



未来社会創造事業

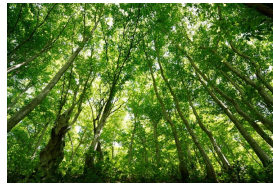
JST Mirai-Project 2019-2024

Providing 'humane' services by expanding the function of flavor and fragrance

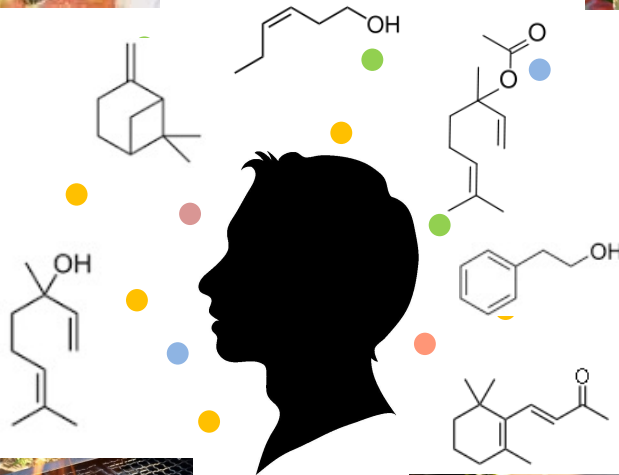
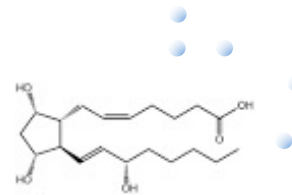
showing kindness, care and sympathy to others

Kazushige Touhara

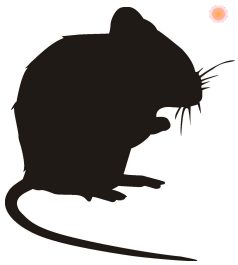
Department of Applied Biological Chemistry
The University of Tokyo



A photograph of three wine glasses. In the foreground, a glass filled with white wine is on the left, and a glass filled with red wine is on the right. In the background, another glass filled with red wine is visible. The glasses are set against a warm, golden, textured background.

A white ceramic cup filled with dark coffee, sitting on a matching white saucer. The cup is positioned on a light-colored wooden surface. In the background, there is a blurred green plant and a small yellow object. The lighting is soft and warm, creating a cozy atmosphere.

