Effect of panel performance on olfactometry

Environmental Odour Management
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H. Ueno, M Higuchi, S. Tatsuichi,
Y. Iwasaki and J. Nishikawa*
Tokyo Metropolitan Research Institute
for Environmental Protection
* Ministry of the Environment, JAPAN

Presentation Outline

1.Background

Olfactometry and standard odors in Japan

2.Experimental and results

Measurement results of olfactory threshold

for standard odors

3.Summary

Triangle odor bag method

1970s : Local ordinances   1995 : National Law

Standard odors for panel selection

β-Phenylethyl Alcohol
> Smell of rose petals

Metylcyclopentenolone
> Sweet burning smell

Isovaleric acid
> Smell of stinking socks

γ-Undecalactone
> Smell of ripe fruit

Skatole
> Excrement smell

Control liquid

T&T Olfactometer

Aim of this study

To identify human factors affecting olfactometry

- Distribution of threshold
- Effect of Age, gender, smoking habit
- Within-individual variability

Comparison between the Japanese and the European panel selection test

Determination of threshold

5-2 descending method

Sniff 5 slips and select 2 slips that contain an odor.

If correct, repeat at 3times lower concentration.

The lowest concentration with the correct answer is the threshold.
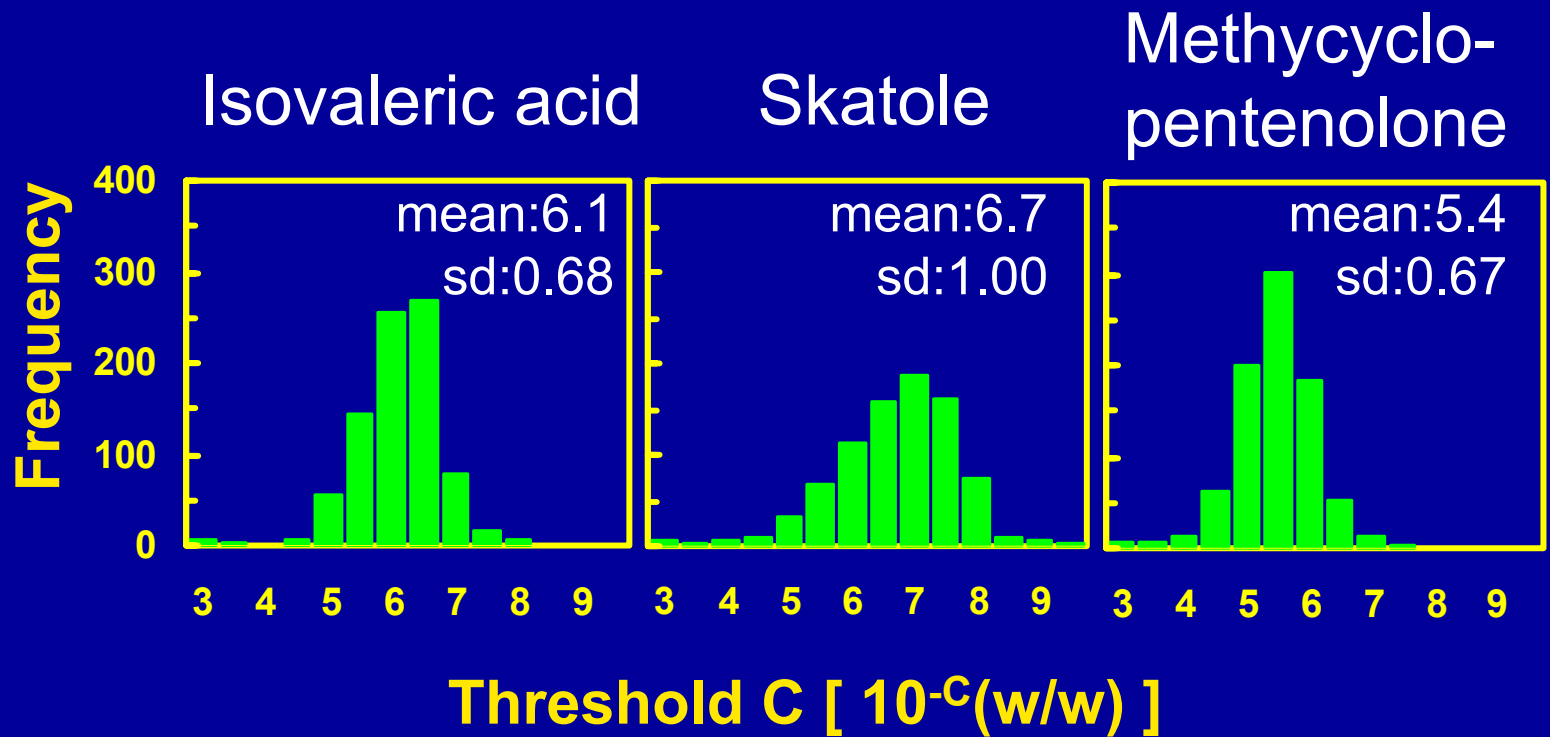
Distribution of threshold

