



Supercentenarian as a model of happy, healthy longevity

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LIVING TO 100 Conference 2018

ICC Sydney, Darling Harbour

Contents of the Presentation

Part 1 Brief summary of centenarian study

- ✓ Demography
- ✓ Function and medical history
- ✓ Inflammation, Frailty and aging
- ✓ Well-being

Part 2 Supercentenarian study

- ✓ Demography of SC
- ✓ Function of YC, SSC and SC

Part 3 Message from the oldest man

110 years old

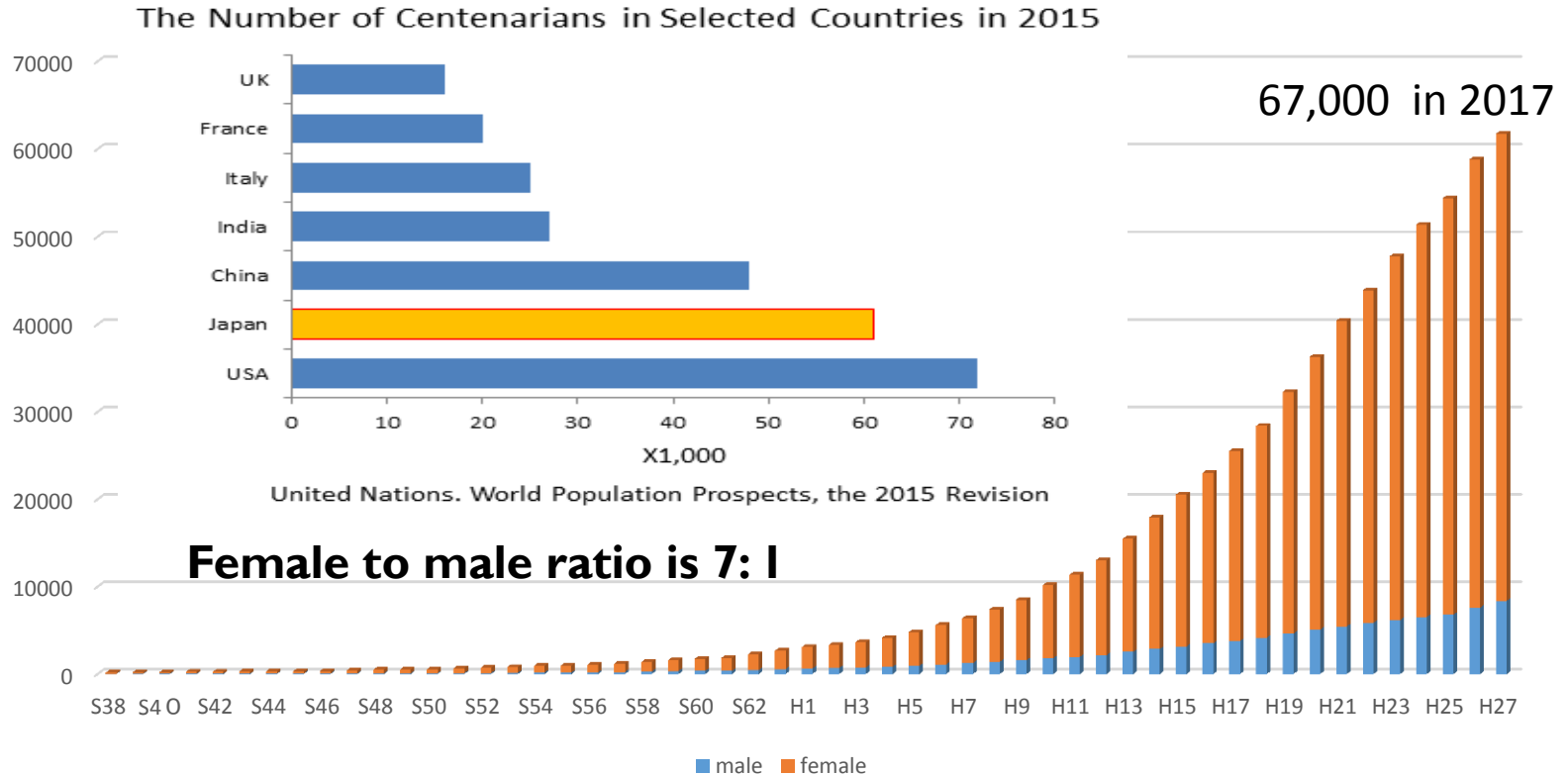
The map of residence of participants



Group	Age range	number of participant
Young Centenarian	100-104	216
SSC	105-109	593
SC	>110	160
Long-lived sibling	>90	76 pairs
Family of centenarian	45-85	421 families
Offspring		421
Spouse of offspring		224

