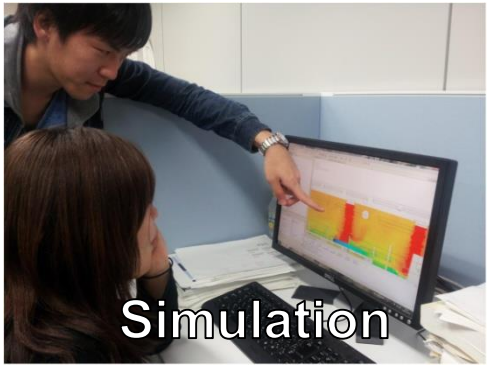
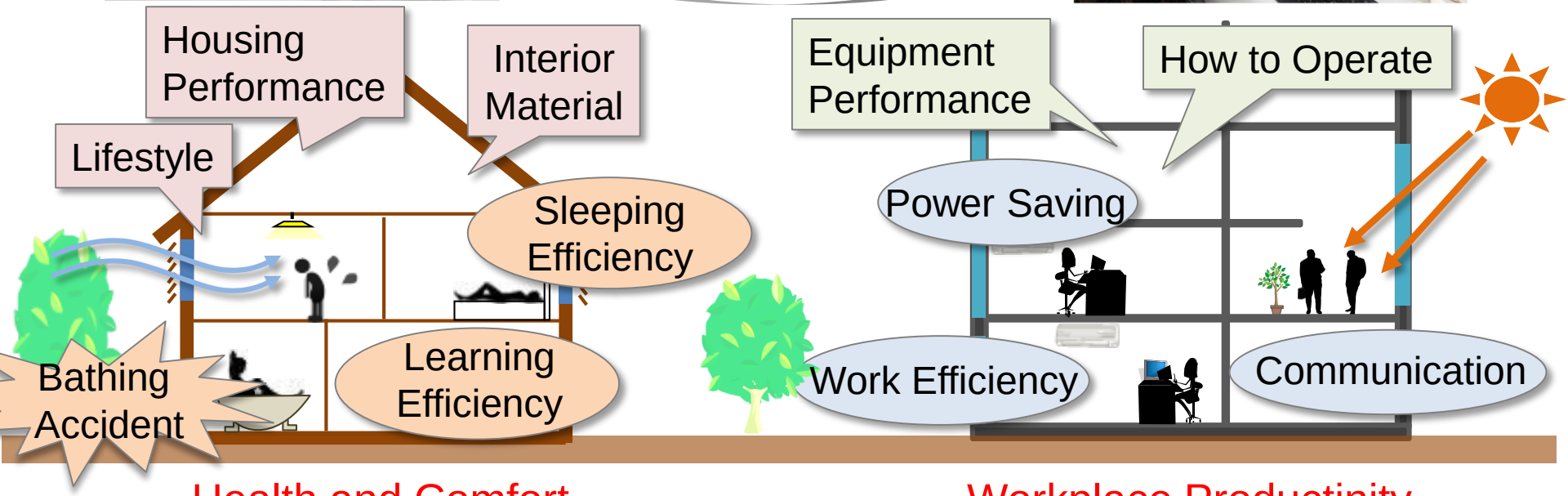
# ①Human and Indoor Scale

**Research on scheme how to improve health and workplace productivity based on Actual survey and Experiment**


Quantitative Evaluation of
Health, Comfort
And Workplace productivity




## Health and Comfort

Blood pressure・Sleep
Heatstroke・Bathing Accident…etc.

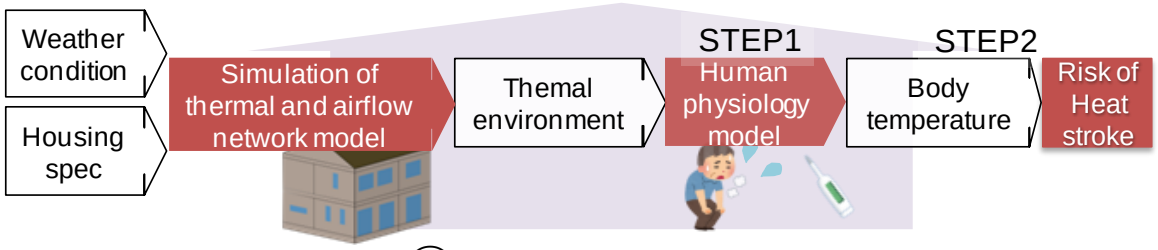
## Workplace Productinity

Work Efficiency・Idea Creation…etc.

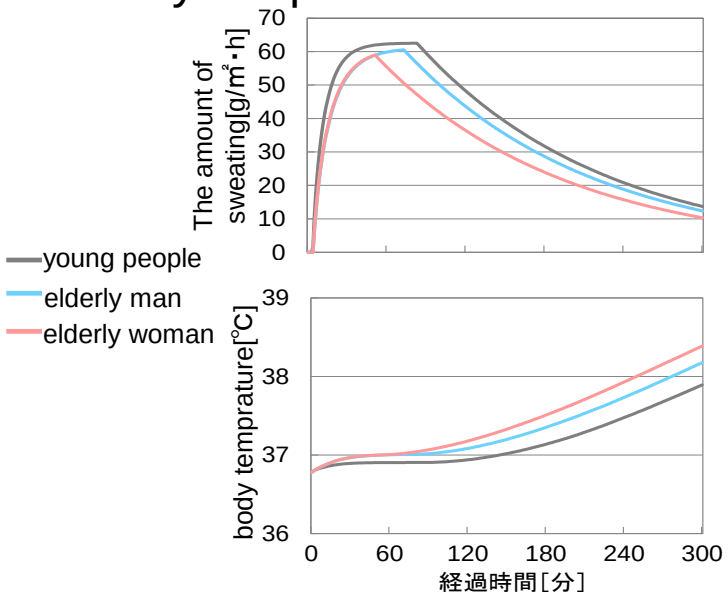
# Studies on the Reduction of Risk of Heat Stroke in the Elderly in Residential

