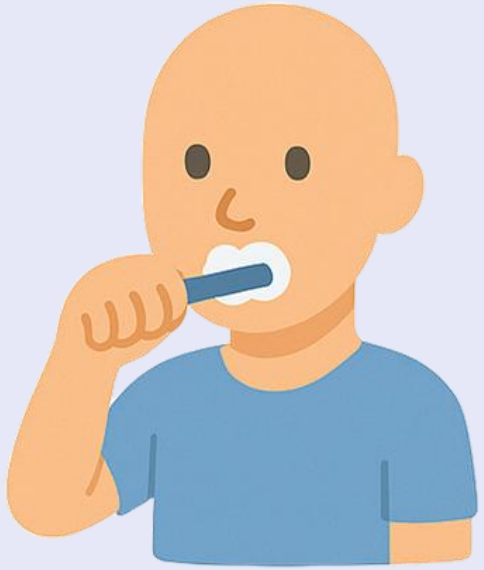
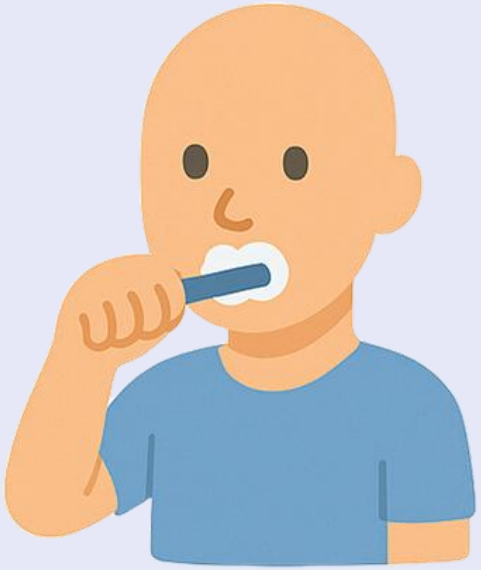
Creme Global