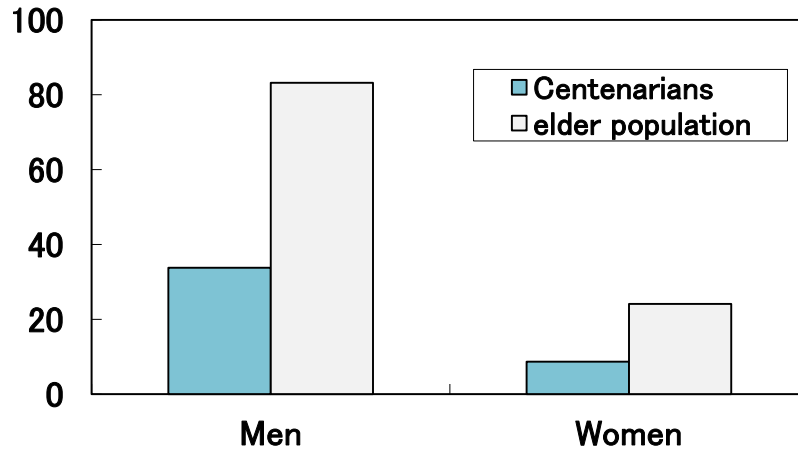


Number of Centenarians in Japan from 1963 to 2017



Smoking and drinking behavior of Centenarians

Smoking

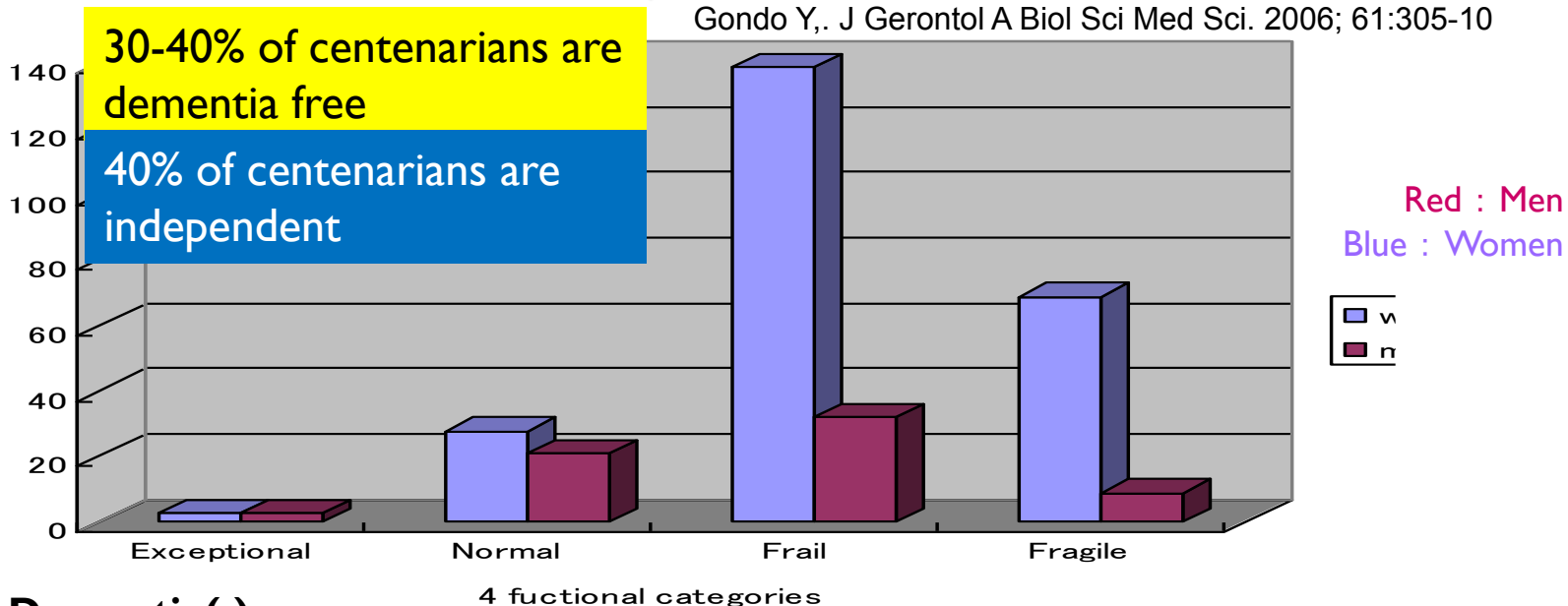


Drinking



Classification of centenarian, based on function

Gondo Y., J Gerontol A Biol Sci Med Sci. 2006; 61:305-10



**Dementia(-),
independent,
No impairment of vision
& hearing**

**4% of total
8% of men,
2% of women**

**Dementia(-)
Independent
Impairment of
hearing or vision**

**14% of total
26% of men
8% of women**

**Dementia,
dependent**

Function of female centenarian is lower than male. Absolute number of exceptional and normal cent is same between male and female