**Background** Heatstroke occur frequently in the elderly in the home

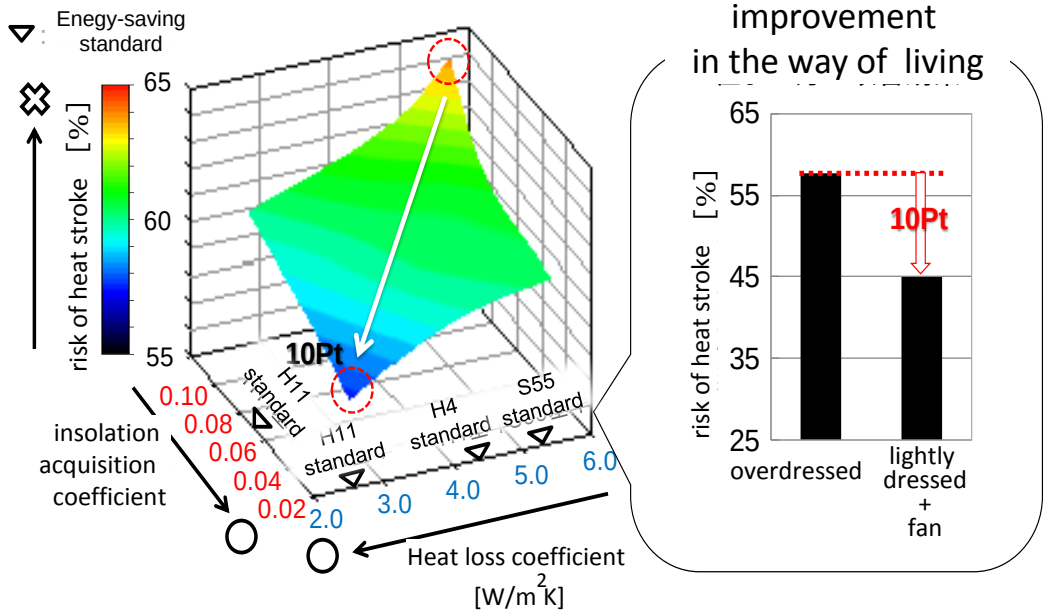
**Purpose** To clarify the impact on the risk of heat stroke from way of living and housing spec




## ① Prediction of the sweat amount and body temperature of the elderly




## ②Modeling risk of heat stroke besed on vital data

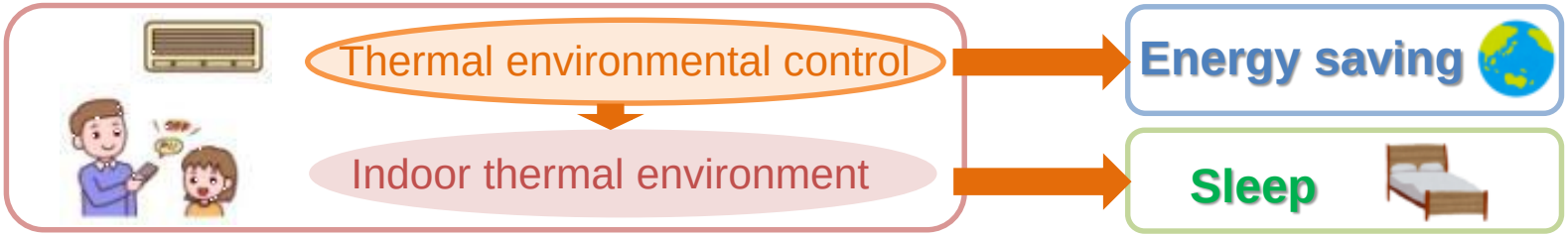



**Clarify the effect from improvement of living and housing to reduce the heatstroke ris**

# Effect of thermal environmental control in summer on energy saving and sleep

**Background** Possibility of cooling use of summer affects the energy saving and sleep

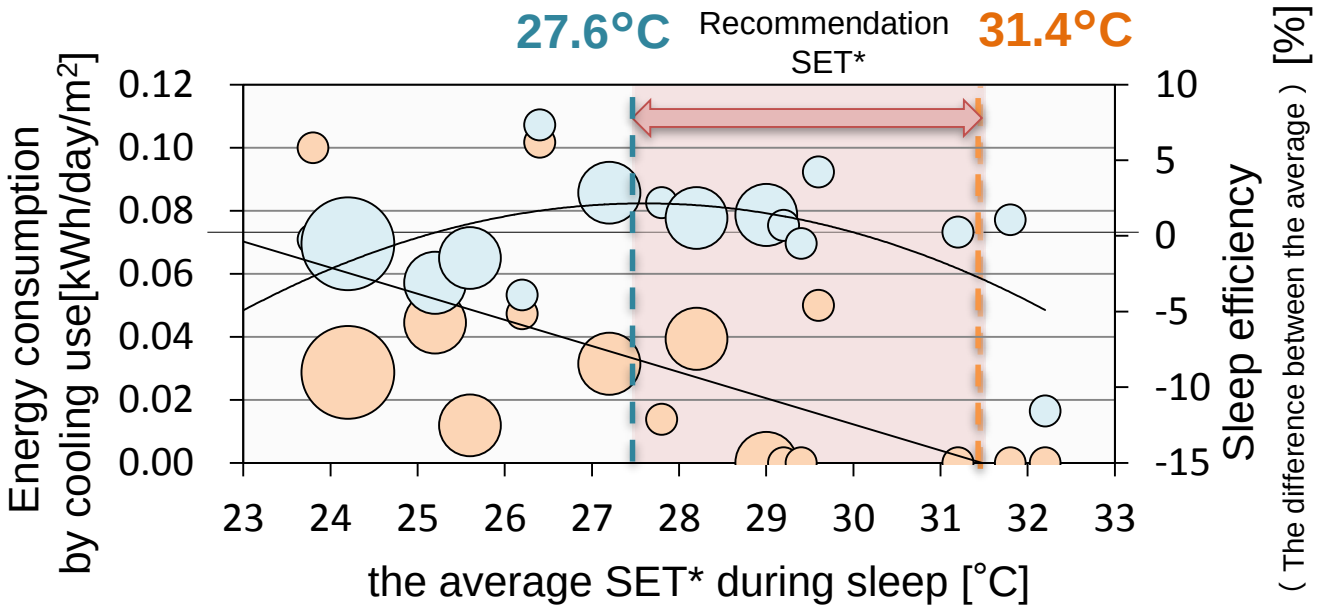
**Purpose** To elucidate the impact of air conditioning on both energy consumption and sleep during the summer.