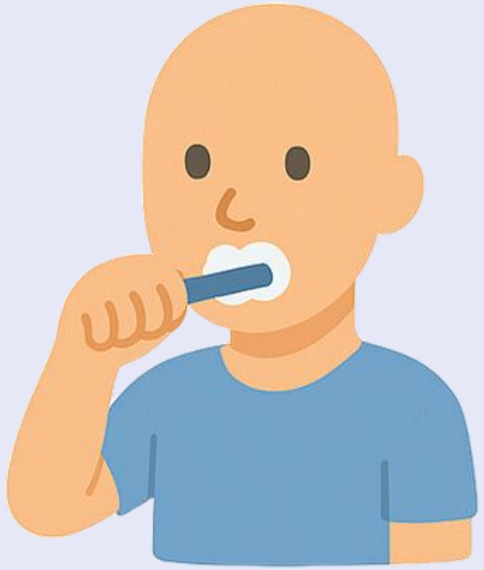
CREME RIFM Aggregate Exposure Model

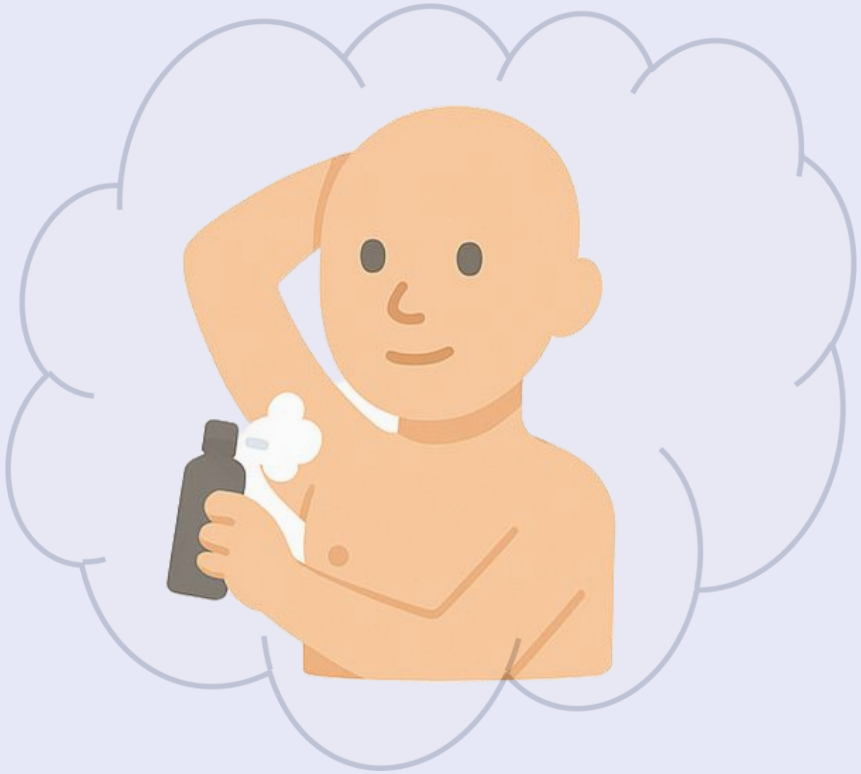
IDEA Annual Review
29th January 2026, Brussels, Belgium

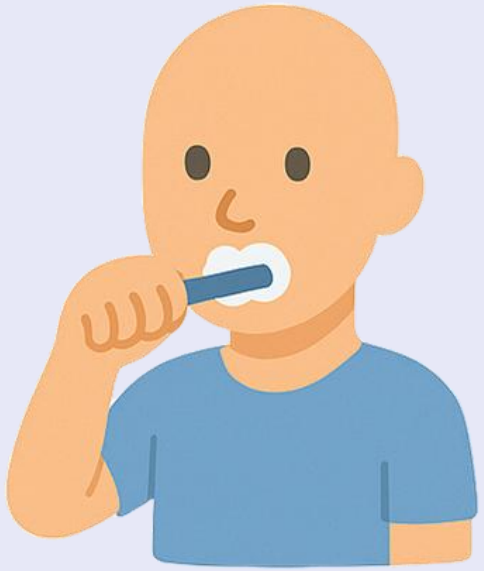
Cesar Scrochi, Senior Data Scientist
cesar.scrochi@cremeglobal.com