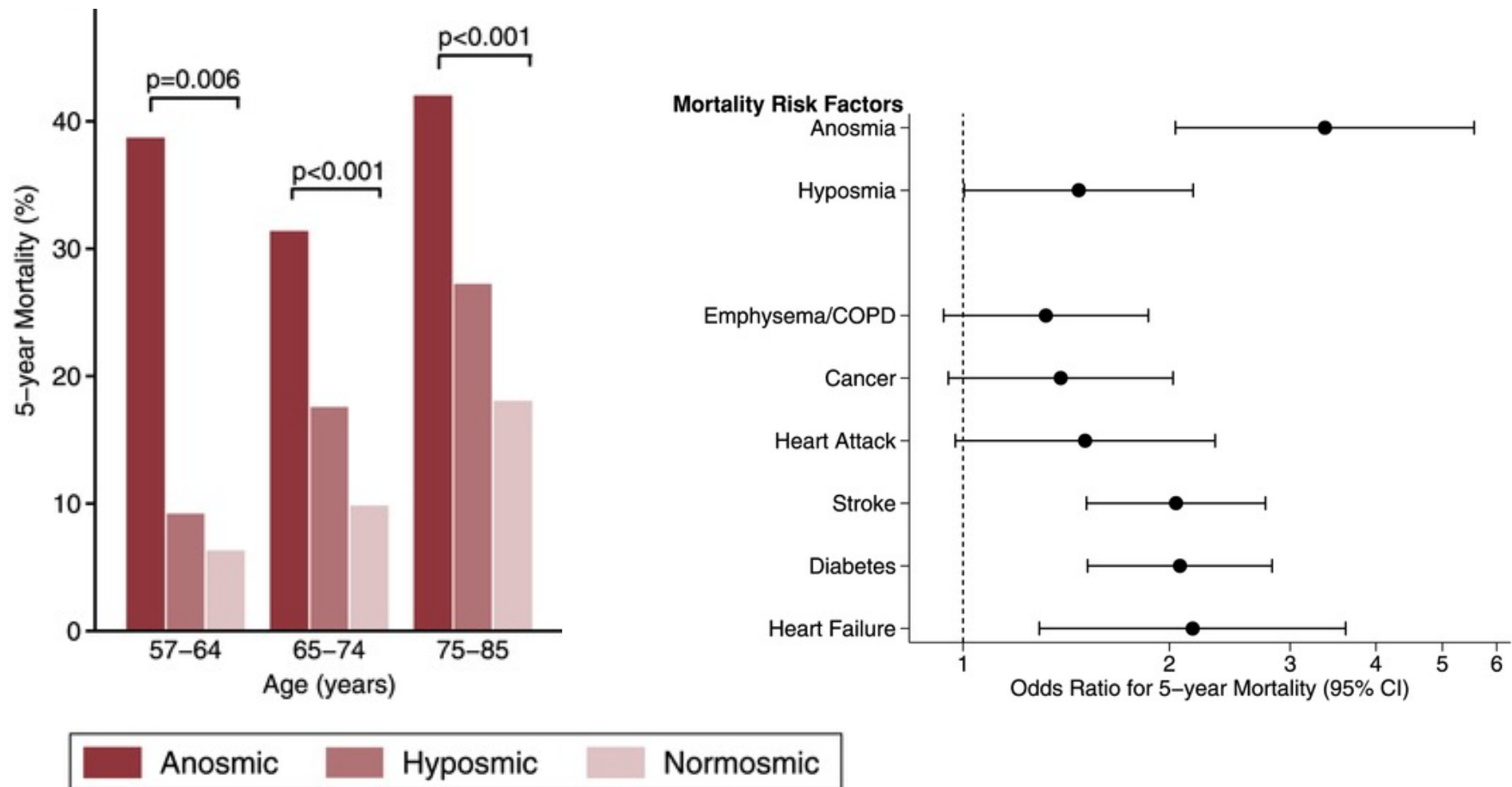
Pheromone



QoL

Olfactory dysfunction predicts 5-year mortality in older adults

Pinto et al.: PLoS ONE 9 (10):e107541 (2014)