Totally dependent

Morbidity Spectrum of Centenarian (%)

Disease	total	Men	Women
HBP	63.6	61.5	64.1
Fracture	46.4	24.6	52.3
Cataract	46.4	40.0	48.1
HeartDisease	28.8	26.2	29.5
Respiratory	20.9	24.6	19.0
Stroke	15.9	23.1	13.9
Cancer	9.9	18.5	7.6
DM	6.0	4.6	6.3

Takayama M, et al. J Gerontol Med Sci 2007 ; 62 : 774-82.

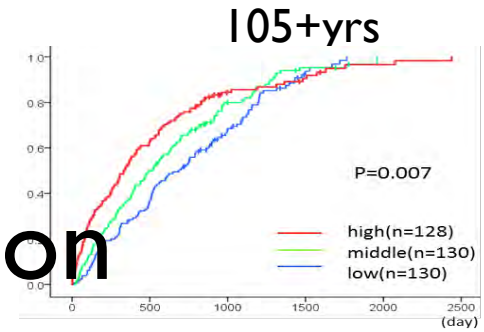
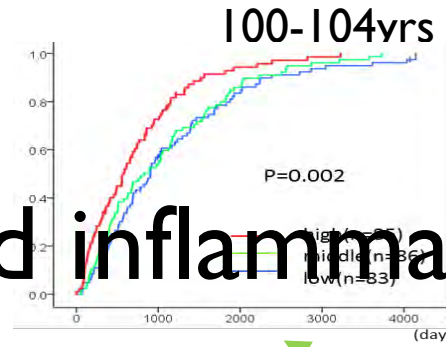
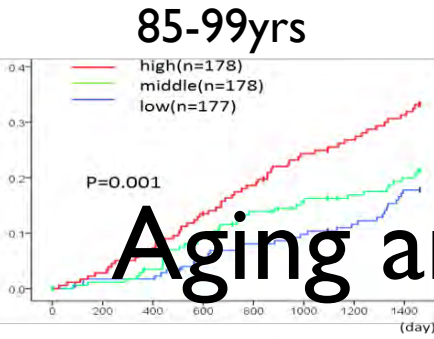
Morbidity spectrum is different between men and women