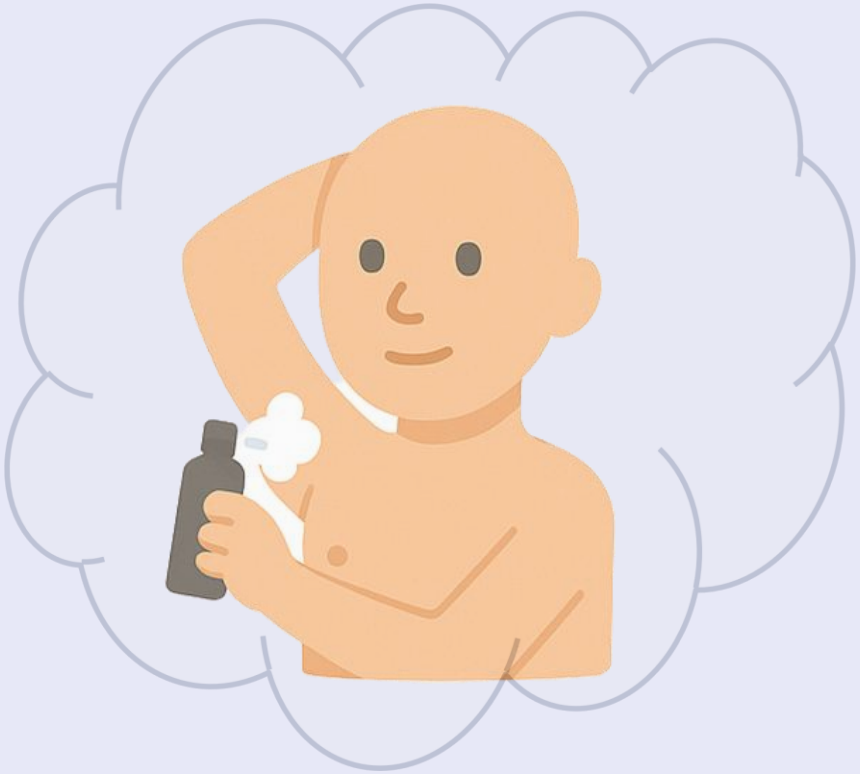


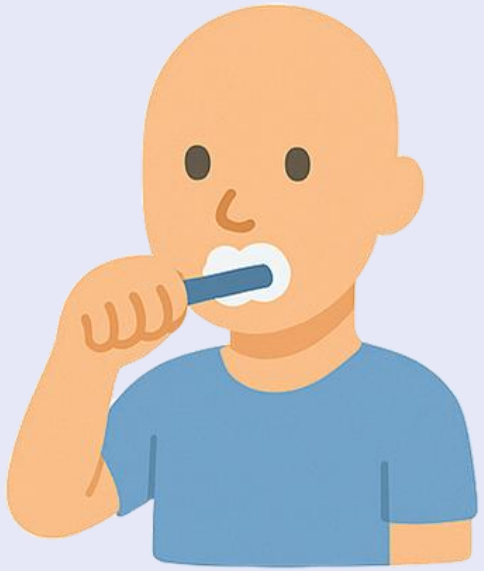


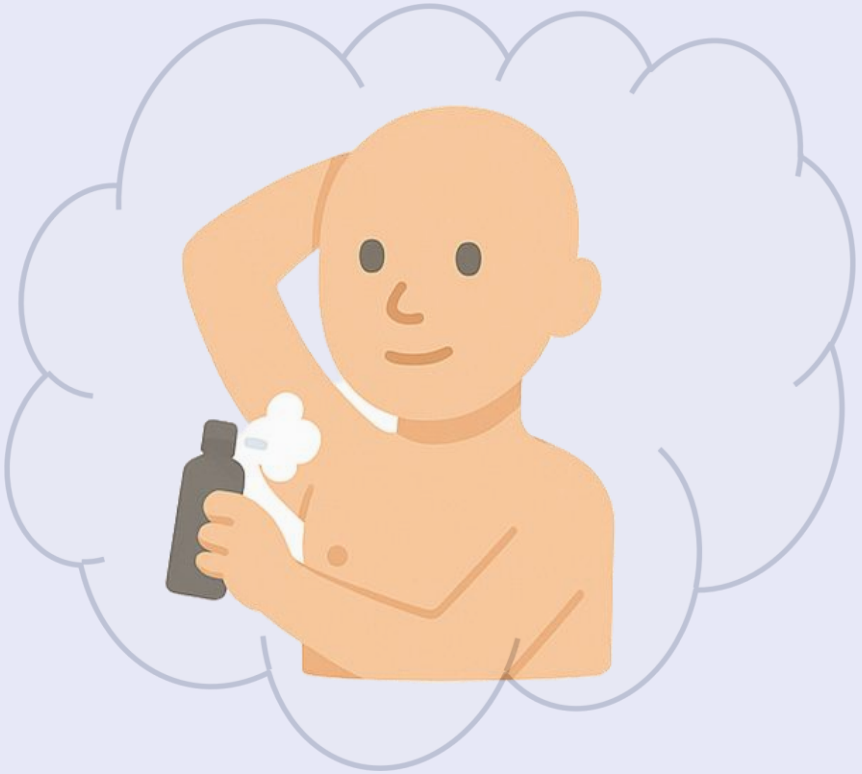