The test subjects

Age group	Male	Female	Total
-19	26	55	81
20-29	240	215	455
30-39	109	79	188
40-49	54	21	75
50-59	20	8	28
60-	7	5	12
Total	456	383	839

Standard odors used

Isovaleric acid, Skatole, Methylcyclopentenolone

Distribution of threshold

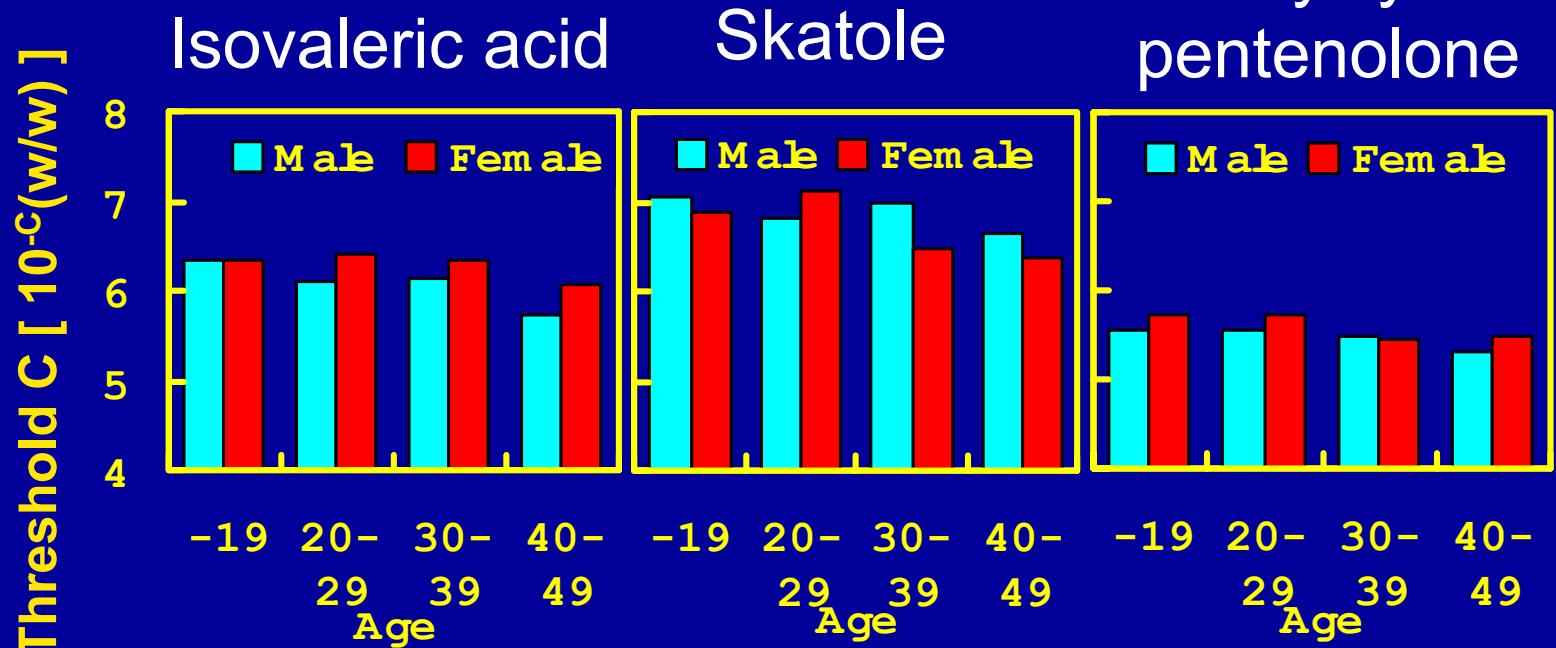Isovaleric acid   Skatole   Methycyclo-pentenolone