Impact on energy consumption

Impact on sleep



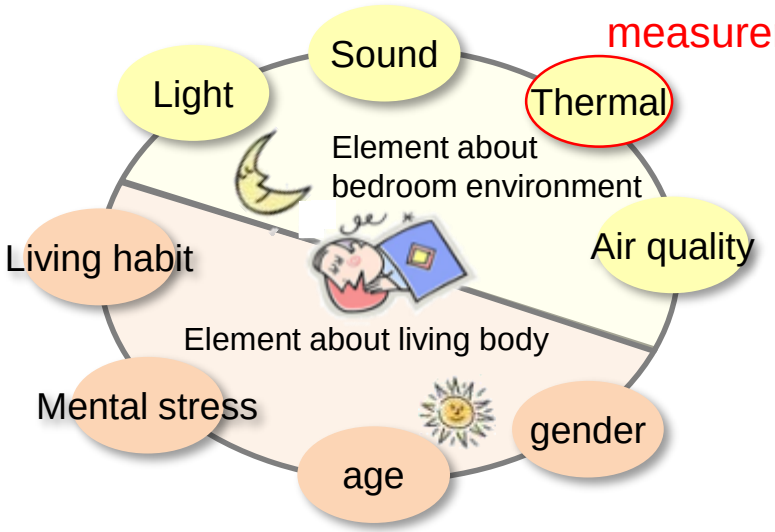

➡ Presenting a range of indoor thermal environment in which both energy saving and good quality sleep

# Study on Effect of Comprehensive Housing Environmental Performance on Sleep

**Background** Expectation to improvement of sleep by improvement of the bedroom environment

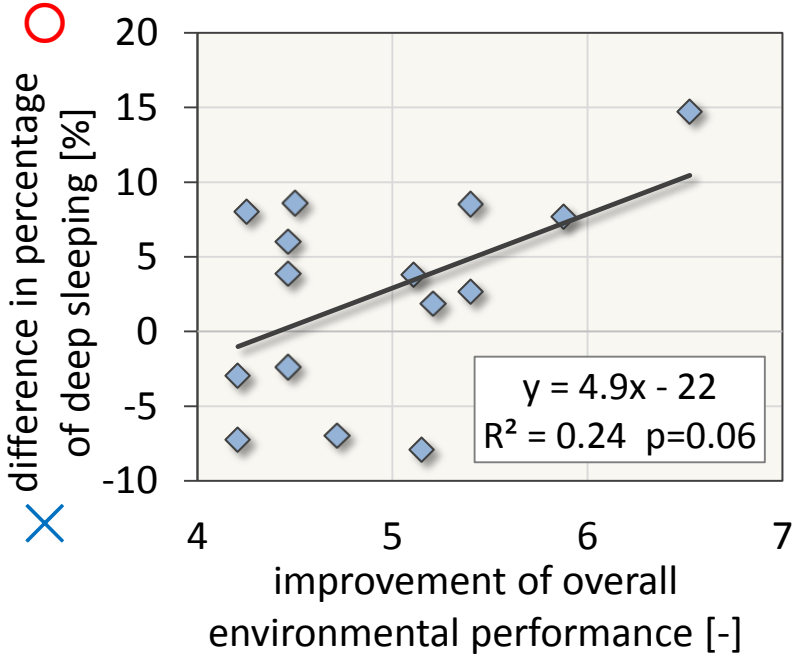
**Purpose** Verification of Improvement of overall indoor environment on sleep

## 1. Measurement at a home and model housing




| Temperature-humidity | Sleep |
|---|---|
| Temperature<br>Humidity | Sleep state<br>Awakening state<br>Sleep depth and so or |

## 2. Analyze relation between Housing Environmental Performance and Sleep




Increase of percentage of deep sleeping by overall environmental performance improvement in housing

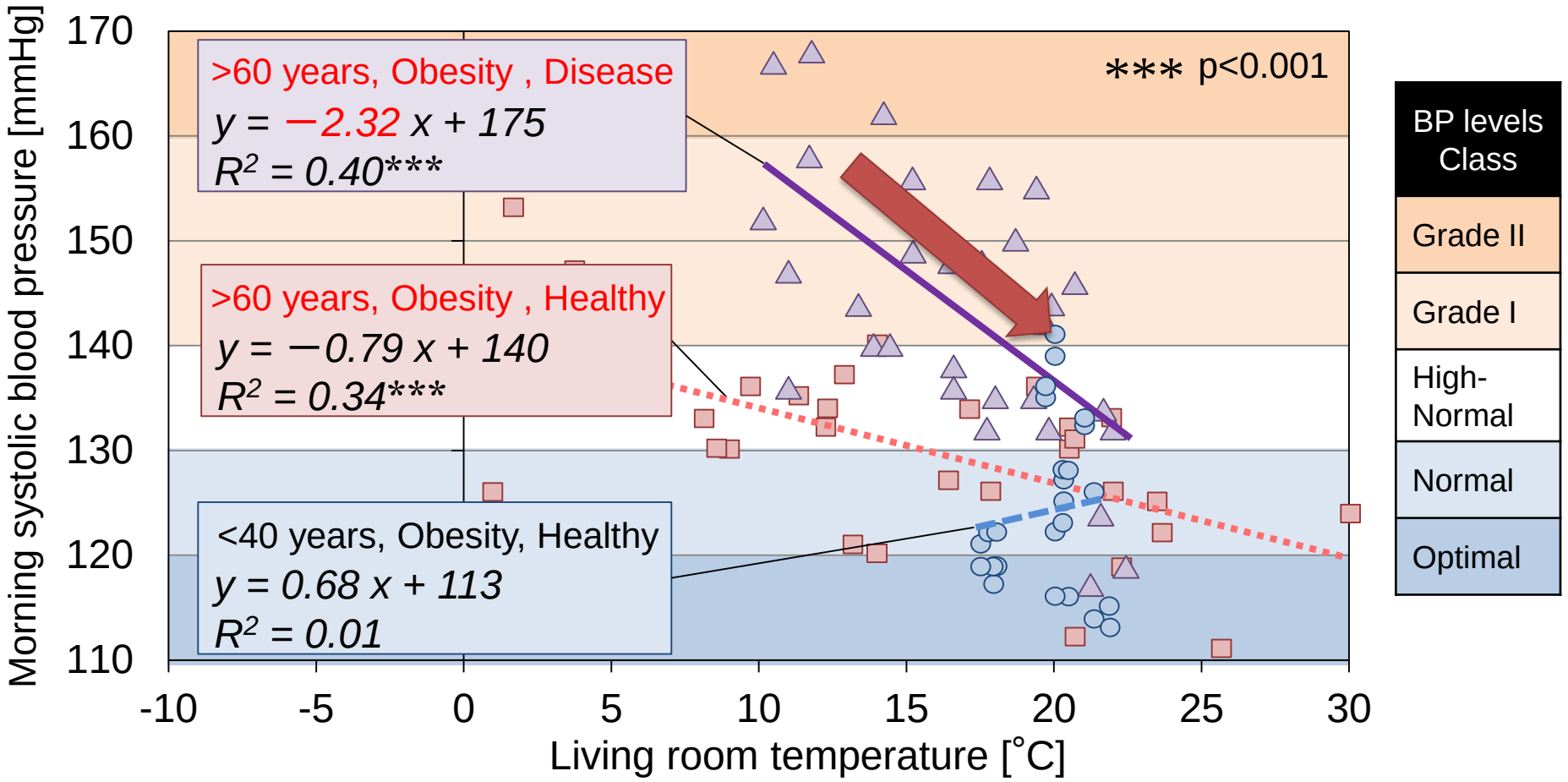
The results of this study will contribute to creating appropriate environments that promote good sleep, and will help to maintain and improve the health of people

# Verification of Living Environmental Factors Affecting Home Blood Pressure in Winter

**Background** Deaths from cardiovascular diseases※ in houses rise in winter

※ cardiovascular diseases：heart disease, cerebrovascular disease etc.