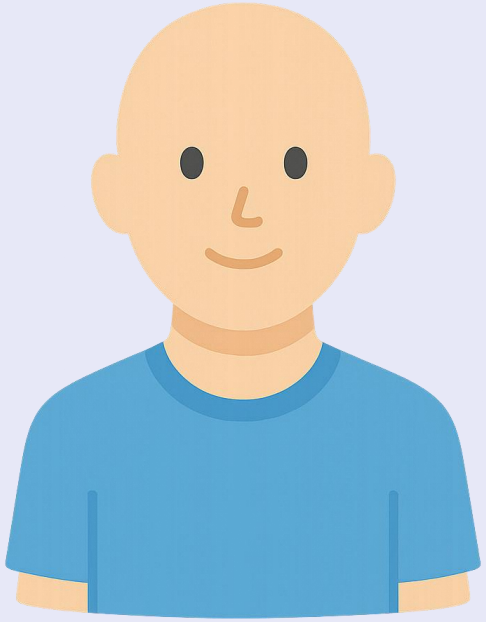


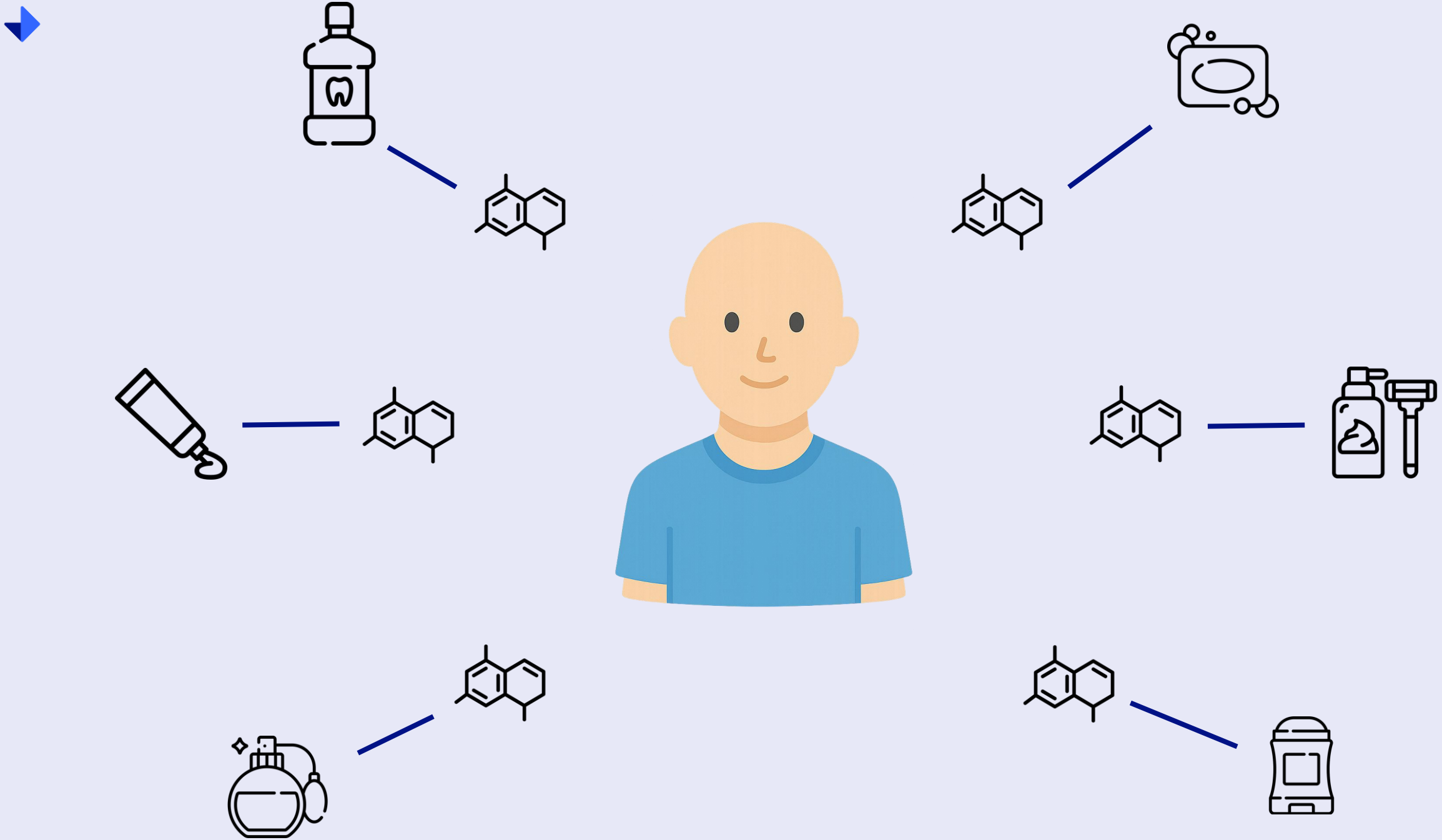


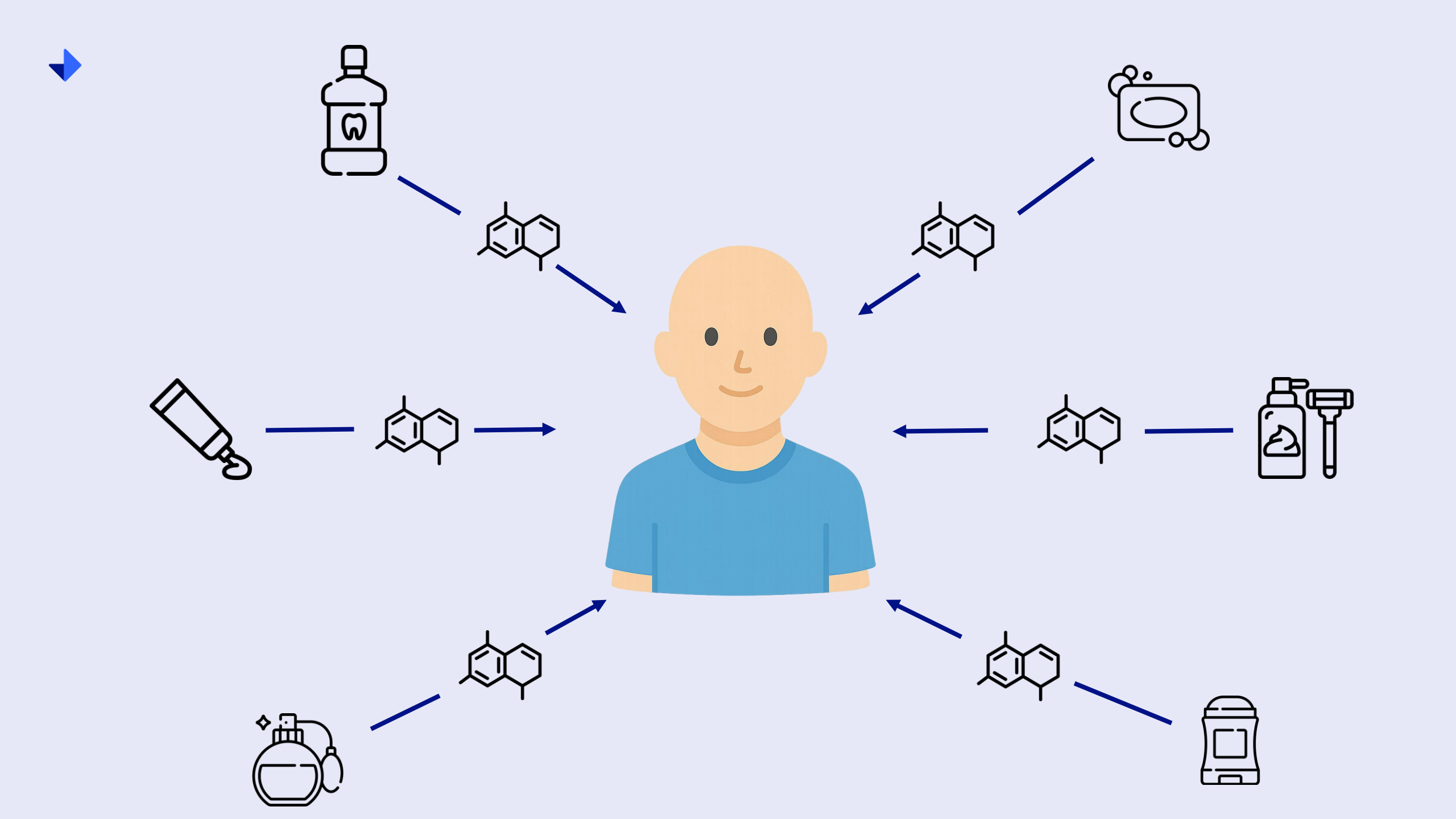