mean:6.1 sd:0.68   mean:6.7 sd:1.00   mean:5.4 sd:0.67

Frequency

Threshold C [10^{-C}(w/w)]
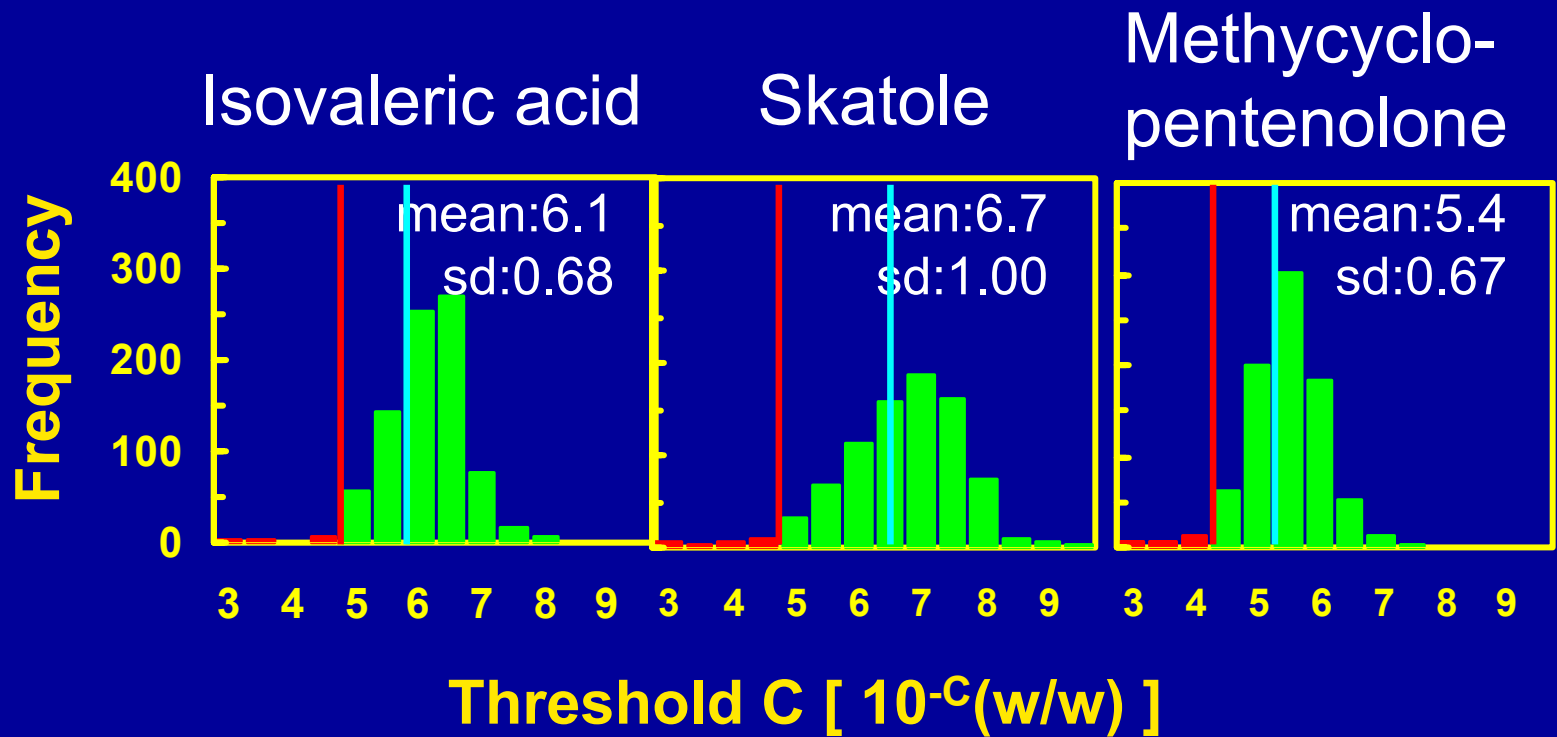
The criteria for panel selection : m – 1.5sd

The number of smell disturbances

Age group	Male		Female	
-19	0	(0%)	0	(0%)
20-29	13	(5%)	6	(3%)
30-39	5	(5%)	4	(5%)
40-49	9	(17%)	1	(5%)
50-59	3	(15%)	0	(0%)
60-	1	(14%)	0	(0%)
Total	31	(7%)	11	(3%)

Gender and age differences

Except for the smell disturbance and smoking people

Age

Threshold C [$10^{-C}(w/w)$]

