

Health care by walking in an aging society and encouragement for tourism



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Issues in Japan

- Decreasing birthrate and aging population (**depopulation**)
- The population is rapidly concentrating in urban areas
- Energy and Environment
- Disaster and terrorism
 - abandonment of cultivated land
 - collapse of a local community
 - difficulty of increase of GDP
 - medical expense is over $\$40 \times 10^9$

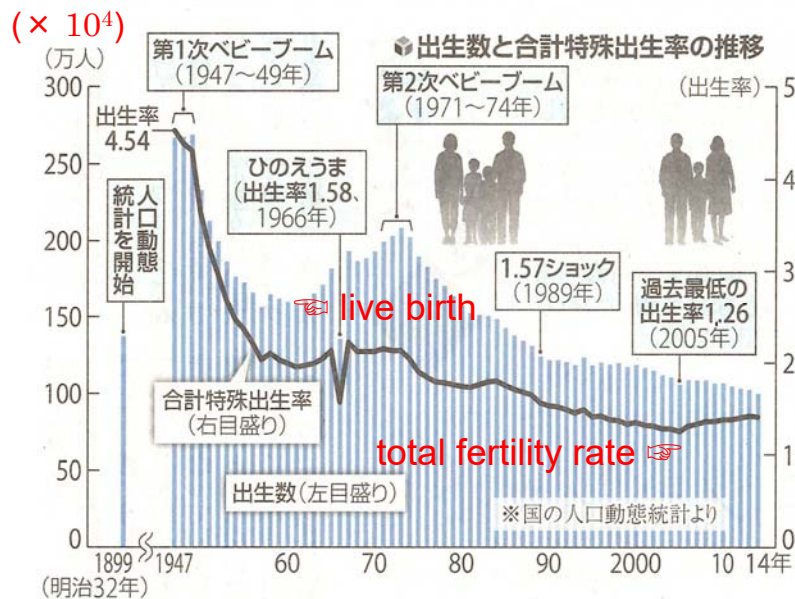


Regional revitalization

(Role of **tourism** is important → **Expansion of travel consumption**)

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Decline in the birthrate of Japan



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Disappear-able cities in Hokuriku District

Japan Policy Council
(in 2040)

Fukui	52 %	(9 municipalities)
Ishikawa	48 %	(9 municipalities)
Toyama	38 %	(5 municipalities)

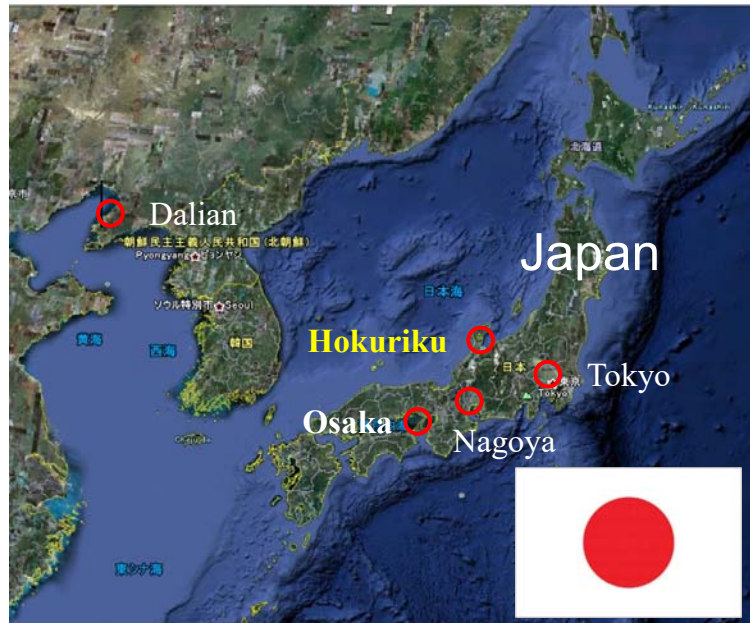
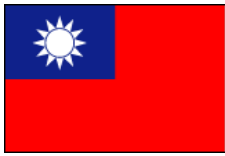
I am living in this district



There are about **900** cities in Japan

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Hokuriku District



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Regional revitalization

『Creation of **community** · **inhabitants** · **jobs**』



Establishment of sustainable local community



Increasing of job opportunity in the community
(**Tourism promotion**, Revitalization of agriculture and fisheries, Scientific and technological **innovations**)



Boasting the community and place of work

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Foreign visitors visit livable town

