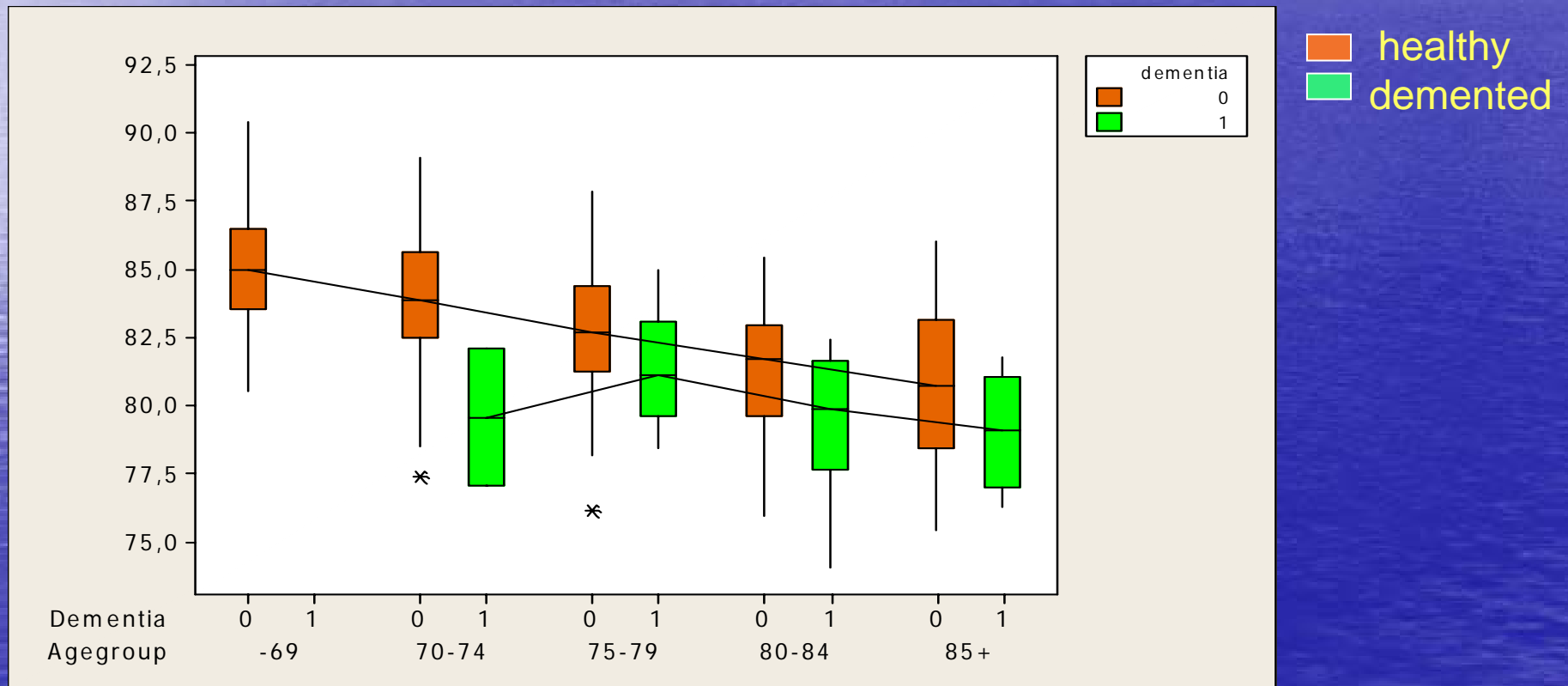
Males

$p < 0.001$

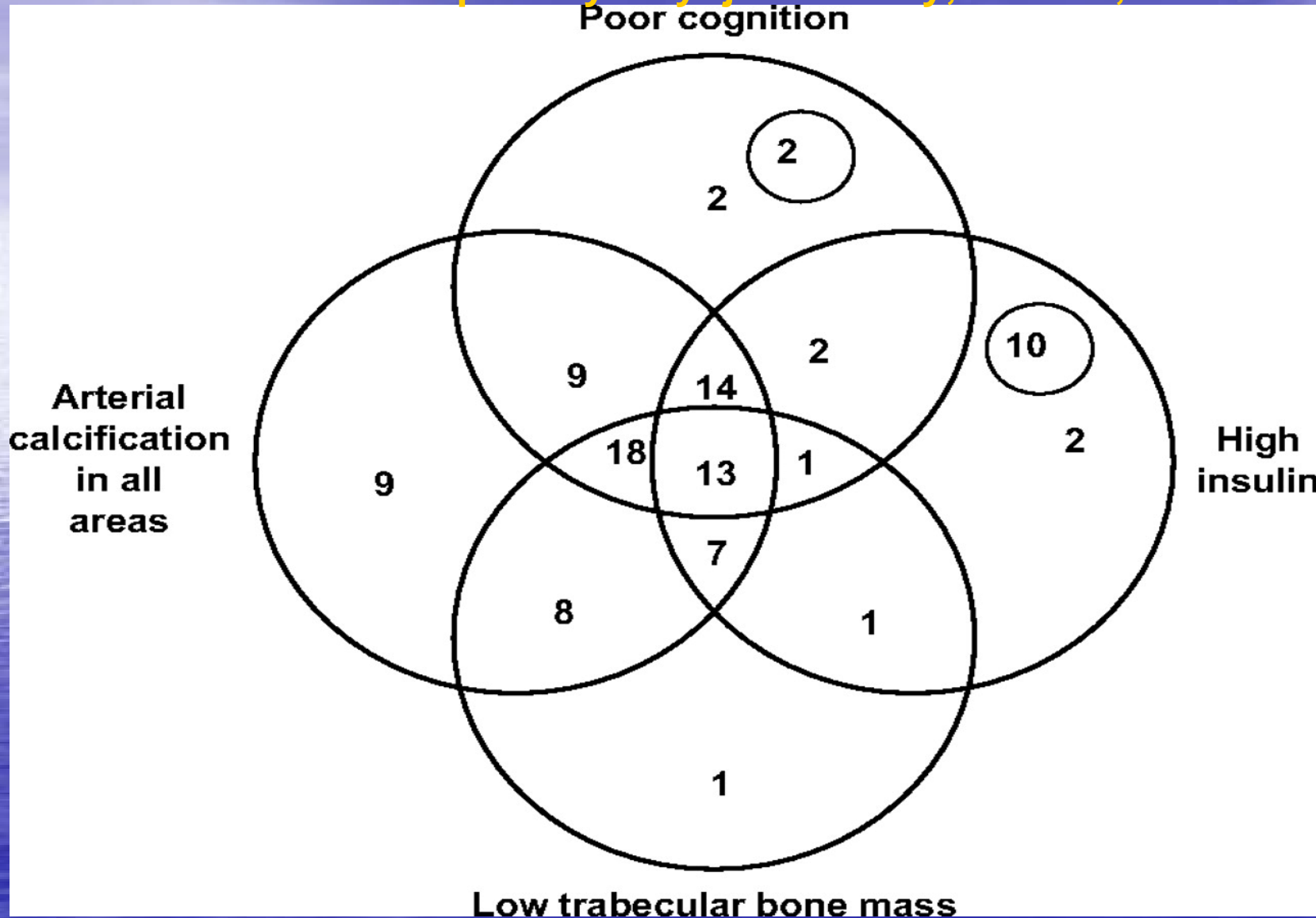
Unpublished results

Brain Volume

Males



Independence and overlap of prevalent phenotypes in the Age, Gene/Environment Susceptibility-Reykjavik Study, Iceland, 2002-2004



2% had none of the phenotypes and only 13% shared all of them