**Purpose** Analyze relation between indoor temperature and blood pressure

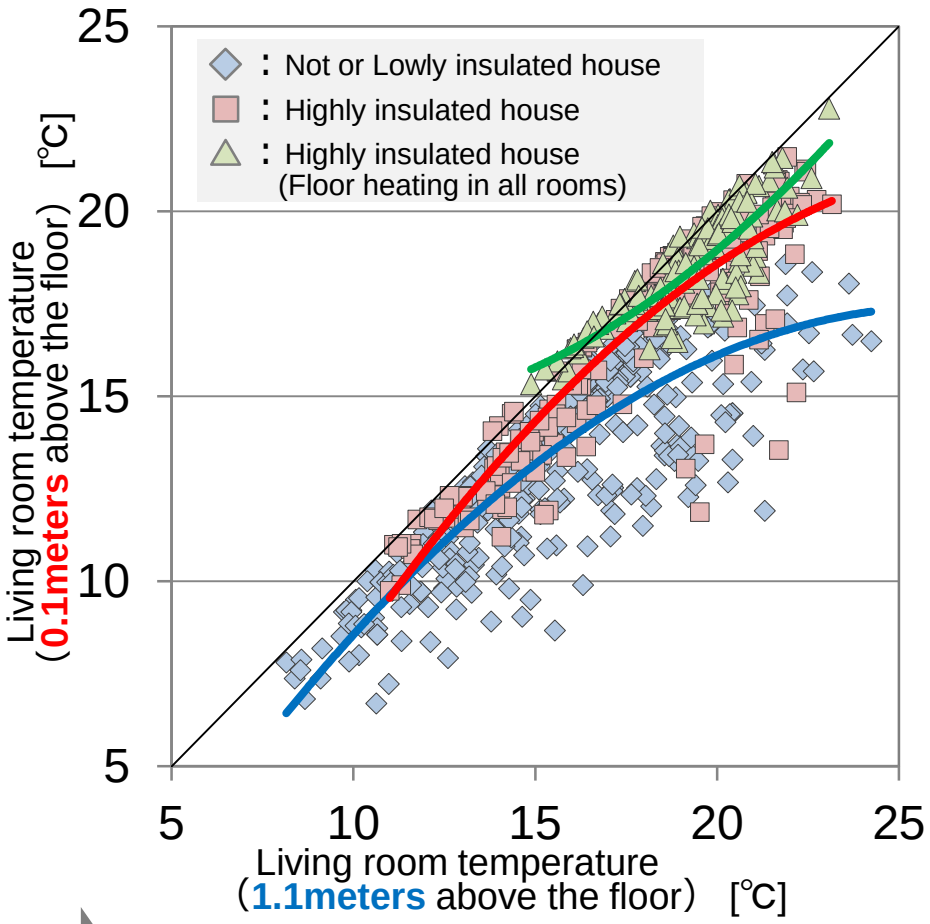


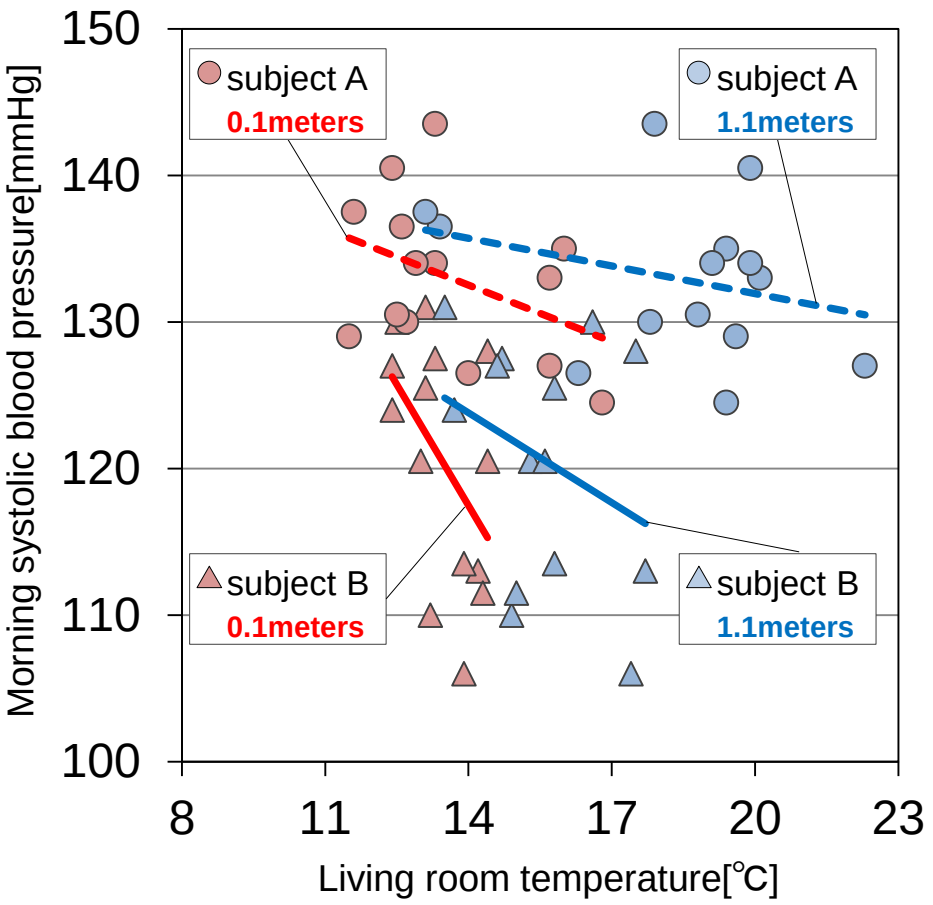

To keep indoor temperature within an appropriate range is effective to reduce cardiovascular events

