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Sydney Centenarian Study (SCS)

Perminder Sachdev



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- "All my possessions for a moment of time."
Elizabeth I of England
(1558-1603)



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Why study centenarians?

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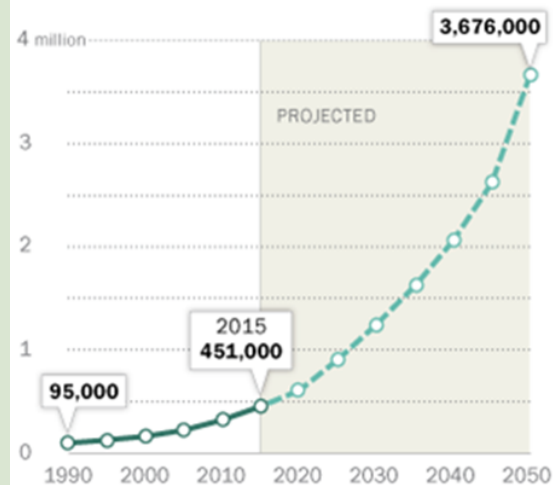
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The number of centenarians is increasing exponentially

The world's centenarian population projected to grow rapidly

Number of persons ages 100 and older



Source: United Nations, Department of Economic and Social Affairs, "World Population Prospects: 2015 Revision"

PEW RESEARCH CENTER

There are now about 4,250 people aged 100 years or older living in Australia. By 2050, statisticians believe Australia will have more than 50,000 people aged 100 and over.

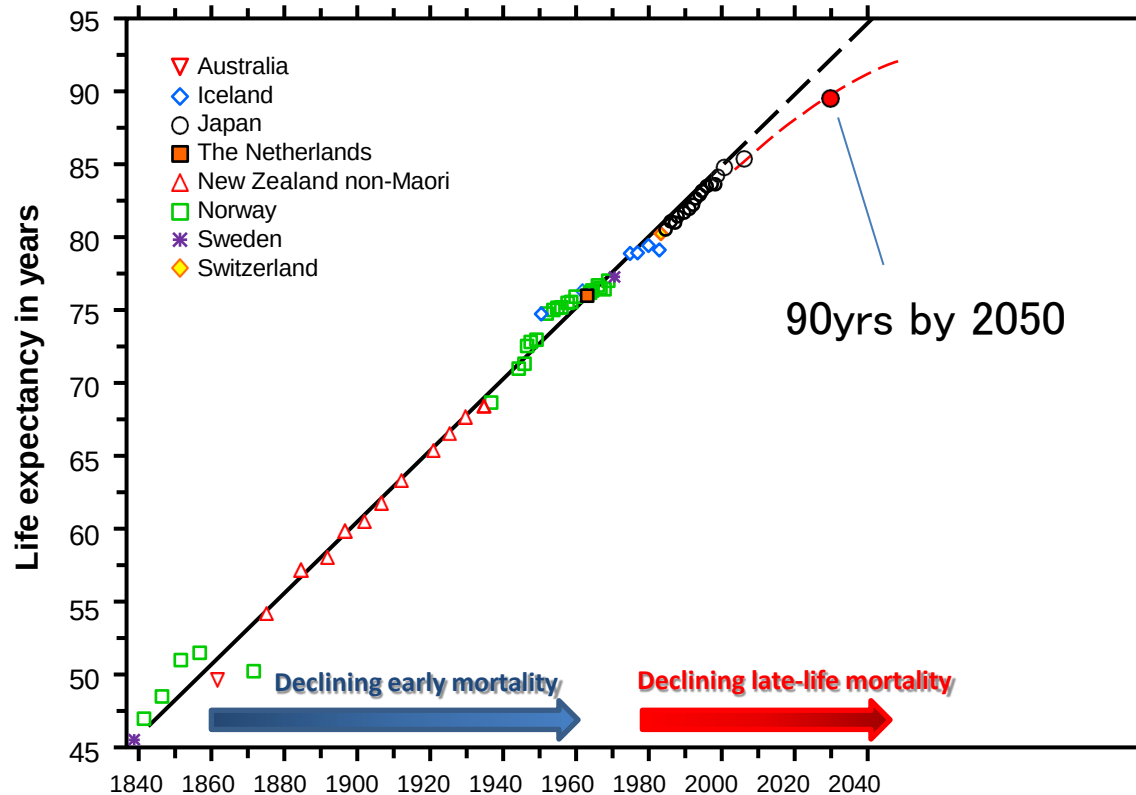
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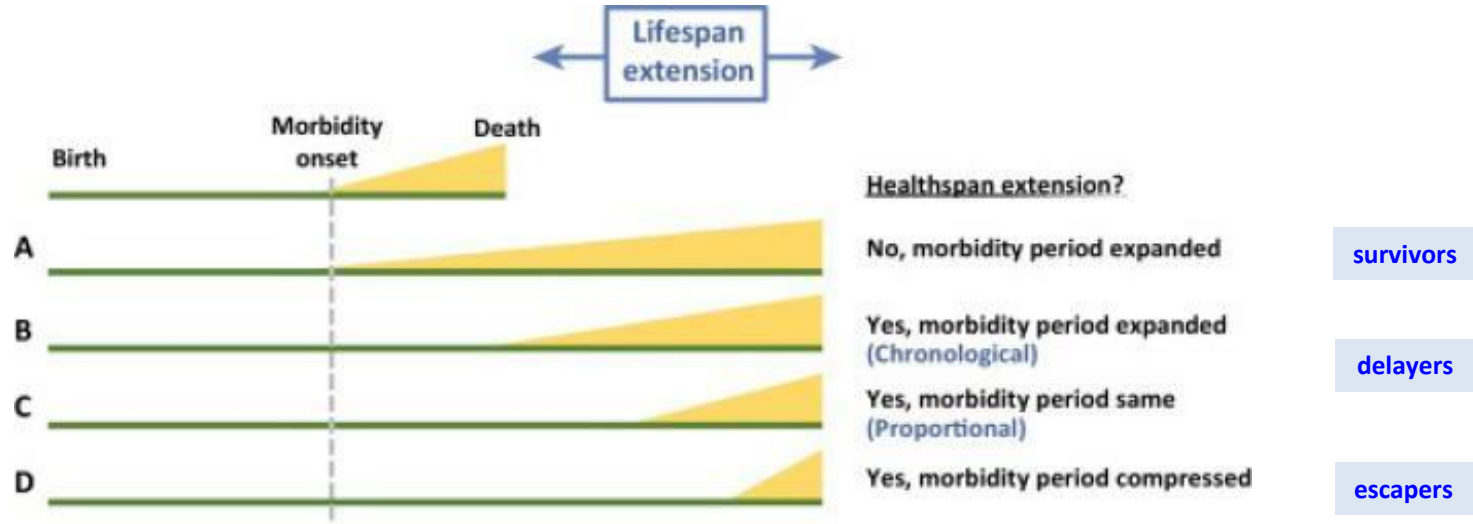