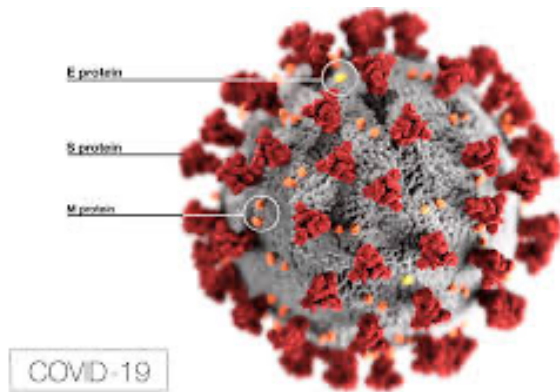


COVID-19 and loss of sense of smell

ENTUK

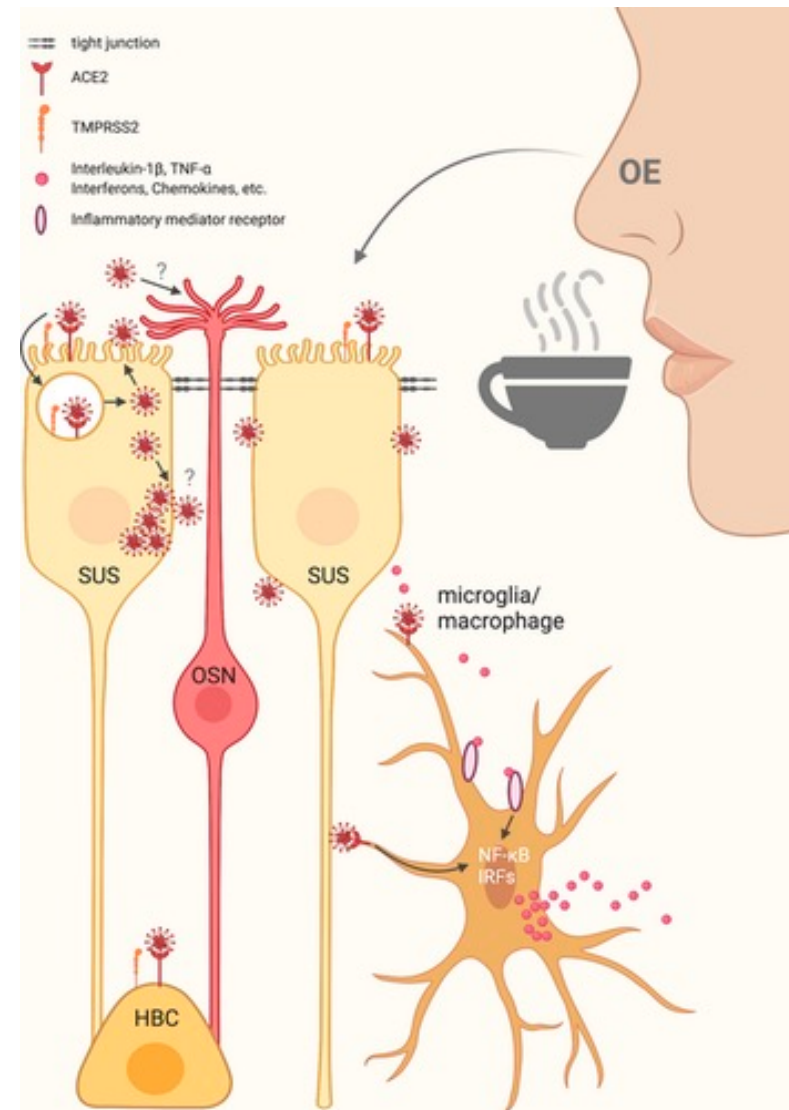
Loss of sense of smell as marker of COVID-19 infection

There is new evidence for the loss of smell as a symptom of COVID-19 infection. We are circulating the following Intelligence to Public Health England with regards to anosmia. As a result, this information highlights the importance for healthcare personnel to employ full PPE and in turn help stem the rates of infection. Full details can be read below:



International survey

<https://gcchemosensr.org/>
<https://smelltracker.org/ja>



Glezer et al. J. Neurochem. 2020

Aroma and smell in our life

Previous and current needs
Typical approach

Malodor!! ➡ Deodorant



Next generation strategy
: positive effect for QoL

➡ Humane use



Why is the targeting 'olfaction' challenging?

Difficulty in reconstituting or designing odors

For the visual system, VR can recapitulate the texture but not for olfaction



Sawayama et al/. J Vis. 2017

entertainment



<https://www.vertechs.jp> <https://www.pixar.com/>

Individual differences in odor perception

Good aroma in turn makes some people unhappy or even 'toxic'



Happy with aroma



Unhappy with aroma



<http://www.nhk.or.jp/nc11blog/200/275737.html>

Weak scientific evidence for effect of aroma

Cannot visualize/quantify olfactory effect and perception

Aroma effect?

relax
concentration
weight control
sleep



Malodor claim

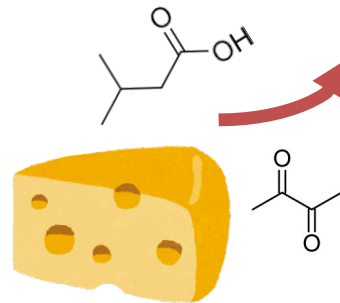
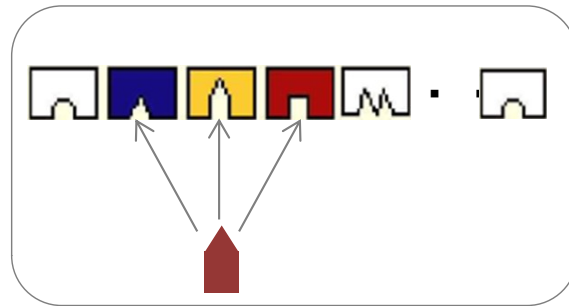