Inflammation, Frailty and Aging

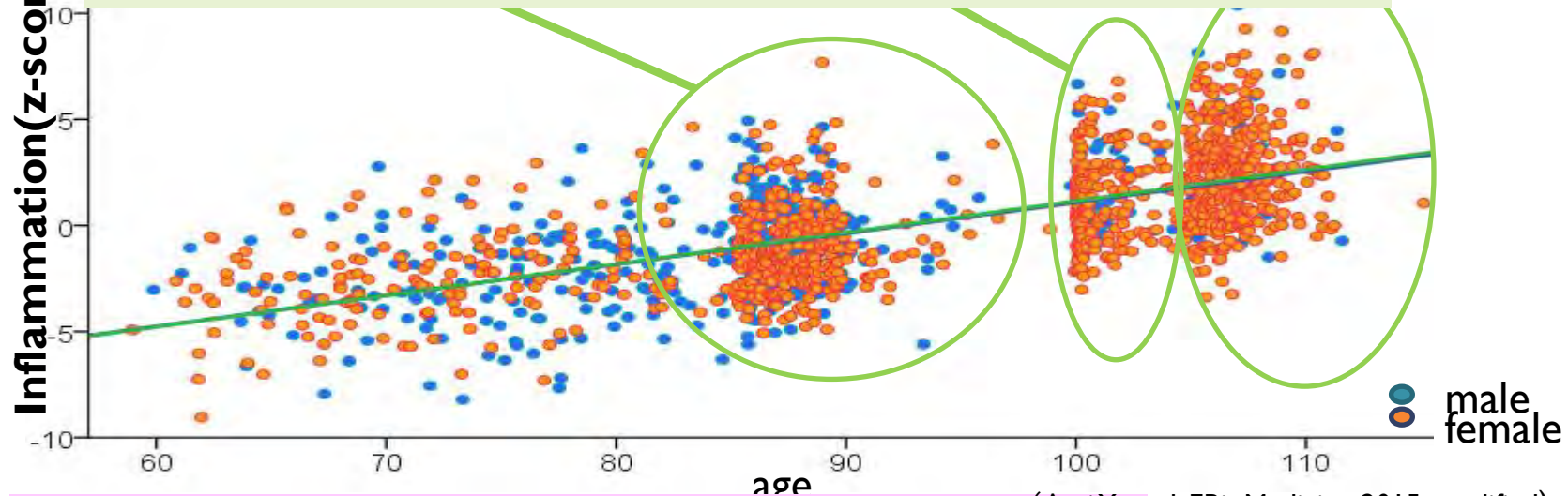
110 years old

All-cause Mortality



Aging and inflammation

Inflammation predicts life expectancy.



(Arai Y, et al. EBioMedicine 2015, modified)

Low-grade inflammation increases with age

WHAT IS **FRAILITY**?

The November 8, 2006, issue of *JAMA*

commonly associated with aging. Frail older adults are weak, have a lower ability for independent living, and often require assistance for daily activities (dressing, eating, toileting, mobility)

Definition(Fried)

- Low physical activity
- Muscle weakness
- Slowed performance
- Fatigue or poor endurance
- Unintentional weight loss

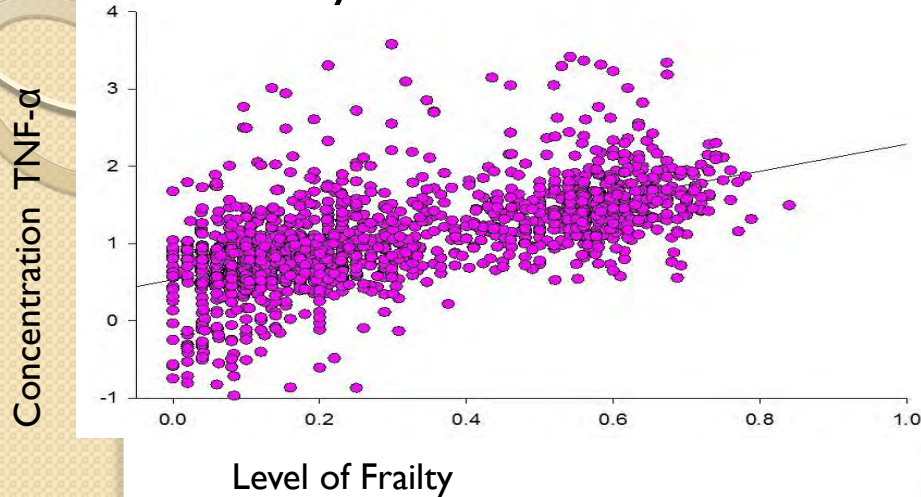
Frailty

More than Three symptoms

Inflammation is associated with Frailty

Arai Y, et al. EBioMedicine 2015

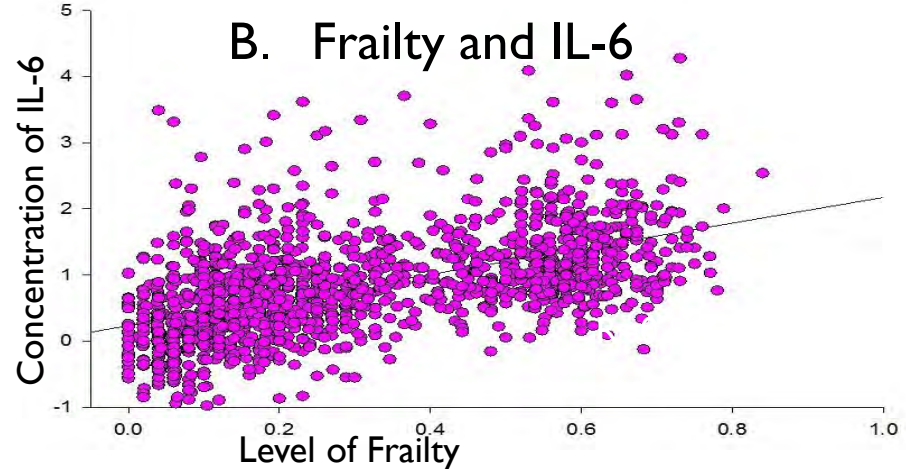
A. Frailty and TNF- α



The level of frailty is correlated with the concentration of TNF and IL-6.

TNF and IL-6 are cytokine causing inflammation.