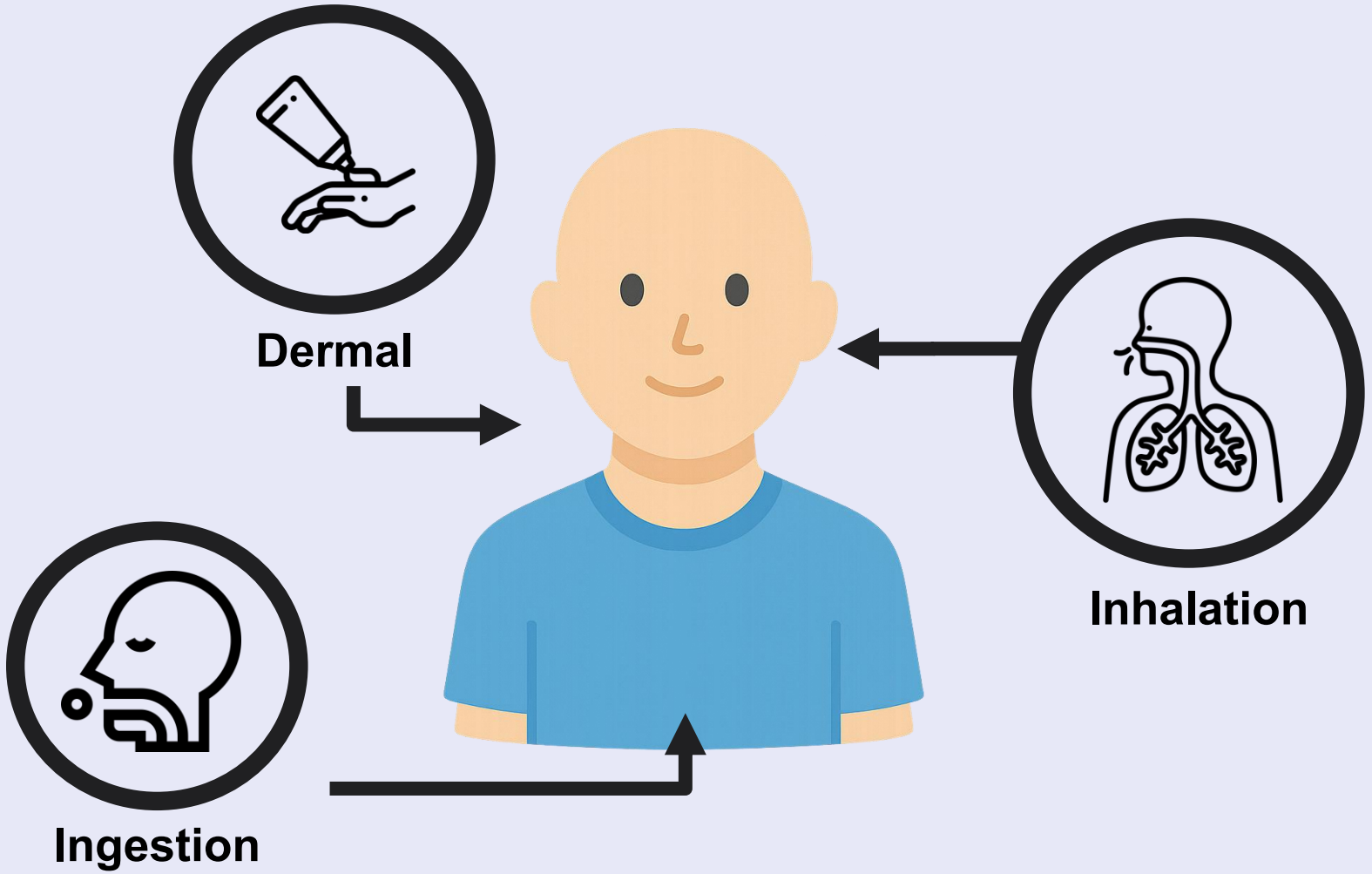












Aggregate exposure: *total amount of a substance a person comes into contact with from all relevant **sources** and through all **routes** over a certain period of time*

What is the Creme RIFM exposure model?