# Effect of Temperature near Floor on Home Blood Pressure in Winter

**Background** Possibility of temperature near floor affects home blood pressure

**Purpose** Analyze the relation between indoor temperature near floor and home blood pressure in winter



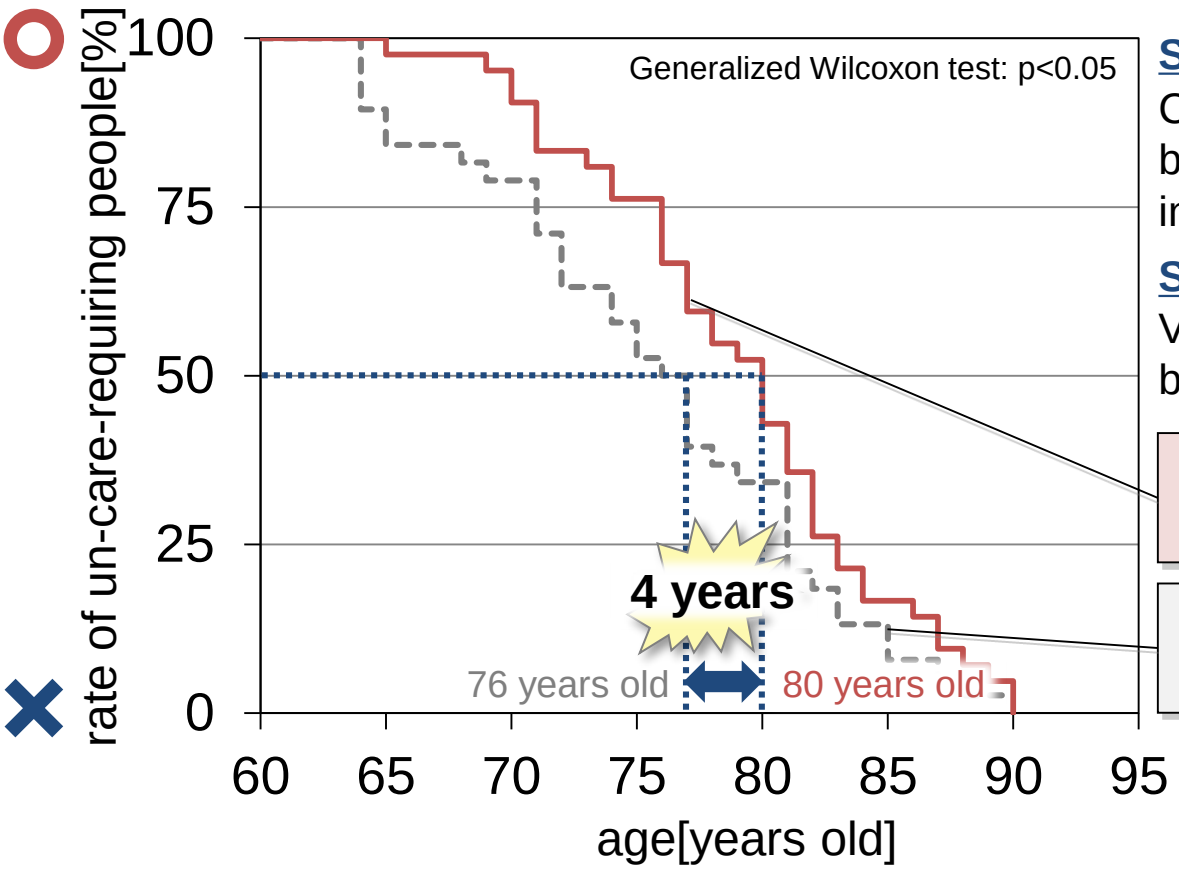




It suggests that keeping indoor temperature near floor within an appropriate range is effective to inhibit blood pressure elevation

# Effect of Indoor Environment on Care-requiring Condition of Frail Elderly

**Background** Increase in the number of elderly persons who require nursing care
Importance of preventive long-term care

**Purpose** Verification of effect of indoor environment on care-requiring condition




**Step1**
Classify the participants on the basis of subjective evaluation of indoor thermal environment

**Step2**
Verify the speed of care authorization based on survival analysis

High Score Gr. (n=42)
mean dressing room temp.: 14.6℃

Low Score Gr. (n=38)
mean dressing room temp.: 12.4℃

➡ Improvement of indoor thermal environment in winter has potentiality to extend healthy life expectancy

# Effect of Indoor Environment at Kindergarten on infant's Health

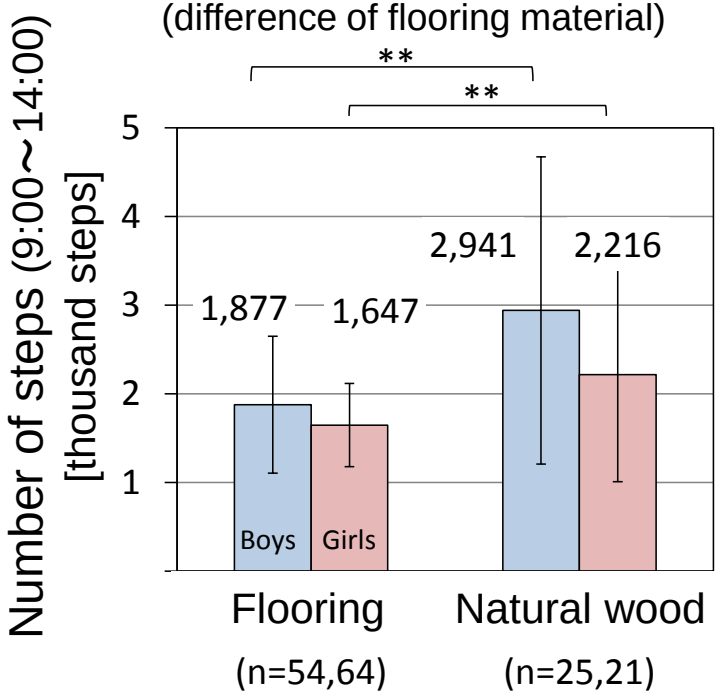
**Background** Increase of kindergartens, Insufficient environmental standard infant

**Purpose** Inspection of the influence that the insulation performance enhancement of the kindergarten building and interior give to the health of the infant