B. Frailty and IL-6



Inflammation is one of the causes of frailty.
Other factors are associated with frailty

Prevention of Frailty

Some physical activity (such as walking) in each day

Keeping the mind active



JAMA 2006; 296: 2280

Recognize and treat depression

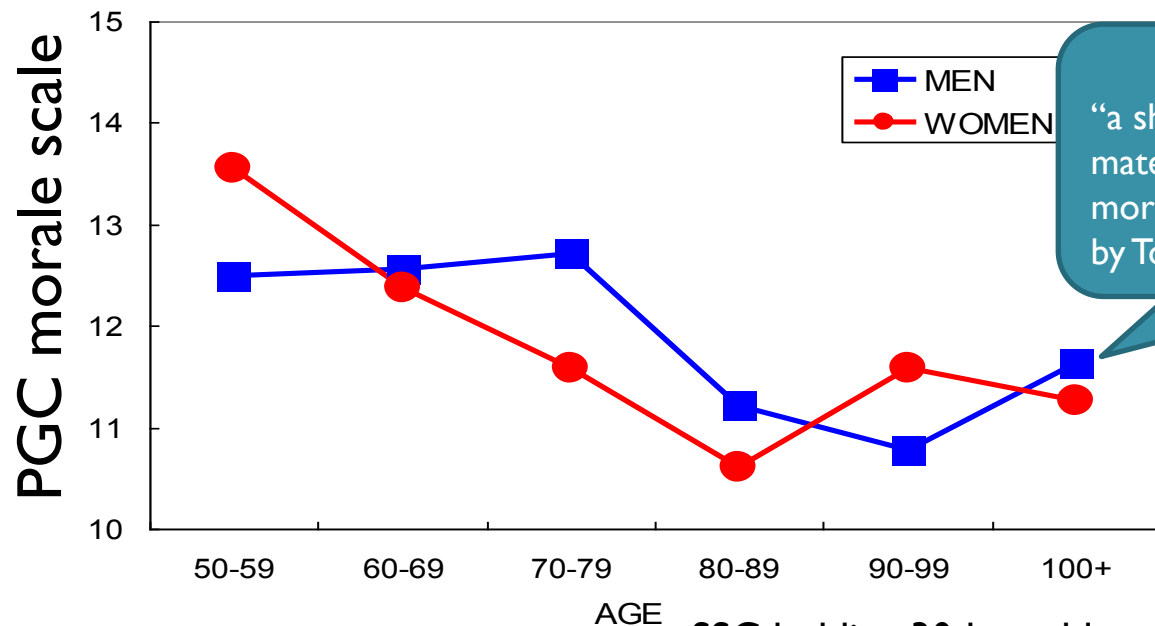
Recognize and treat medical problems

Maintain good nutrition with a balanced diet including enough protein

Are they really happy?

Wellbeing of Older Adults and Centenarians

Gondo Y & Masui Y. presented in 20th Anniversary of Georgia Centenarian Study



Gerotranscendence
“a shift in meta-perspective, from a materialistic and rational vision to a more cosmic and transcendence one.”
by Tornstam

SSC holding 30days old great granddaughter.
He looks so happy.

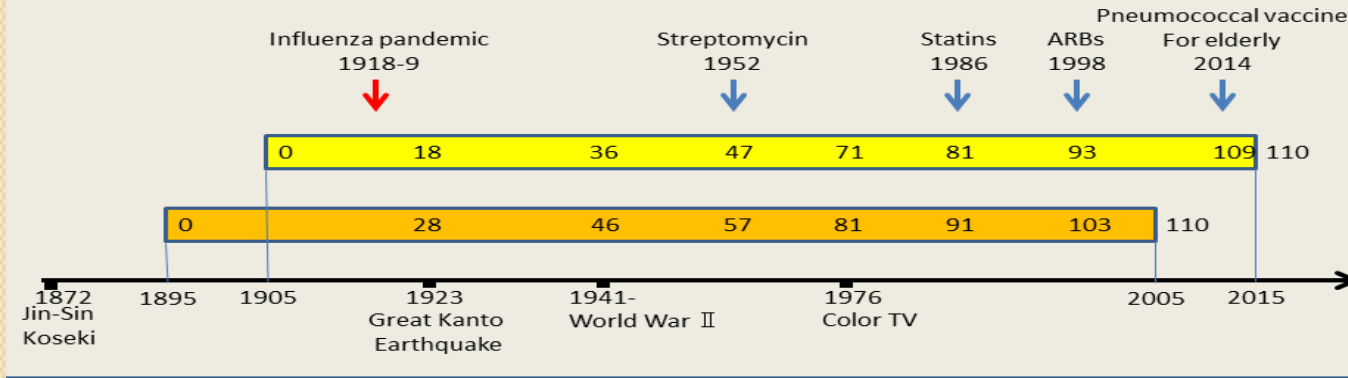
Part 2 Preliminary results of supercentenarian

- Demography and Characteristics of supercentenarian
- Autopsy of SC

Number of SC from 1991 to 2015

Life Event of Supercentenarians

the year of national census.