Continuing Increase in Life Expectancy (Woman)



In Australia, a boy born in 2019–2021 can expect to live to the age of 81.3 years and a girl would be expected to live to 85.4 years

Schematic illustrating effects of lifespan extension on healthspan extension



$\text{lifespan} - \text{healthspan} = \text{healthspan gap}$

Trends Cell Biol. 2016 Aug; 26(8): 565–568.

Centenarians may help respond to two challenges

1. Extending life span

- What is the limit? 110; 120; 150?

2. Bridging the healthspan gap

- A key factor is **frailty**: a state of low reserve and increased vulnerability to poor resolution of homoeostasis after a stressor
- Another challenge is dementia



Sydney Centenarian study

Sampling strategies

- 95+ years
- 2007-2019
- 7 local government area (LGAs) in East and Southeast Sydney
- Mail out (contacts from the Medicare record), community newspapers and the local radio; residential aged care facilities (RACFs), meetings of senior citizens' organisations, GPs' surgeries, psychogeriatricians and geriatricians



	Total
Wave 1	506
Wave 2	315
Wave 3	238
Wave 4	182
Wave 5	26
Wave 6	12
Blood	327
MRI	81
Blood AND MRI	68
Brain donor consented	21
Brain donor donated*	13

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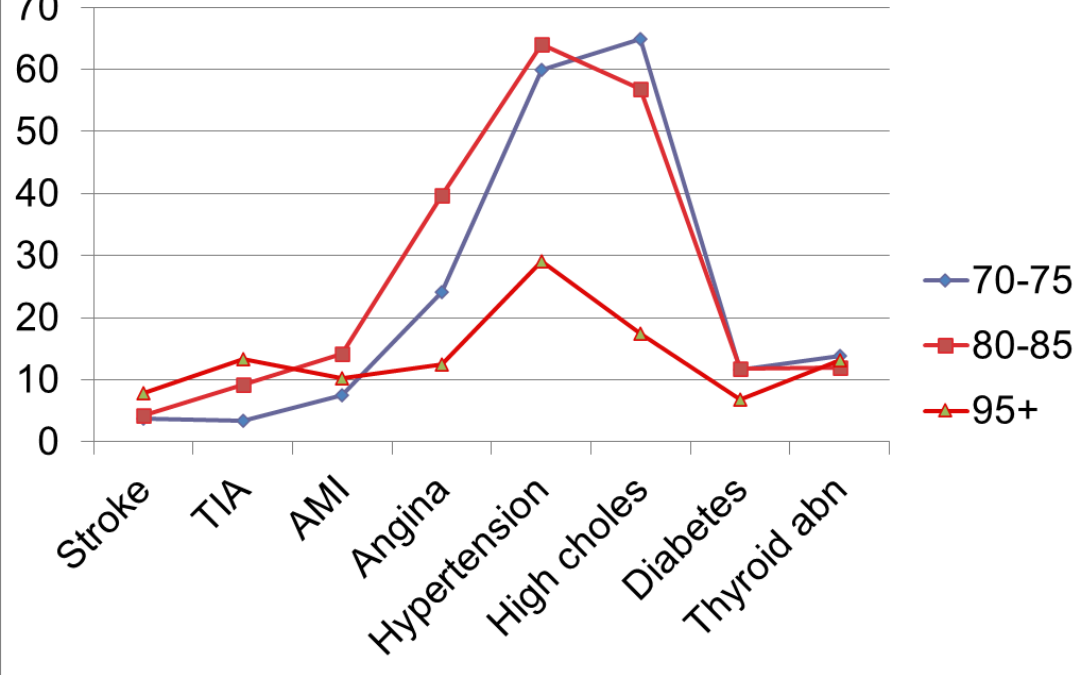


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Some findings

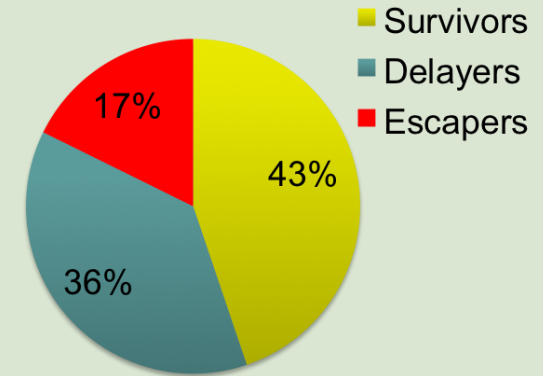
- Female to male ratio 4:1