It is needed more **inbounds** in Japan
because population decreases
(Inbounds = foreign visitors)



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Travel consumption of **inbounds** and annual expenditure of permanent resident

Annual expenditure of permanent resident **\$1.1 million**

Travel consumption per inbound **\$0.15 million**
(**7persons** × **\$0.15 million** = **\$1.05 million**)

Domestic traveler who lodges correspond to **26 persons**

Domestic day-tripper correspond to **81 persons**

Inbounds means foreign visitors to Japan

Environmental improvement for acceptance of **inbounds**

1. Improvement of **Wi-Fi** device and development of user-friendly application
2. Multi-lingual Translation application
3. Credit card payment (establish ATM unit)
4. IC card issued by JR (Japan Railway)
5. Measure for prevention of disaster

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Society where woman and **elderly persons** can be active

Suppress the public pension and nursing-care cost



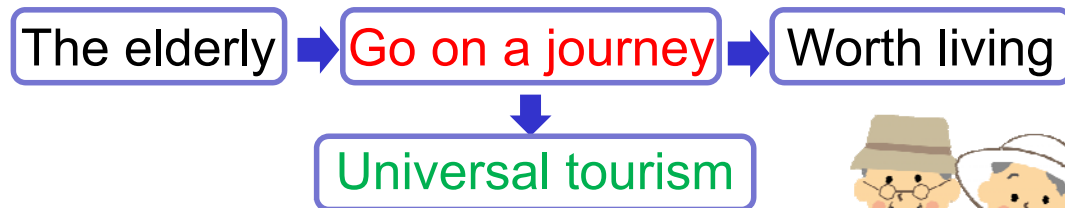
Productive work for older persons



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Employment-rate of the elderly in Japan

Employment-rate of the elderly 14%
The elderly having the desire to work over 70%



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Attracting tourists and healthy life expectancy

It is necessary to revitalize the local community

- attracting tourists
- healthy life expectancy



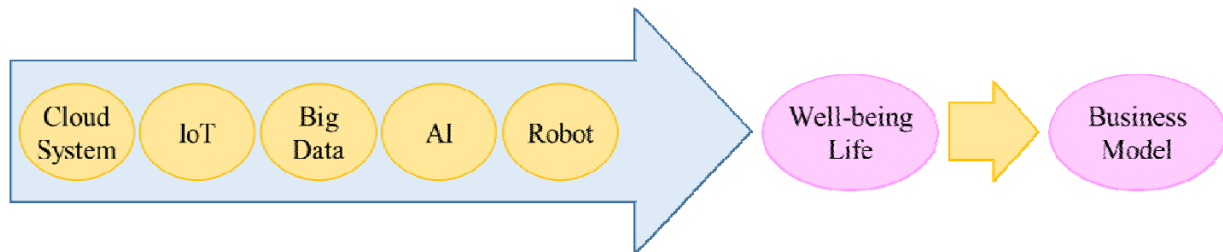
healthy elderly



Innovation using **ICT** apparatus

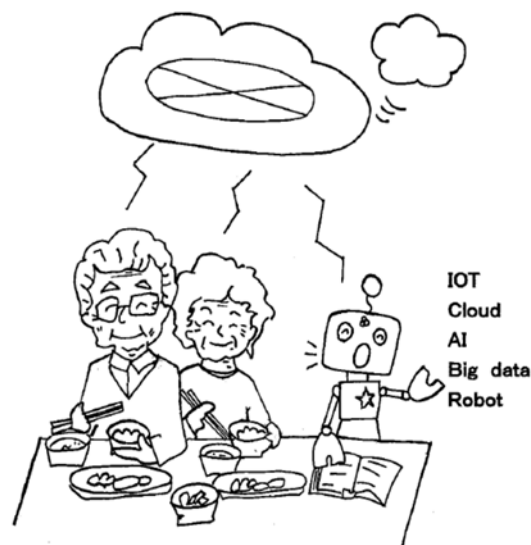
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ICT is necessary for **well-being life**



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Life of the elderly monitored by a **robot**



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Walking is effective for our **health**



Immunity for the disease
is going up

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Trekking, hiking and **journey** is also effective



For health and working

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Be careful for traffic and physical conditional accidents

Understand the **g**eographical information
(**G**-information) of the subject



G-information
Position is important at
the time of an accident

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It is also important the **number of steps**

Suitable **number of steps** is 8,000 to 8,500
for adult every day



Persons have a high possibility
to lead a healthy life

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Number of steps was recorded with bio-information