146

2015

2010

80

Female to male ratio is 15 to 1

78

Long term care insurance

60

40

20

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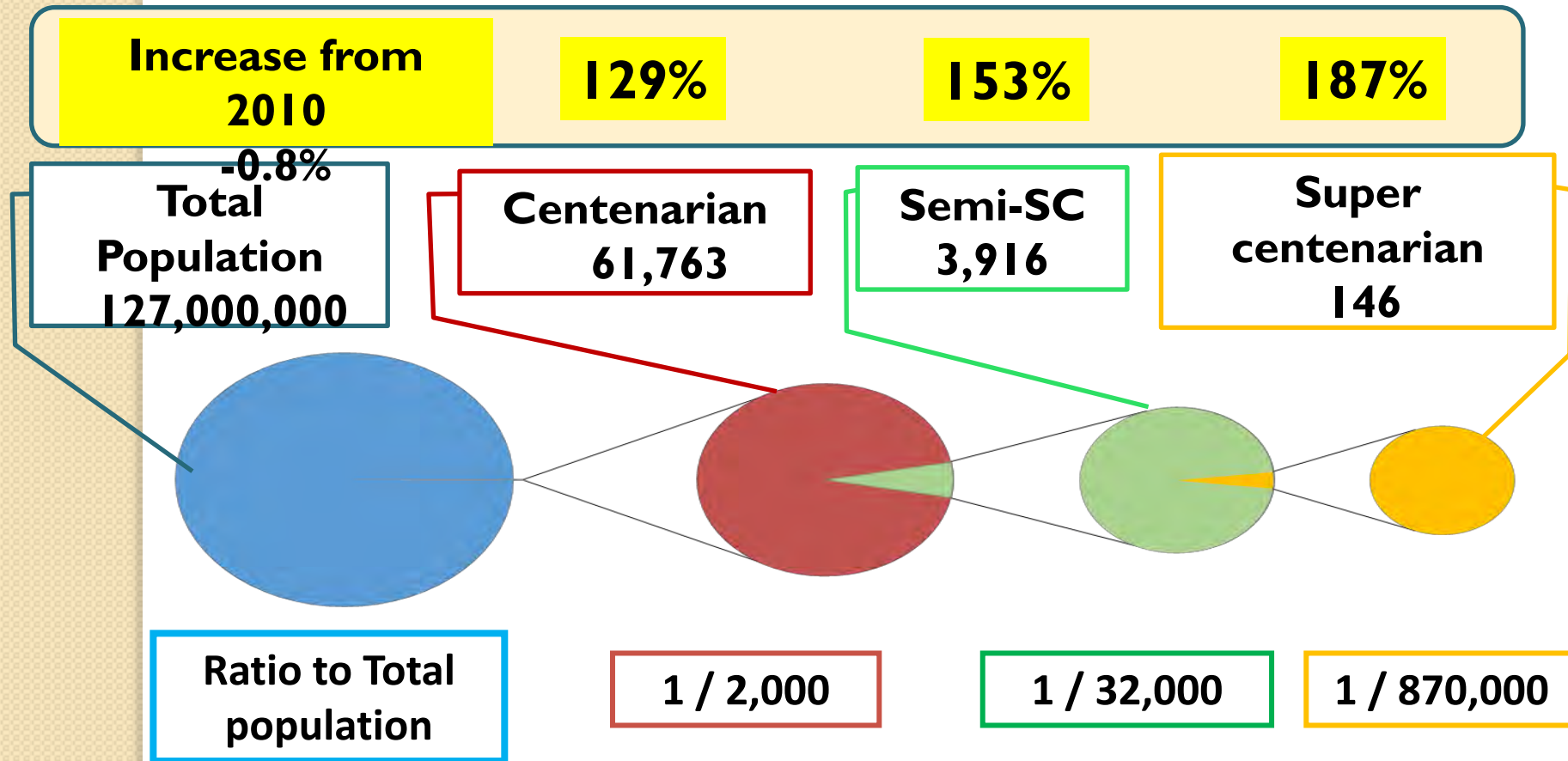
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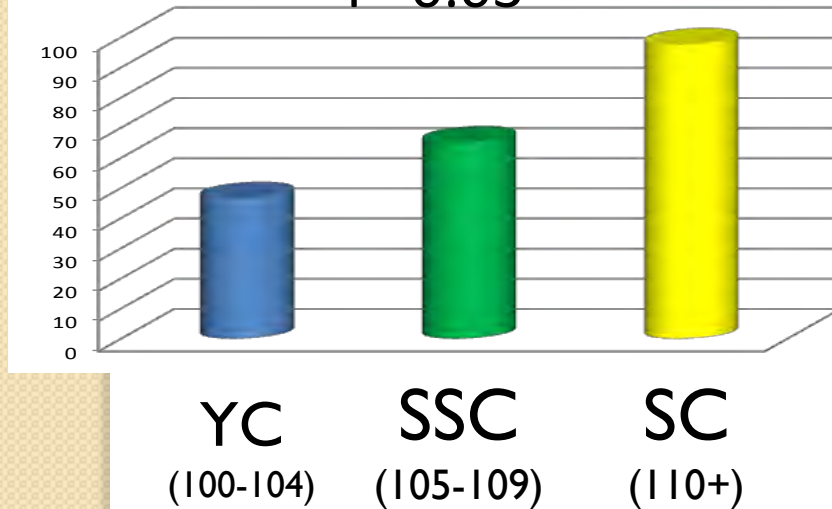
Number & ratio of Cent., SSC and SC in Japan in 2015