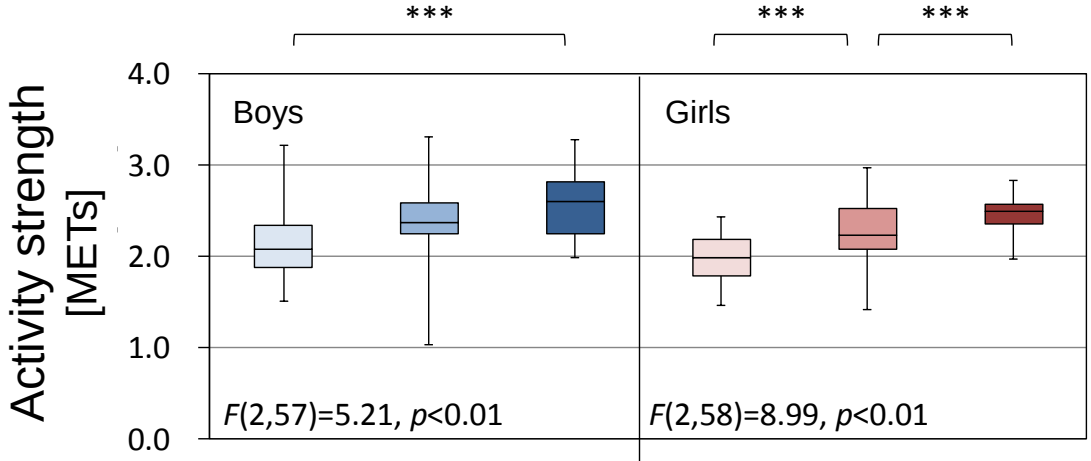





## Number of steps
(difference of flooring material)




## Activity strength
(difference of thermal environment)




| Temperature[℃] | Low (C) | Middle (B,D,E) | High (A) | Low (C) | Middle (B,D,E) | High (A) |
|---|---|---|---|---|---|---|
| 0.1m high | 9.2 | 13.7 | 17.2 | 9.2 | 13.7 | 17.2 |
| 1.1m high | 16.6 | 15.9 | 17.6 | 16.6 | 15.9 | 17.6 |

➡ To built kindergarten considering for the health of infants

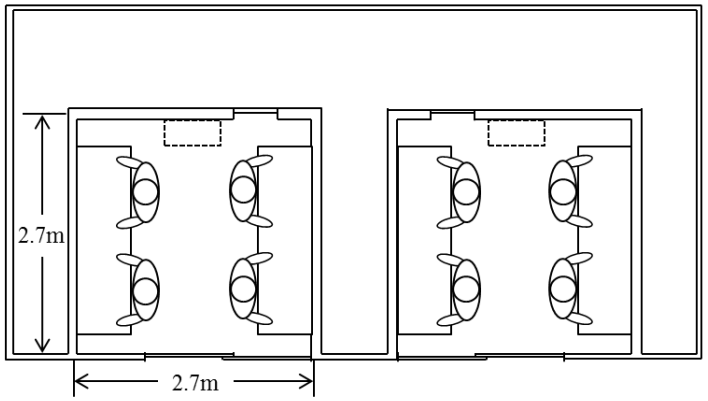
# Experimental Study Blood Pressure in Winter affected by Thermal Insulation Performance and Flooring

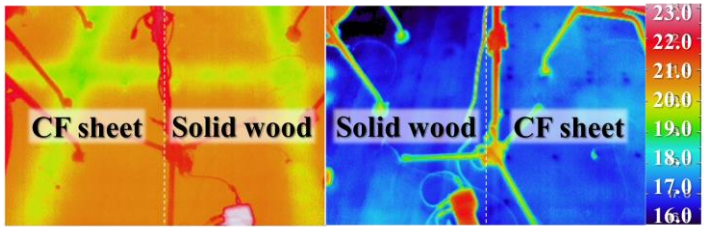
**Background**

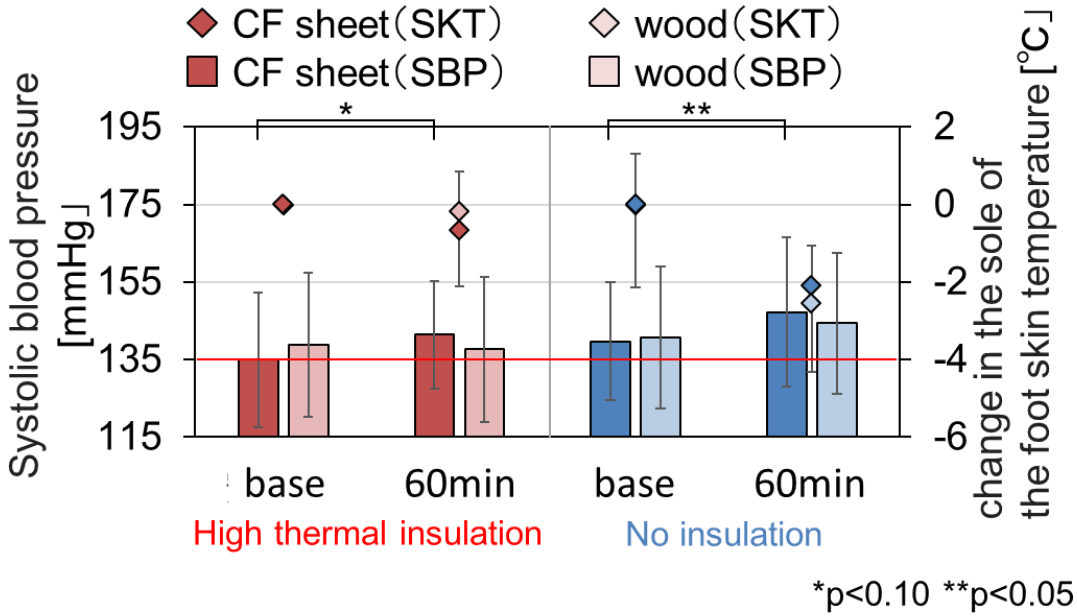
- Increase of cardiovascular disease risk in house due to the height of the blood pressure in the winter
- There is a possibility of impact on the rise in blood pressure by Floor surface temperature and flooring

**Purpose**

- Verification of the effect of thermal insulation performance and flooring on the blood pressure