Experimental period
Subject
Measurement item

over three years (2013.7~now)
male (67 years old at the present)
number of steps, **weight**, **body fat**,
basal metabolism, muscle mass,
visceral-fat level, maximum and
minimum pressures, feeling at the time
of rising, maximum and minimum
temperature, weather at the time of
rising



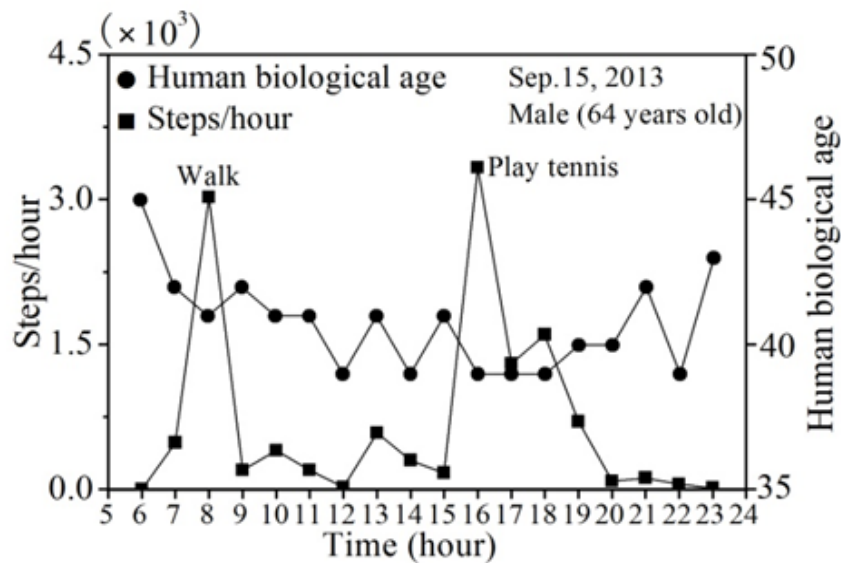
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Apparatuses used in the experiment



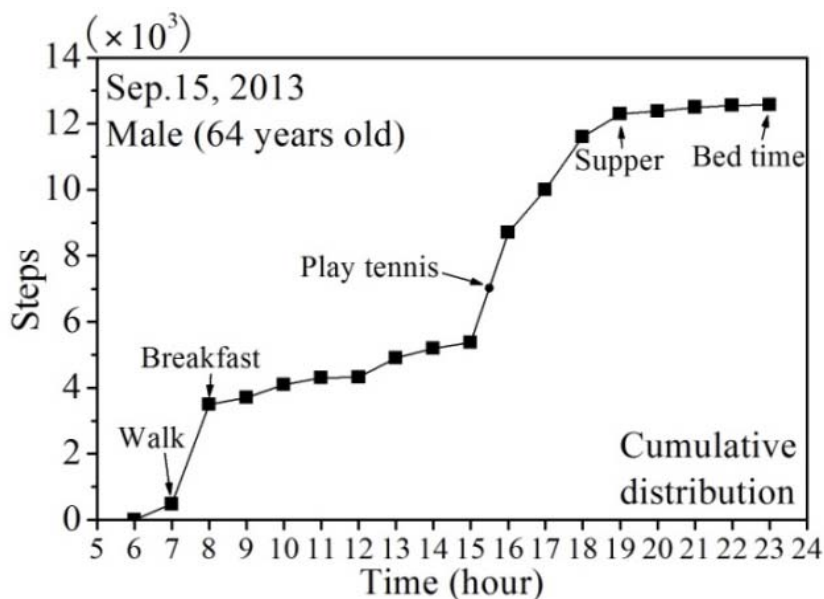
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Characteristics of steps-number and human biological age measured every hour