Physical and Cognitive Function of YC, SSC and SC at the age of 100 y/o

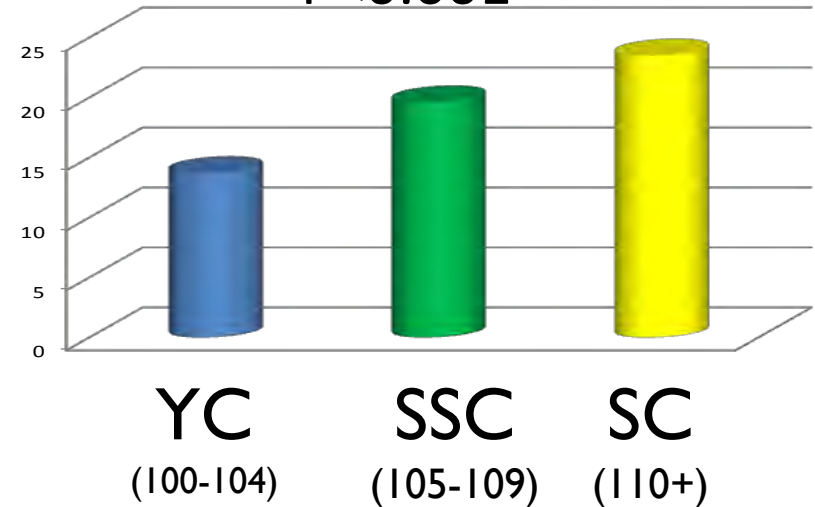
Physical function
(BADL)

$P=0.03$



Cognitive function
(MMSE)