Hard to describe
impression



Odor sensing in the olfactory system

A combinatorial receptor coding
~400 odorant receptors



Odorants
Pheromones

POC3
POC4

Olfactory
receptor

POC1

Neural
circuit

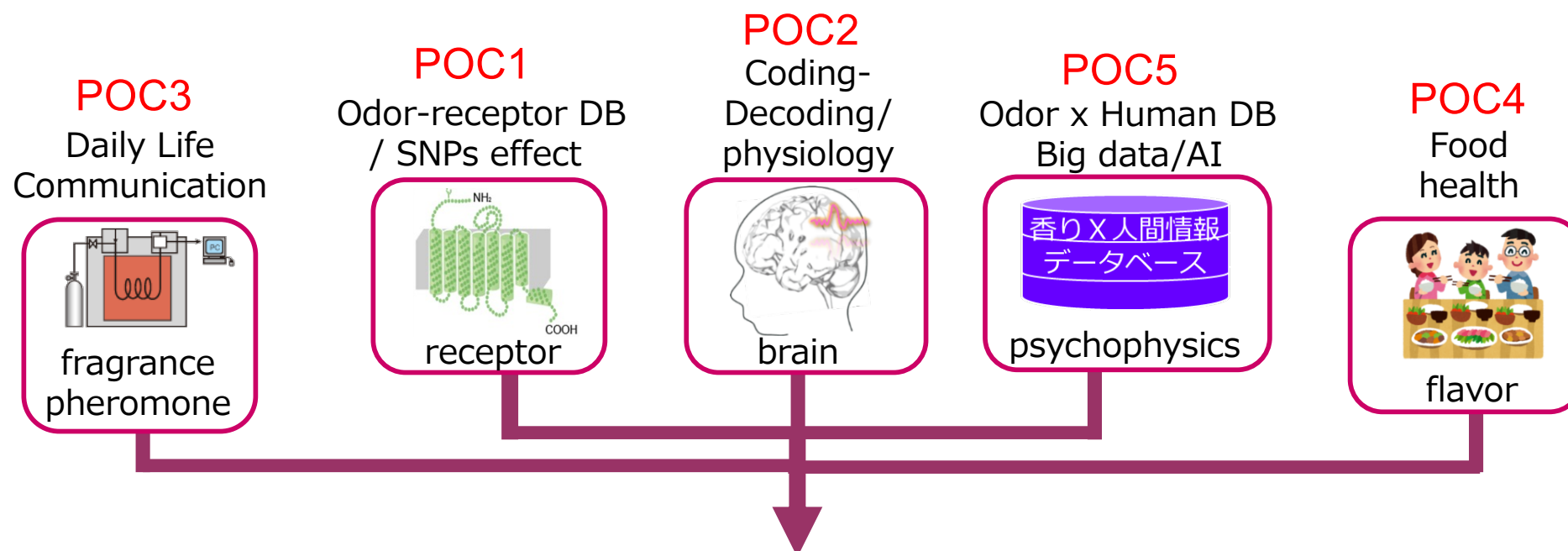
POC2

Perception
Behavior
Emotion
Memory

POC5

Cheese
Yummy
Stinky

Providing humane services by expanding the function of flavor and fragrance



Construction of a model to predict one's preferred aroma
Exploring service market and social implementation

Universally accepted odors/ individually 'tailor-made' odors/
Enhancing comfort • safety • bonding/ Supporting health/ food market

Outputs QoL ↑ Health ↑ Safety ↑ Comfort ↑ SDGs ↑

Examples of digital transformation targeting olfaction in the world

Givaudan : Smart Tool by using Big data

- By using Virtual Aroma Synthesizer® (VAS) that can produce aroma in real time, one can acquire preference in each country, race, and region efficiently
- mix flavor easily and quickly and thus, general people can attend to experience flavor creation

出典 : <https://jp.givaudan.com/flavours/meeting-your-needs/smarttools>

Firmenich : personalization of aroma using big data and AI

- Partnership with Ecole Polytech. Federal in Lausanne (EPFL) and put Digital lab 「D-Lab」
- Create innovation across flavor and fragrance by using AI

出典 : <https://www.perfumerflavorist.com/networking/news/company/Firmenich-Launches-Digital-Lab-at-EPFL-Innovation-Park-489868571.html>

Symrise : providing aroma for specific use with the IBM Res.

- A method of using AI to create perfumes based on digital fragrance models
- Philyra, as the project is called, uses AI developed by IBM Research for product design technology
- AI identifies existing fragrances and suggests complementary additional components and formulas.

出典 : <https://www.symrise.com/newsroom/article/breaking-new-fragrance-ground-with-artificial-intelligence-ai-ibm-research-and-symrise-are-workin/>

Potential service market targeting olfaction