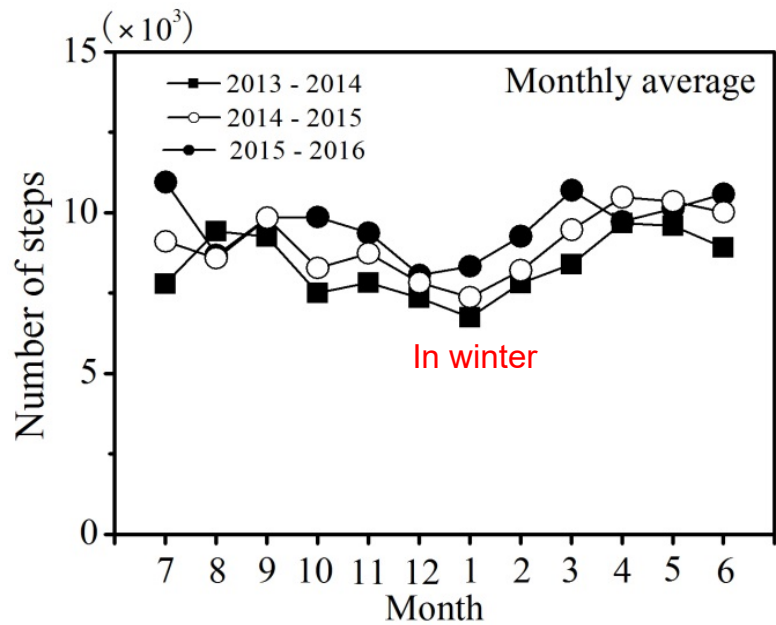
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Cumulative distribution of step-number



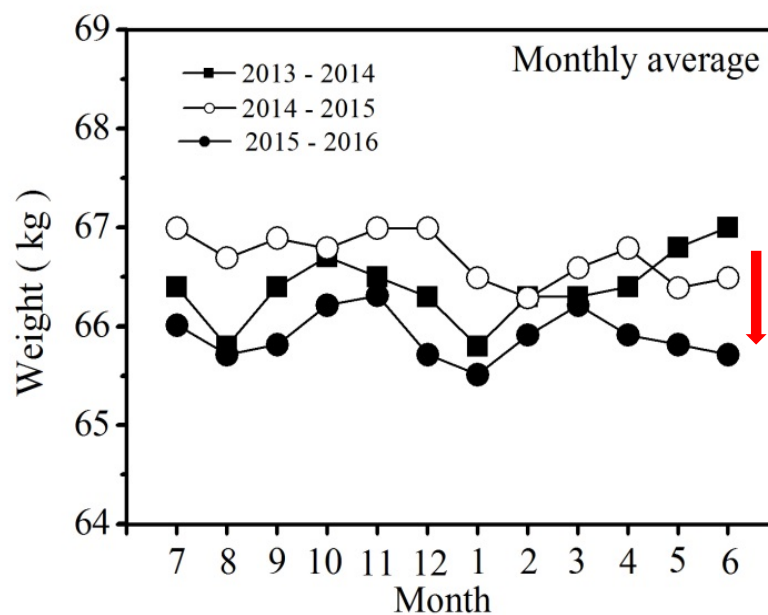
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Long-term characteristics of monthly average of steps-number for three years



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Long-term characteristics of monthly average of weight



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BMI (guideline)

$BMI = \text{Weight (kg)} / (\text{height (m)} \times \text{height (m)})$

Male: **22.0**

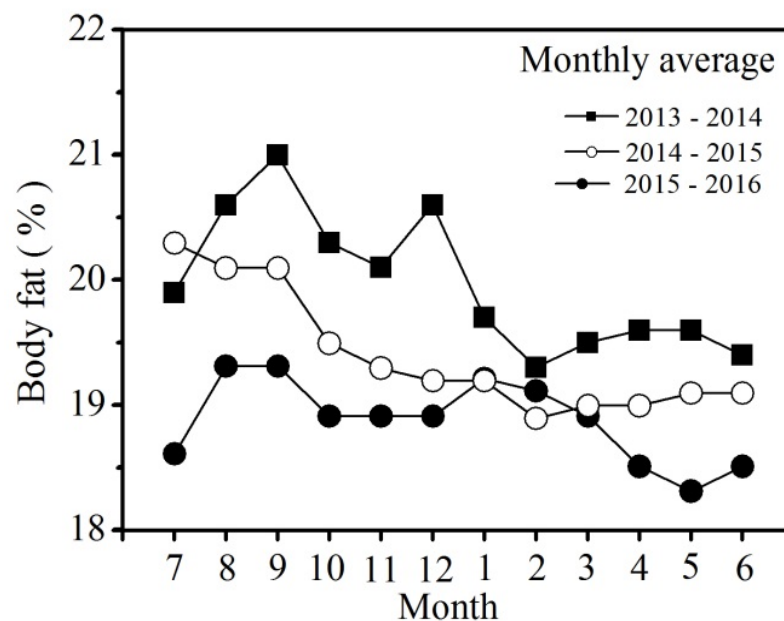
Female: 21.0 in Japan

Standard weight (kg)

$= \text{height (m)} \times \text{height (m)} \times 22$

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Long-term characteristics of monthly average of body fat