A powerful tool to estimate aggregate exposure from ingredients present in consumer products

- Sources: Cosmetics, personal care products, air care and household products.
- Routes: Dermal, Inhalation, Ingestion and Systemic.
- United States, Europe and Singapore populations.
- Probabilistic model based on real world data.

RIFM®
RESEARCH INSTITUTE FOR FRAGRANCE MATERIALS

Agenda

1) Introduction
2) Calculating Exposure
3) Why use a model
4) Data Sources
5) Model Calculations
6) Customisation and Flexibility
7) Upcoming Enhancements

2) Calculating Exposure

Creme RIFM

$$Exp = \frac{F \times A \times C \times R \times P}{}$$

Formula to calculate ingredient exposure from one product in a single day for a single subject

Frequency

$$Exp = F \times A \times C \times R \times P$$

Formula to calculate exposure for a single individual from one product in a day

Frequency

Amount

$$Exp = \frac{F \times A \times C \times R \times P}{}$$

Formula to calculate exposure for a single individual from one product in a day

Frequency

Amount

Concentration

$$Exp = \frac{F \times A \times C \times R \times P}{}$$

Formula to calculate exposure for a single individual from one product in a day

Frequency

Amount

Concentration

Retention Factor

$$Exp = \frac{F \times A \times C \times R \times P}{}$$

Formula to calculate exposure for a single individual from one product in a day