Age

Methylcyclopentenolone
Male
Non-smoking
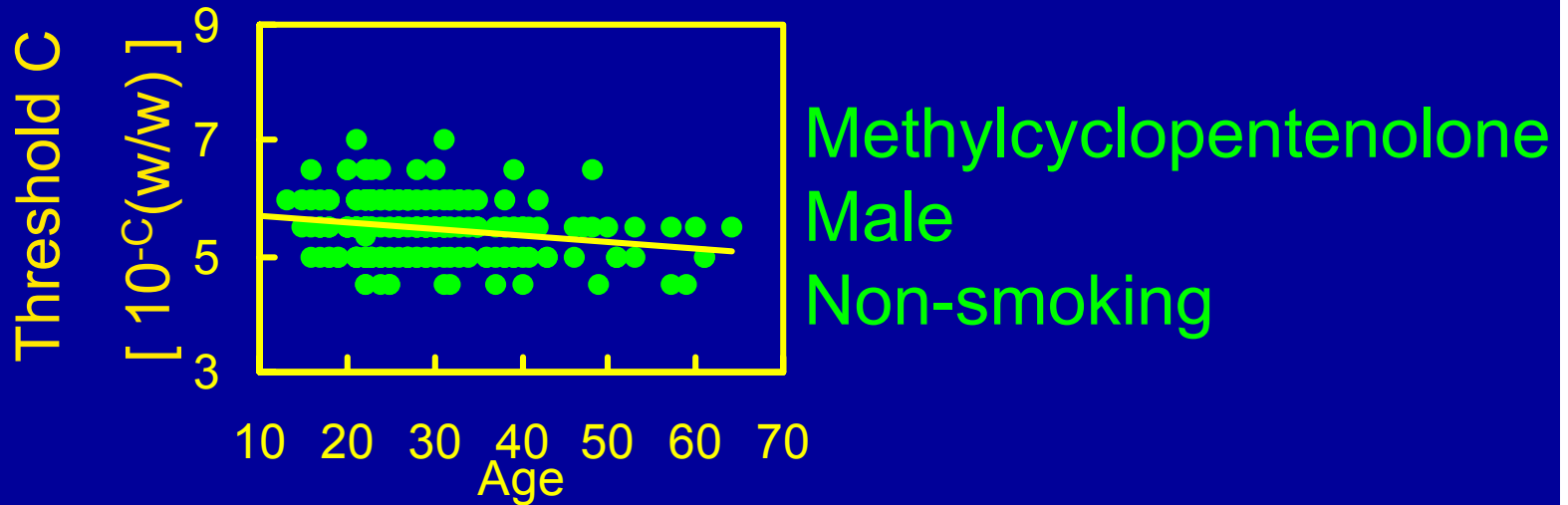
50%loss of sencitivity			(year)
	Isovaleric acid	Skatol	Methylcyclopentenolone
Male	30	24	25
Female	31	14	31
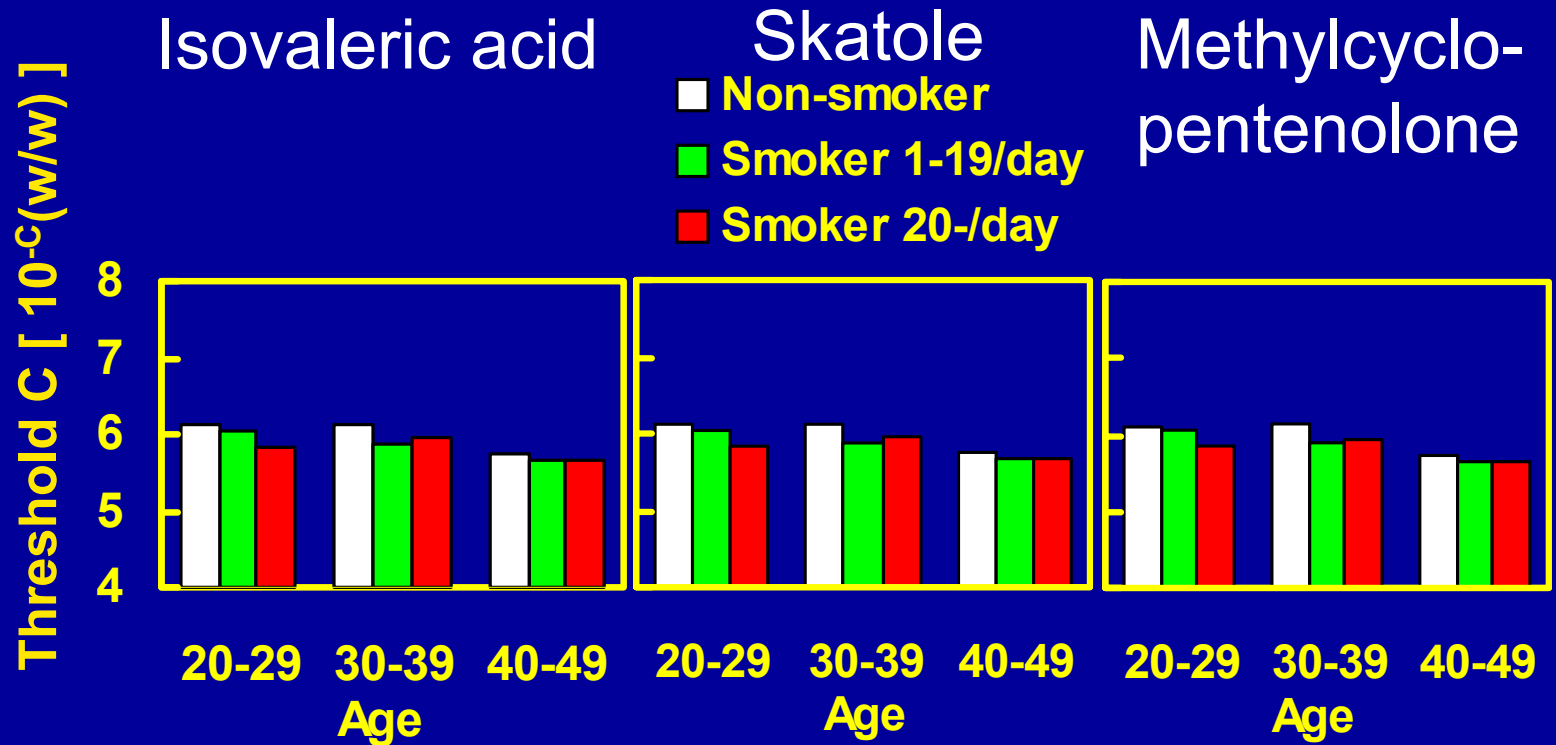
Within-individual variability