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Ideal percent of **body fat** for Japanese

Male: 15~20 %

Female: 20~28 %

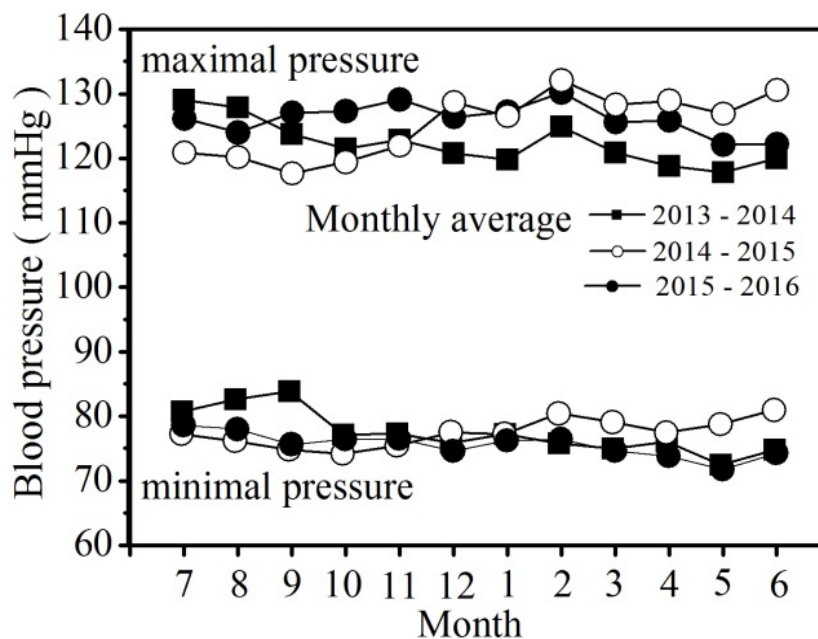
Elderly

Male: 20~24 %

Female: 30~36 %

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Long-term characteristics of monthly average for **blood pressures**



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Blood pressure

Maximal pressure (systolic pressure)

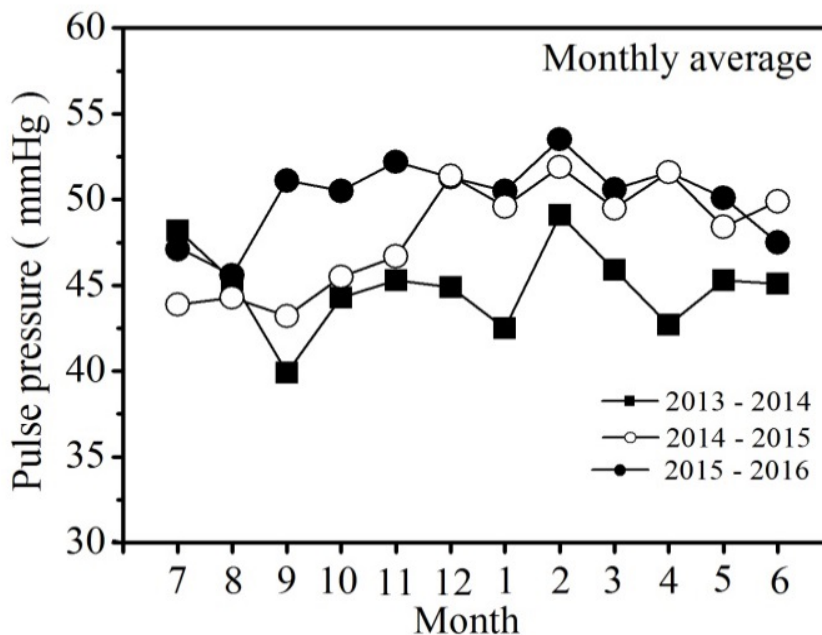
Minimal Pressure (diastolic pressure)

Pulse pressure = systolic pressure – diastolic pressure
(脈圧 < 65)

Mean arterial pressure = diastolic pressure + pulse pressure / 3
(平均血圧 < 100)