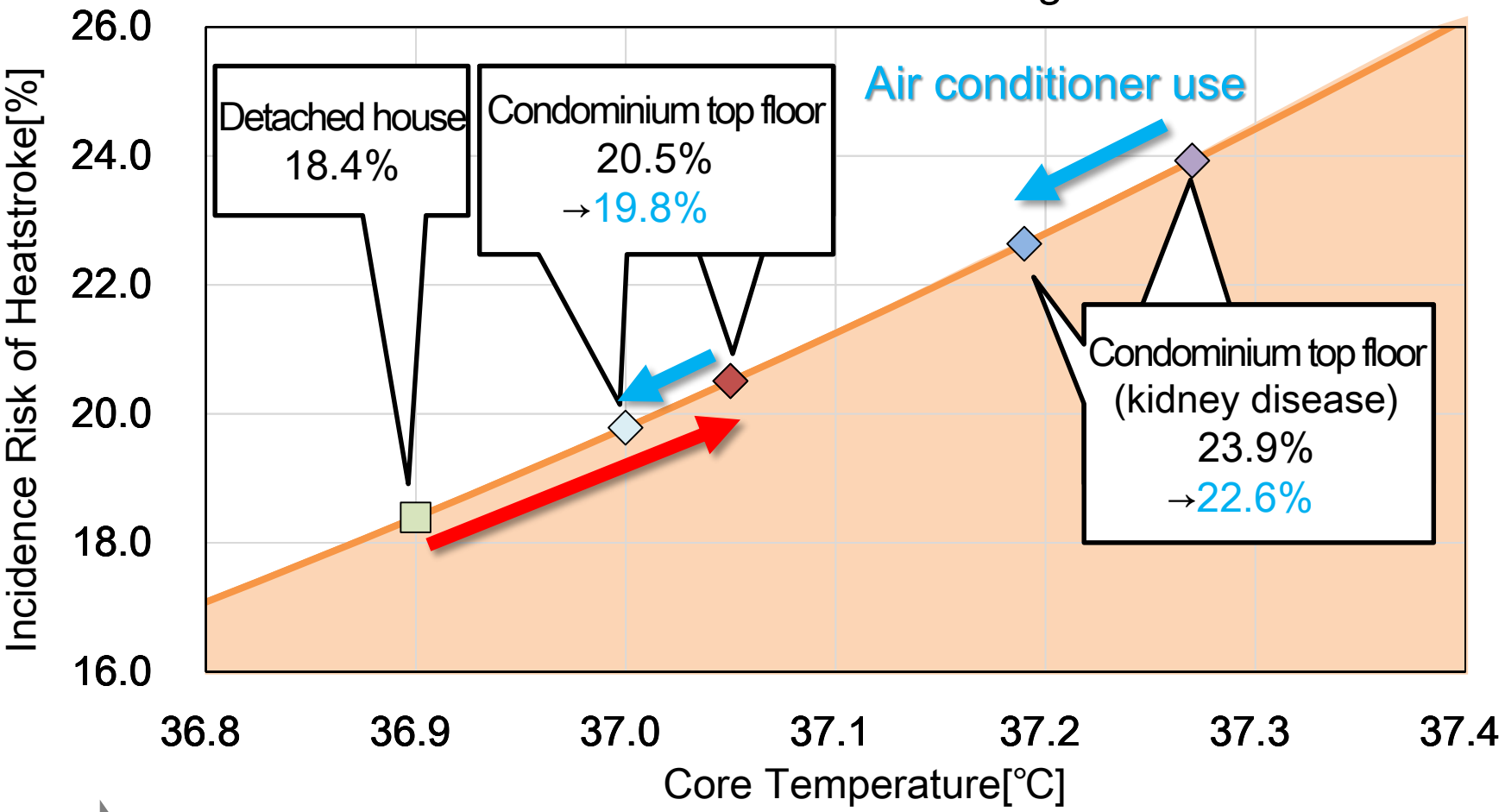

*p<0.10 **p<0.05

There is a possibility of suppressing blood pressure elevation by thermal insulation performance improvement and appropriate flooring selection

# Effect of Housing Envelope and Living Behavior on Incidence Risk of Heatstroke in Aged Residents

**Background** Importance of preventing indoor heatstroke of aged residents

**Purpose** Estimation effect of housing envelope and living behavior on incidence risk of heatstroke in aged residents




Contribute to reduce incidence risk of heatrisk of heatstroke by improvement of housing envelope and living behavior

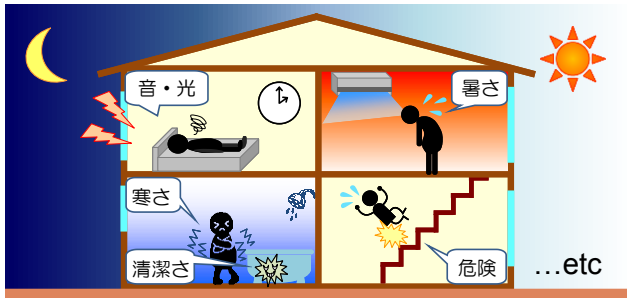
# Study on assessment tool for the health impact of living environment

**Background** Surge of interest in the house in which we can live healthily

➡ Requirement to clarify the problem of house

**Purpose** Development of assessment tool for the health impact of environment based on residents objective report

## 1. Questionnare survey for expert




Residents chose the frequency of problem occurrence of each element in each room

| rooms | elements | frequency |
|---|---|---|
| Ⅰ Living | 1． warmth, coolness | quite often |
| Ⅱ Bedroom | 2． silence | occasionally |
| Ⅲ Kitchen | 3． luminance | rare |
| Ⅳ Bathroom | 4． cleanliness | never |
| Ⅴ Restroom | 5． security | |
| Ⅵ Entrance | 6． reassurance | |
| Ⅶ Stairs and corridors | | |
| Ⅷ Around the house | | |
| Ⅸ Nursing care support | | |

## 2. Inspection and promulgation


➡ **Realization of the living environment which improves health of residents**

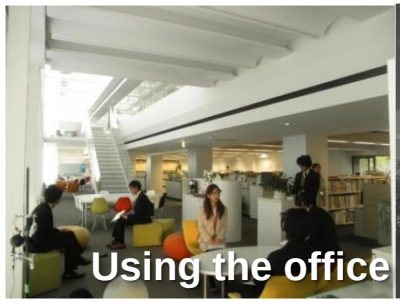
URL of CASBEE health check list: http://www.ibec.or.jp/CASBEE/casbee_health/index_health.htm

# Study on the effect of office support space on the workplace productivity

**Background** Importance of indoor environmental improvement in support space such as refresh corners in addition to the workplace