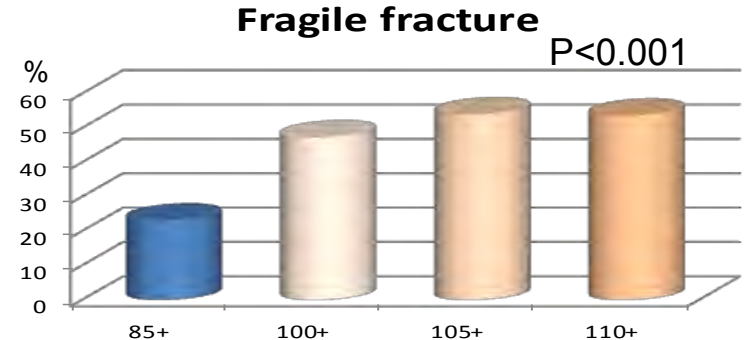
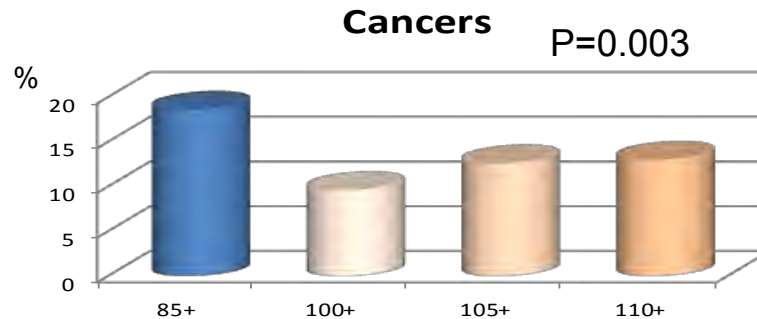
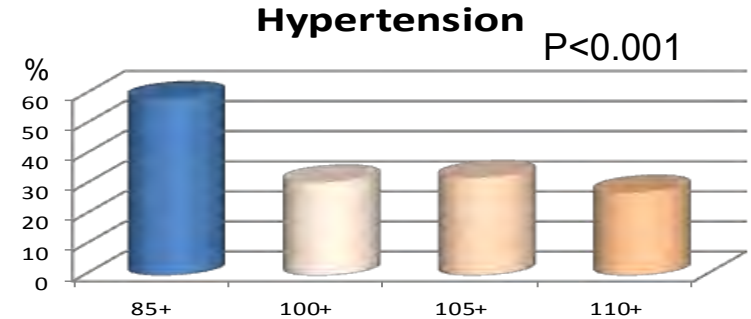
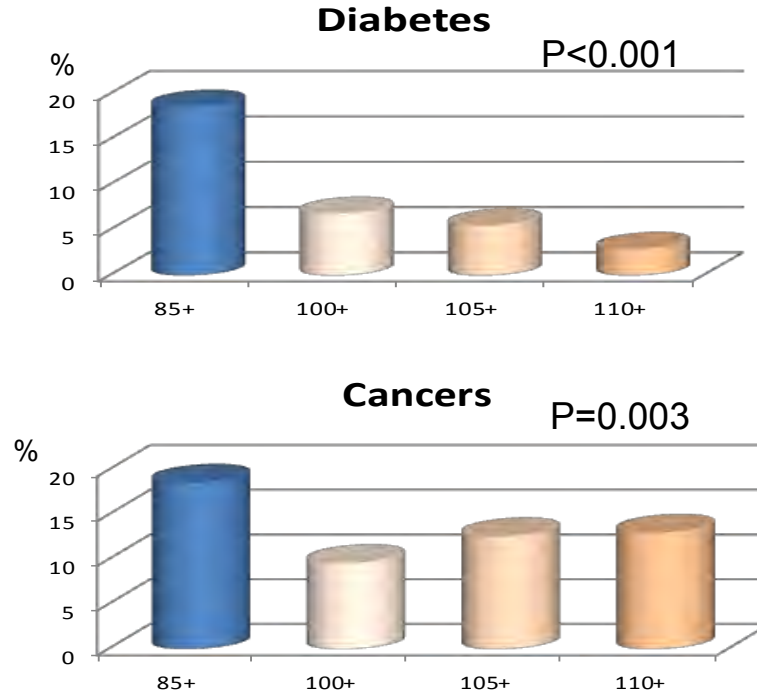
$P<0.001$



Medical history of centenarians and oldest old

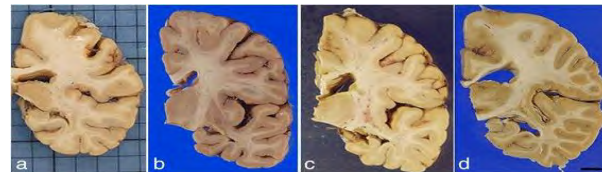
Arai Y, et al. J Gerontol Med Sci 2014, modified

Risk factors of atherosclerosis are low in SSC and SC.



Four Brain Autopsy Cases of Supercentenarians

Takao M, et al. Acta Neuropathologica Communications Neuroscience of Disease 2016;4:97. modified



Neuropathological diagnosis following international criteria(NIA-AA)

	Case 1 (111 yo)	Case 2 (111 yo)	Case 3 (114 yo)	Case 4 (110 yo)
Past medical history	HT-, DM-	HT-, DM-	HT-, DM-	HT+, DM-
Apo E	2/3	2/3	3/3	3/3
Atrophy	F, T	F, T	F, T	T
AD pathological changes (NIA-Reagan)	Intermediate	Intermediate	Unclassified	Intermediate
AD pathological changes (NIA-AA)	Intermediate	Intermediate	Low PART possible	Intermediate
Hippocampal Sclerosis	None	None	None	None
Vascular injury	Multiple cortical infarctes	None	None	None
Arteriolosclerosis	Mild to moderate	Mild to moderate	Mild to moderate	Mild to moderate

Brain of SC shows intermediate AD changes and mild atherosclerosis, suggesting SC has neuroprotective and anti-

December 9th , 2012

(115 y/o)

Are you happy now?

I am very happy for everything and everyday. I want to become acquainted with many people I want to express appreciation. Without the support I cannot survive to 115.

Recently I become forgetful. I always forget and recall. So I do not want to become old.

Many old people also forget and recall.

I think that forgetfulness is nature of old people.