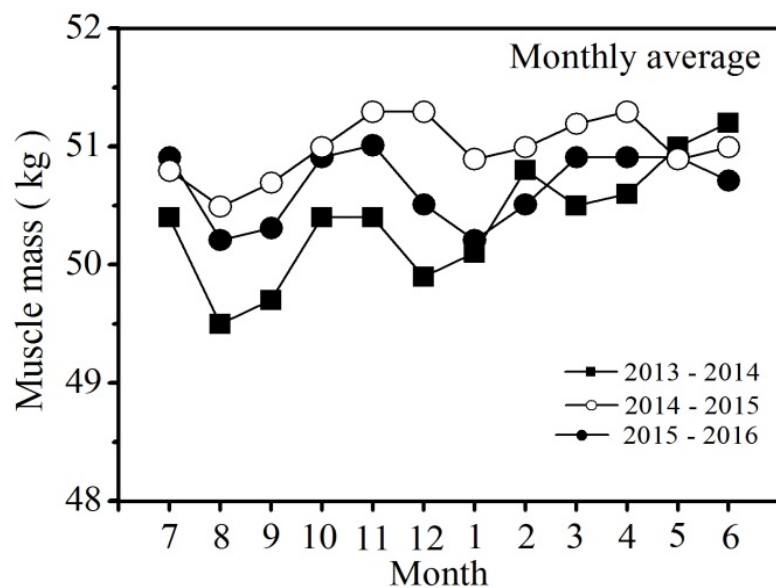
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Long-term characteristics of monthly average for pulse pressures



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Long-term characteristics of monthly average for muscle mass



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Muscle mass

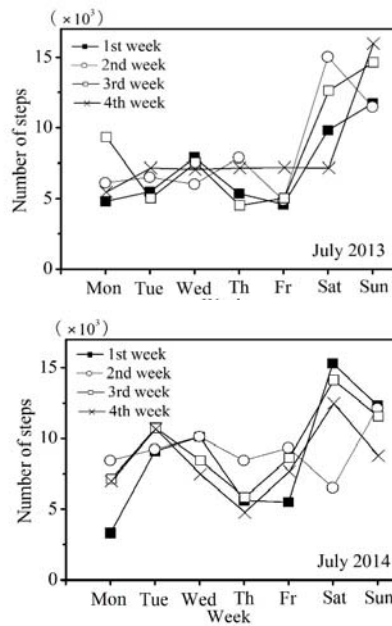
$$\text{Muscle mass} \doteq (\text{weight} - \text{body fat}) / 2$$
$$\text{Body fat} = \text{weight} \times \text{body fat percentage}$$

When the muscle mass increases

- Increase the basal metabolism (lose weight)
- Build up resistance to diseases (ex. cold)

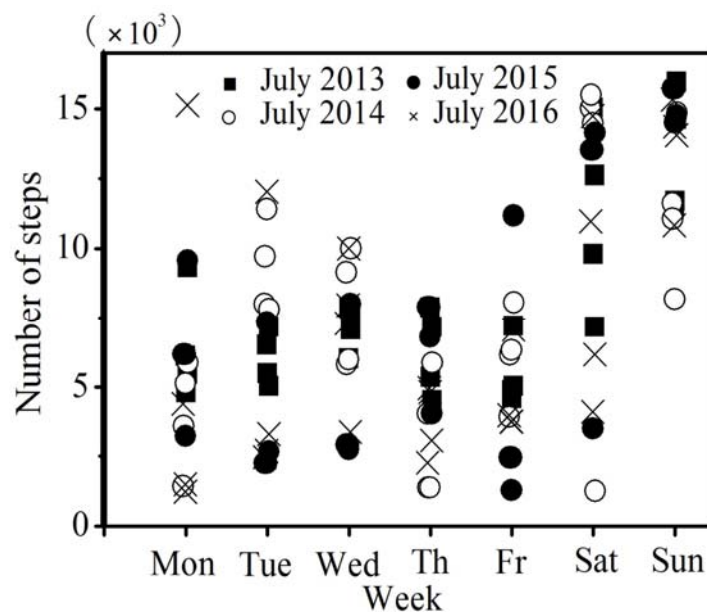
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Steps-number in July for three years