**Purpose** Verification of impact that light and visual environment in support space is on the workplace productivity

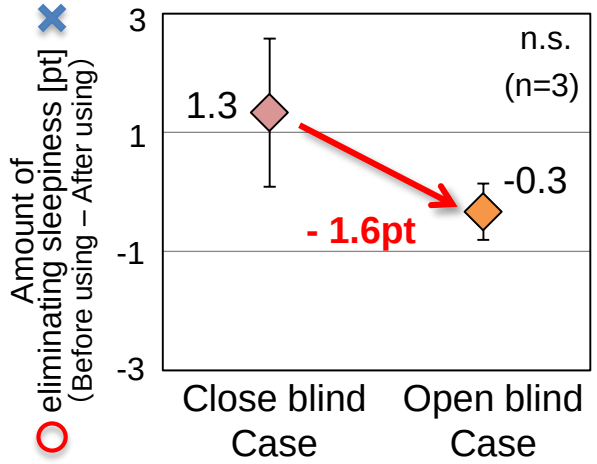
## 1. Human subject experiment

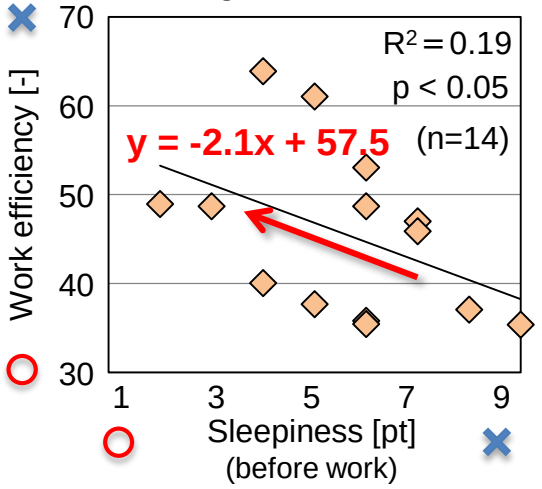


## 2. Quantitative evaluation of the impact

2-1) Elimination of sleepiness by light environment in support space




2-2) Relationship of sleepiness and idea generation work efficiency




➡ Contribute to further improvement of workplace productivity

# Effect of HVAC control based on metabolic rate on workplace productivity

**Background** Thermal discomfort based on metabolic rate change of office occupants

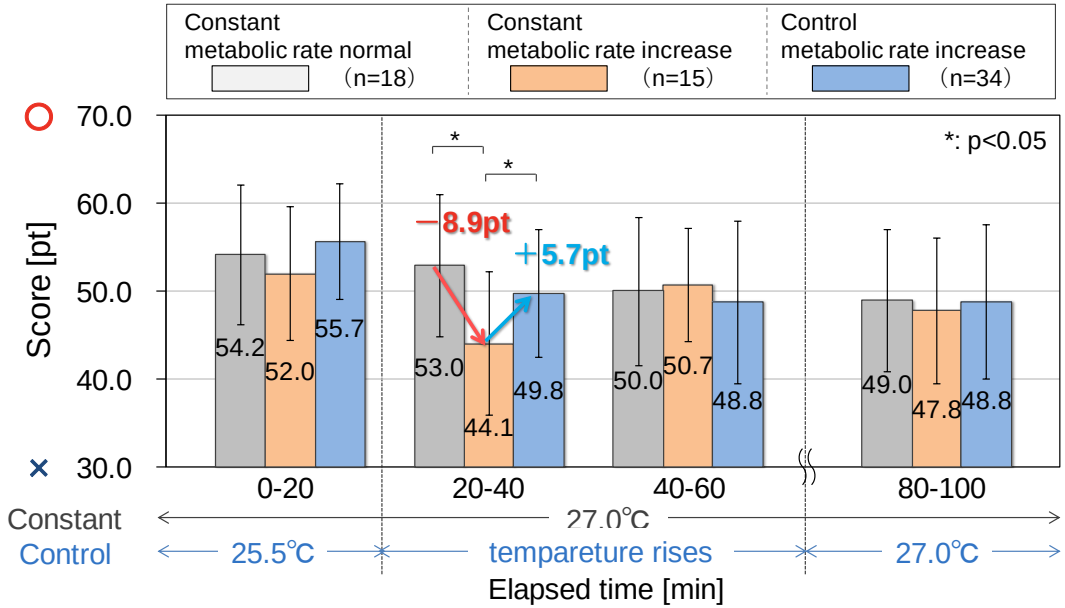
**Purpose** Expectation to effect of HVAC control based on metabolic rate on workplace productivity

Increasing metabolic rate

Conventional HVAC control


HVAC control based on metabolic rate






Presenting an effect of HVAC control based on metabolic rate on workplace productivity

# Effect of wooden interior housing on fatigue recovery and daytime productivity

**Background** Decline of daytime productivity and huge economic loss due to fatigue of workers

**Purpose** Verification of the effects of wooden interior housing on fatigue recovery and daytime productivity

## Subjective experiment

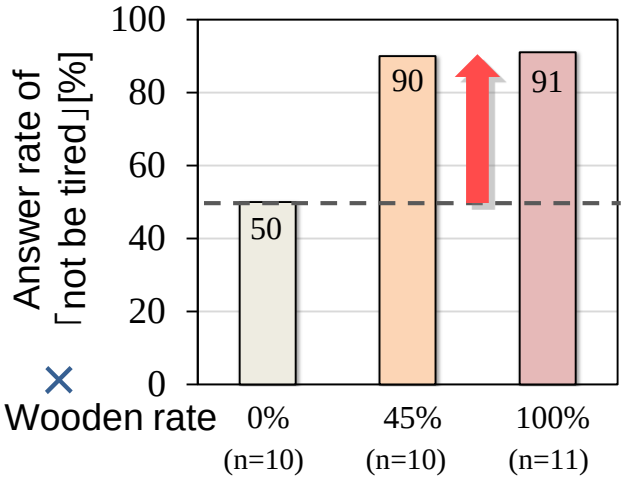
Stay at three different rooms

The next day

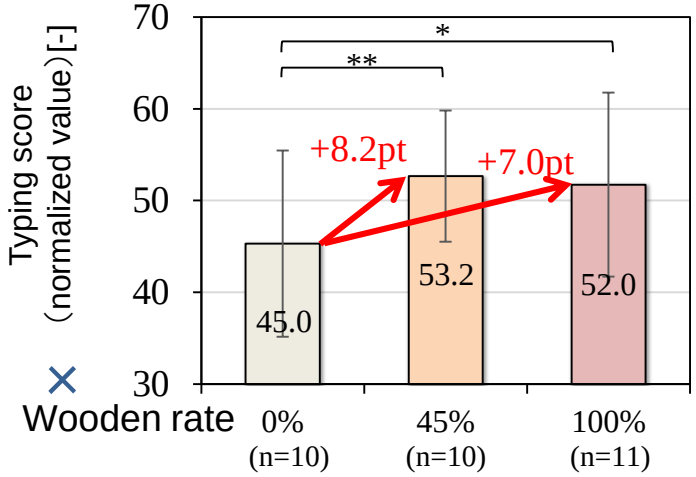
Do some tasks at conference

## Result

○ Fatigue state in the morning




○ Daytime productivity




It suggests that wooden interior housing is effective to recover fatigue and improve daytime productivity



**p<0.05 *p<0.10