- Men who reach this age are healthier (survivor effect?)
- Majority of centenarians maintain autonomy until a very late age: In SCS, about 50% in a private dwelling



MAS

SCS

Morbidity rates



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Behavioural factors	Biomedical factors	Psychosocial risk factors
No smoking	Good mental health; not prone to dementia	Not depressed
Keeps physically active	Good genes: family Hx of longevity - siblings & family	Well supported by family and friends
Variable diet and nutrition; does not overeat results in normal or underweight	Good health to age 90 years. Delays or avoids chronic diseases assoc with ageing: heart disease, cancers, dementia	Acute life events, BUT able to cope with life's stresses by stress-shedding.
No alcohol use or safe levels of drinking	Women have higher rate of successful ageing. Ability to bear children into 40s: reprod system slowly ageing	Low in neuroticism High conscientiousnes
Independent functioning	Low BP & cholesterol. Looks young for age.	

Factors associated with living to 100

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Satisfaction with Life



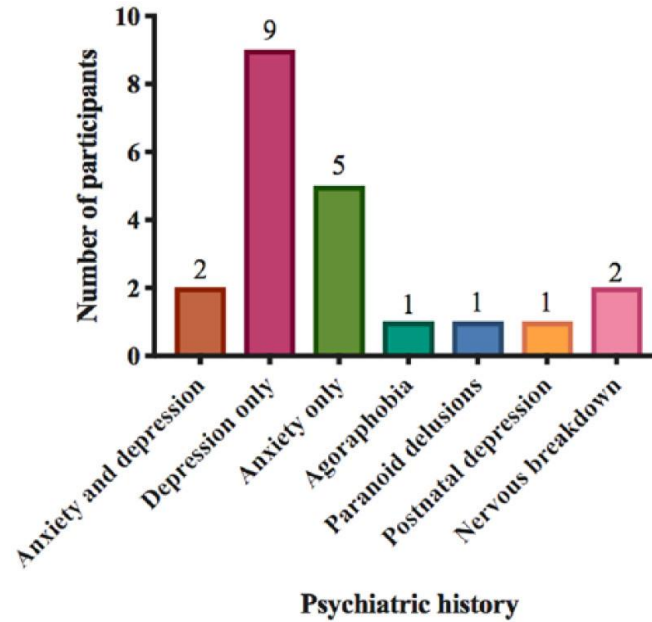
- Although 83.2% of participants were impaired on Activities of Daily Living (ADLs), 86.8% reported being satisfied with their general health.
- Those with fewer family and friends had higher psychological distress and less satisfaction with life.