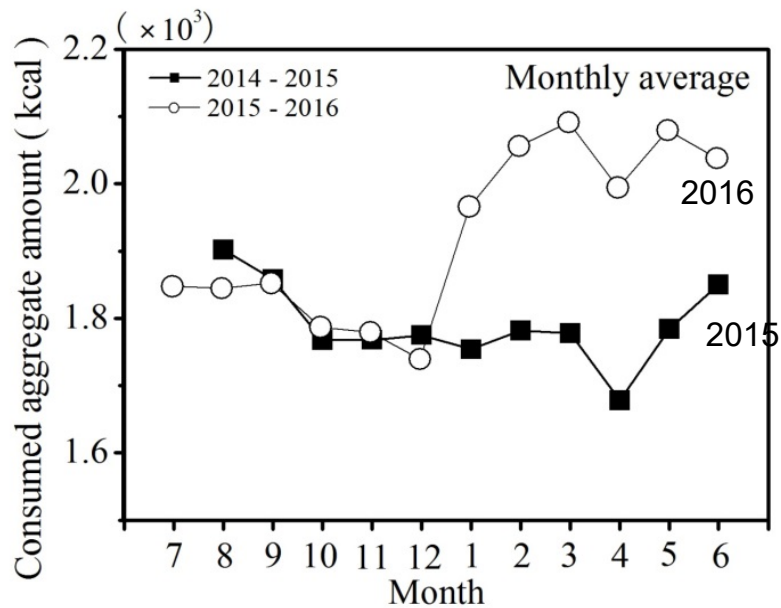
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Steps-number in July for four years



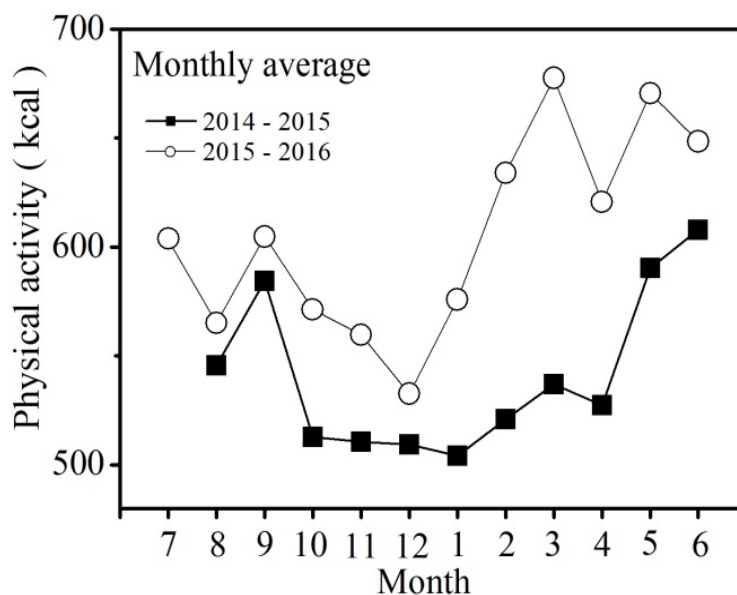
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Long-term characteristics of monthly average for consumed aggregate amount



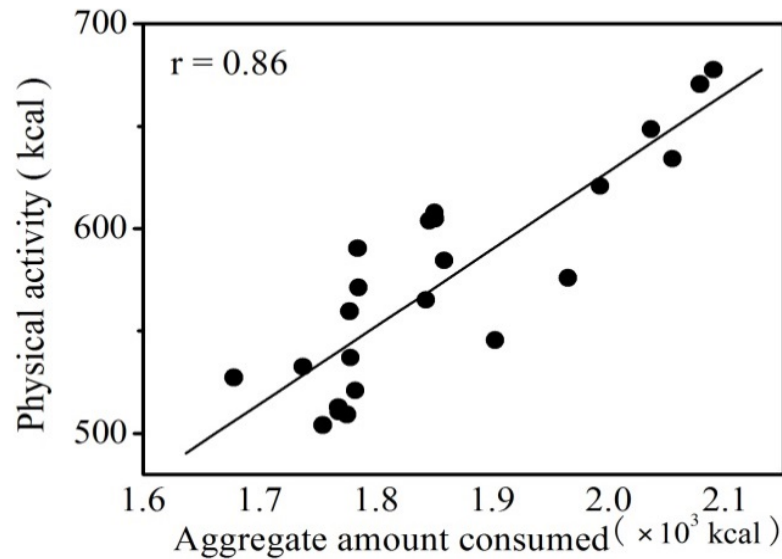
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Long-term characteristics of monthly average for the physical activity



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Correlation diagram between aggregate consumed amount and physical activity