Subject	Gender	Age	n	Isovaleric acid		Skatole		Methylcyclo-pentenolone	
				mean	sd	mean	sd	mean	sd
A	F	20	30	6.80	0.55	8.18	0.70	5.63	0.45
B	F	21	30	6.87	0.41	7.48	0.43	5.62	0.50
C	M	20	30	6.47	0.47	7.55	0.44	5.18	0.53
D	M	23	30	6.90	0.40	8.40	0.69	6.02	0.25
E	M	21	30	6.55	0.38	7.55	0.51	5.32	0.38
F	F	26	30	6.65	0.30	7.77	0.43	5.40	0.48
G	F	25	30	6.95	0.36	7.63	0.43	5.48	0.70
H	M	31	30	6.65	0.46	8.07	0.49	5.42	0.35
I	M	32	30	6.50	0.45	7.88	0.50	5.77	0.34
J	F	25	30	6.93	0.55	8.15	0.60	5.70	0.45
K	F	22	30	6.58	0.27	7.37	0.60	5.75	0.31
L	F	22	30	6.48	0.46	7.23	0.45	5.60	0.40
M	F	22	30	6.18	0.33	7.62	0.43	5.90	0.33
			mean	6.65	0.41	7.76	0.52	5.60	0.42
			sd	0.23		0.35		0.24	

Test subjects : 13 people   Age of 20-32

Comparison between the Japanese and the European panel selection test

Standard odors

- 5 Japanese standard odors
- European standard odor : n-butanol

Test subject

- 20 people

Dynamic olfactometer for European Test

- Olfactmat-n2,
  PRA OdourNet BV

Comparison between the Japanese and the European panel selection test

Subject	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Japanese method	›	›	›	›	›	›	›	×	›	›	›	›	›	›	›	›	›	›	›	×
European method																				
Sensitivity	×	×	×	›	×	›	›	×	›	×	×	×	›	›	›	×	›	×	›	›
Variability	›	›	×	›	›	›	›	×	›	›	›	›	×	›	›	›	›	›	›	×

Note: Odorant for which assessors did not meet the criteria in the Japanese method was β-phenylethyl alcohol

Summary

- Individual threshold values have varied widely.

- Smell disturbances have been about 5 % of the total.

- Effect of gender, age, and smoking habit on the sensitivity have been observed, but they have been comparatively small.

- It has been suggested that the within-individual variability was significantly large.

These results are the basis of the Japanese concept.

- The European panel selection criteria have been stricter than the Japanese criteria. The Japanese test is easier to perform (it takes15 minutes for 5 standard odors) while the European test seems to produce a better precision for olfactory measurements. The balance between easiness and precision should be studied.

Thank you for your kind attention.