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Psychiatric history in non-demented Sydney Centenarian Study participants (N=207)

Dementia

- 47% in centenarians and 35% in near-centenarians (95-99 yos)
- Risk factors: Old age, Low education, Untreated hypertension
- No association with APOE4 status (one participant with E4/E4 is dementia-free)

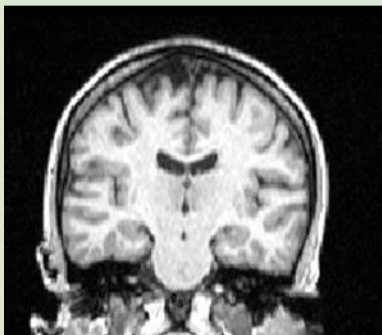
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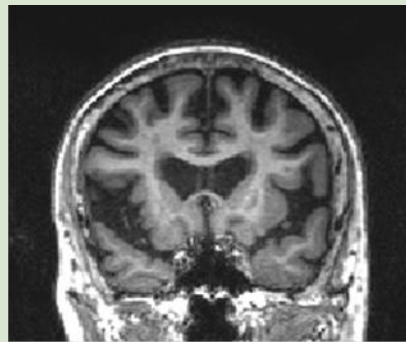
Brain atrophy



A 20-year-old



A 40-year-old



A 100-year-old

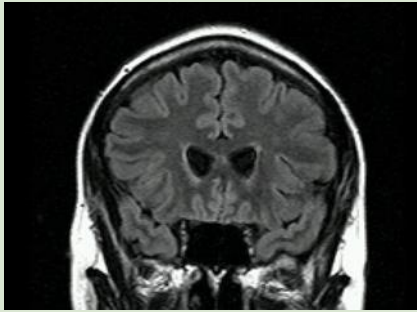
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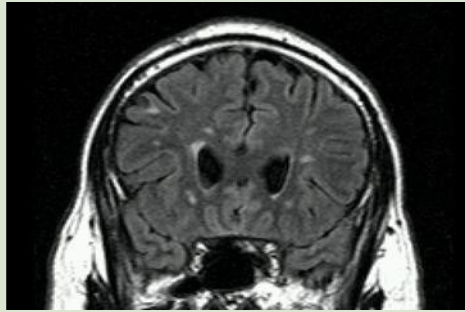
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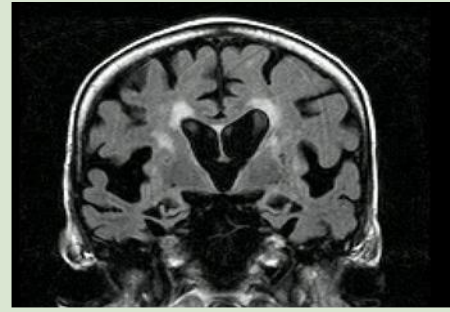
White matter change