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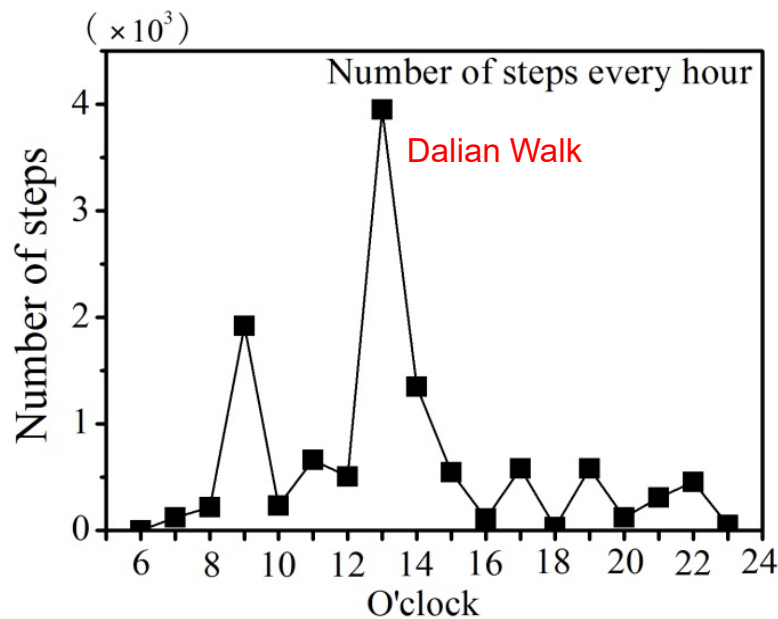
Subject attended “Dalian Walk”

May 22 (Sun), 2016 2 km Total steps: 11,712 in the day



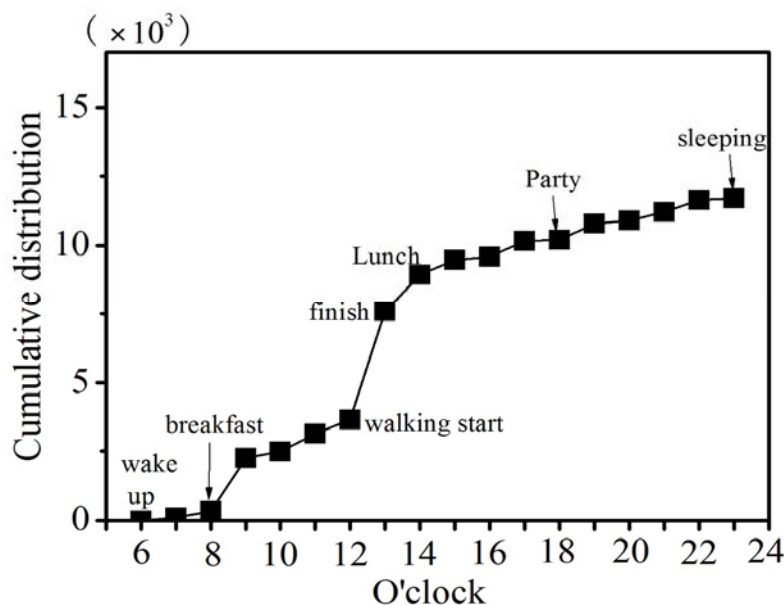
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Characteristic of hourly steps-number in the day of Dalian Walk



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Cumulative distribution of step-number in the day of Dalian Walk



conserve one's
strength over 12,000
体力

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Measurement result of the subject for three years

- Biological indexes are within proper range by walking
- He works and sometimes goes on a journey

BMI=25 .1 (body fatness=1)*

Body fat = 19% (standard)

Pressure

maximal / minimal = 130 / 80 (standard)

pulse pressure = 50 (standard)

mean arterial pressure = 97 (standard)

The subject has never gotten sick for three years

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Health maintenance of the subject

Walking (number of steps is over 8,000)

Work moderately everyday

Nonsmoking

Drinking a little

Play sports once a week

Food

▪ take in vegetable and fruit everyday

▪ prefer fish to meat

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Automatic measurement

The subject prefers automatic measurement
and accumulate the data



Maintain the motivation for walking

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Conclusion and future works

Elderly

- Target steps → Reward (shopping or travel tickets etc.)
- Walk together as a group
- G-information
- Life support system using ICT



The cost is cheap compared with the social security

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Maintain one's health

get a job and go on a journey

Food



Body and mind

Exercise (6,000 steps)

(Too much walking is not good for the elderly)

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The data of the subject in Oct. 2016

Number of steps	9803
Weight	65.9 kg (BMI=25.1)
Body fat	19.1 %
Maximum pressure	126.3 mmHg
Minimum pressure	80.5 mmHg
Pulse pressure	45.8 mmHg
Mean arterial pressure	95.77 mmHg
Aggregate consumed amount	2016 kcal
Physical activity	618 kcal
Basal metabolism	1440 kcal
Pulse	70.2

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Thank you for your kind attention



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