A 20-year-old



A 40-year-old



A 100-year-old

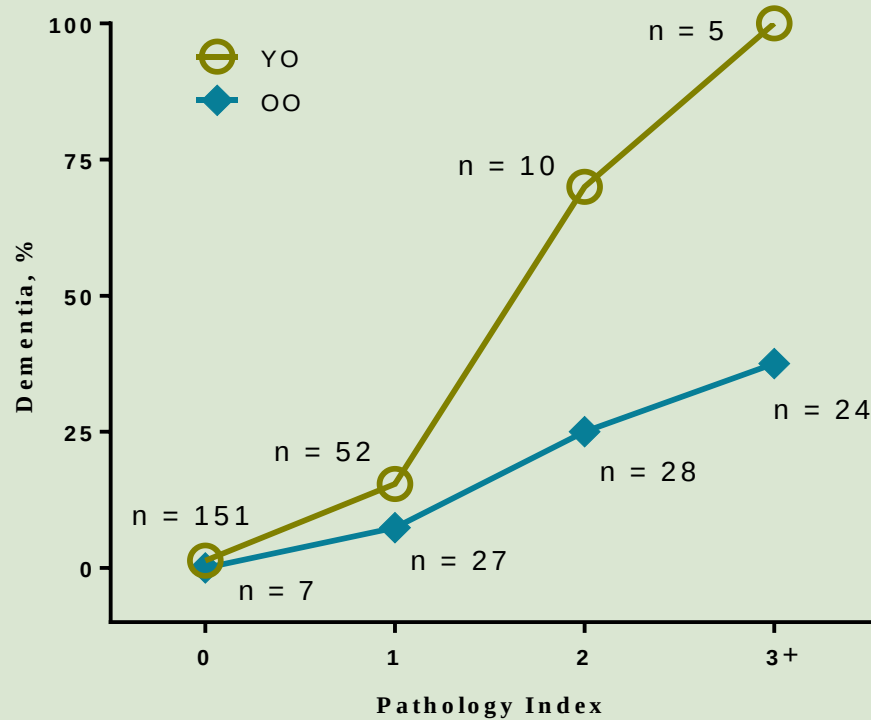
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Rates of dementia by age group and pathology index



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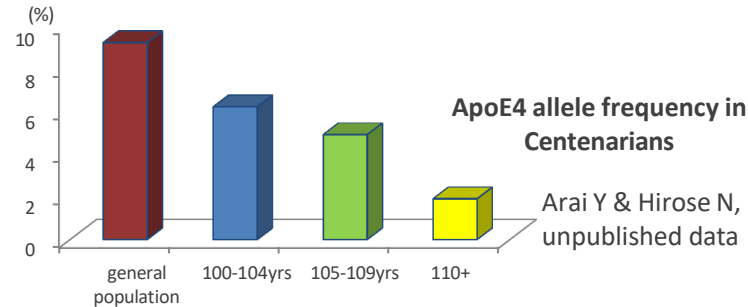
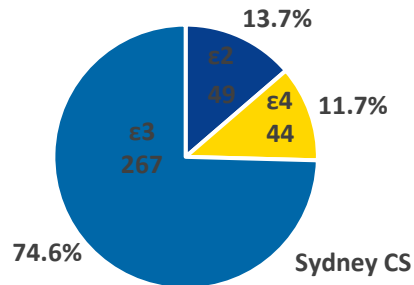


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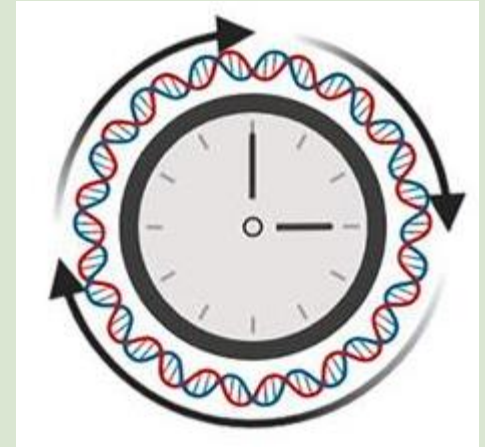
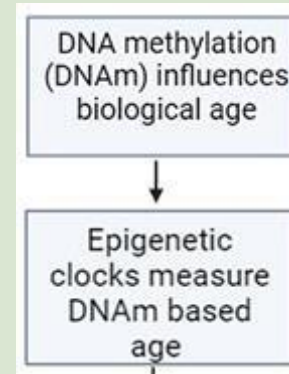
Genetics of Exceptional Longevity

Gene names	Strategy	Population
<i>APOE</i>	Candidate gene	Australian, French and Finnish centenarians
<i>MTP</i>	Linkage analysis	long-lived (≥ 93 y/o) siblings in US
<i>CETP</i>	Candidate gene	Ashkenazi Jewish centenarians
<i>FOXO3a</i>	Candidate gene	long-lived Americans of Japanese ancestry
<i>ADARB1</i>	GWAS	US-based centenarians, replicated in Italian,
<i>ADARB2</i>		Ashkenazi Jewish, and Japanese



Epigenetics

- The biological age of centenarians is younger than their chronological age (**epigenetic clock**)



CONCLUSIONS

- 1. Centenarians, and in particular supercentenarians, are indeed models of successful ageing.**
- 2. They can inform us about mechanisms of ageing, and possible strategies to achieve successful ageing.**
- 3. We can follow the lessons from their lifestyle to increase lifespan and reduce the healthspan gap.**

SYDNEY CENTENARIAN STUDY



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Healthy Brains Positive Ageing

Thank you



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