Frequency | Amount | Concentration | Retention Factor | Penetration Factor

$$Exp = F \times A \times C \times R \times P$$

Formula to calculate exposure for a single individual from one product in a day

Frequency | Amount | Concentration | Retention Factor | Penetration Factor

$$Exp = \frac{F \times A \times C \times R \times P}{Bw \text{ or } Sa}$$

Bw: Bodyweight

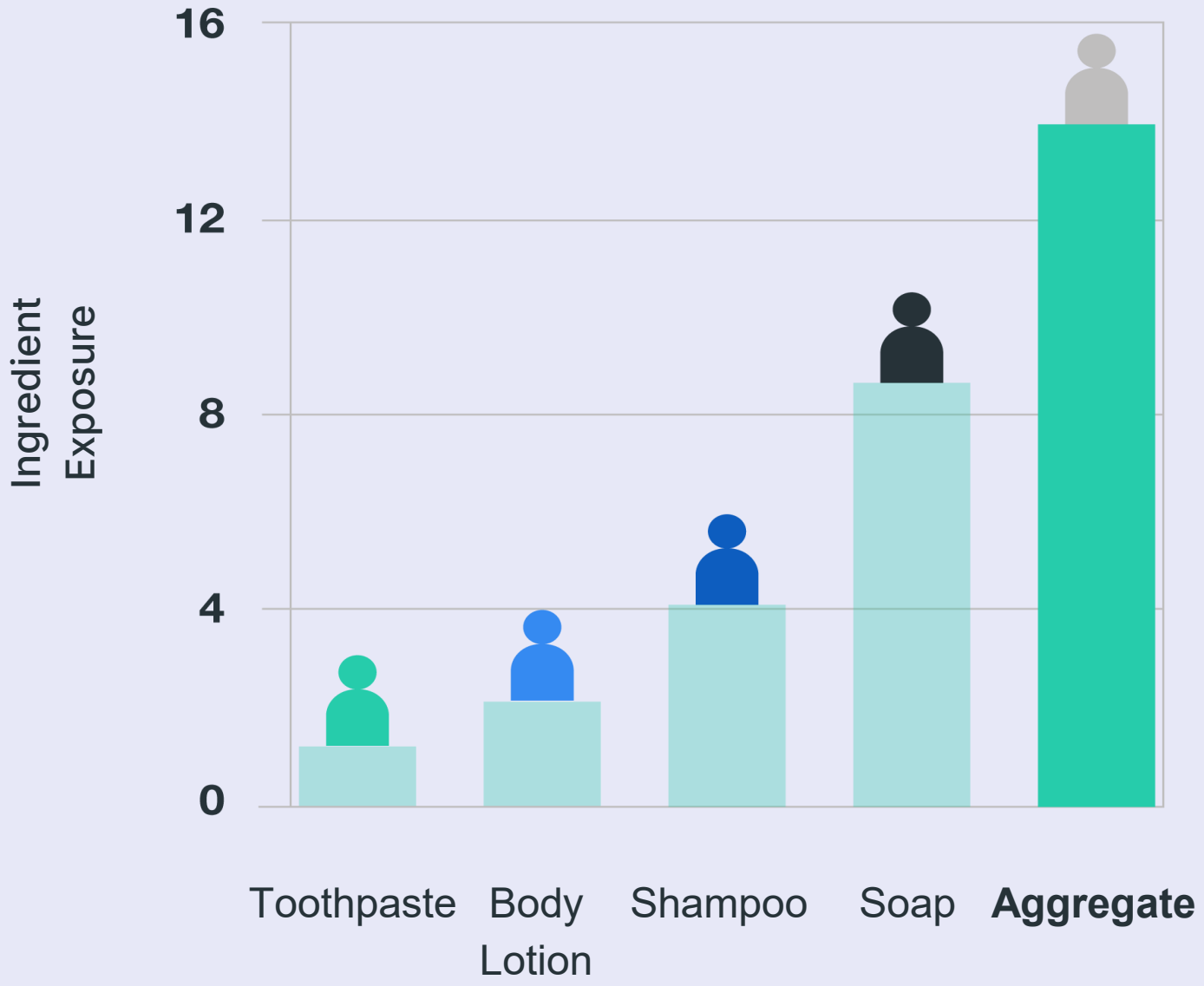
Sa: Surface area

Formula to calculate exposure for a single individual from one product in a day

Tier 1:
Deterministic model

Creme RIFM

Deterministic Method



Very conservative Overestimation

Assumes everyone uses ALL product at the highest levels

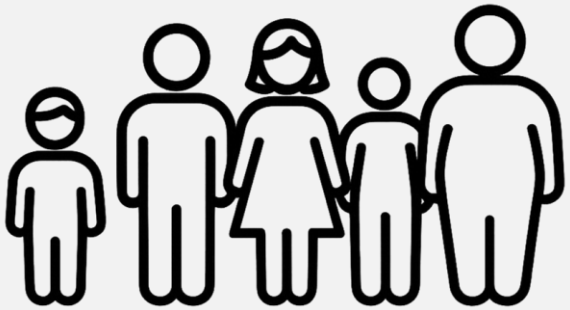
3) Why use a model?

Why Use a Model?

Variability in the population

Age, gender, weight, height, surface areas, location

Why Use a Model?



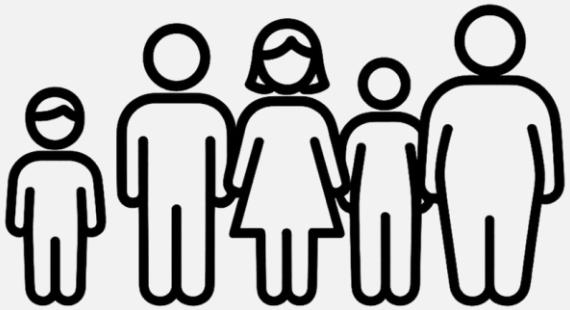
Variability in the population

Age, gender, weight, height, surface areas, location

Variability in their consumption habits

Use/non-use of product types,
Amount of product applied
Application sites

Why Use a Model?



Variability in the population

Age, gender, weight, height, surface areas, location

Variability in their consumption habits

Use/non-use of product types,
Amount of product applied
Application sites

Variability in the market

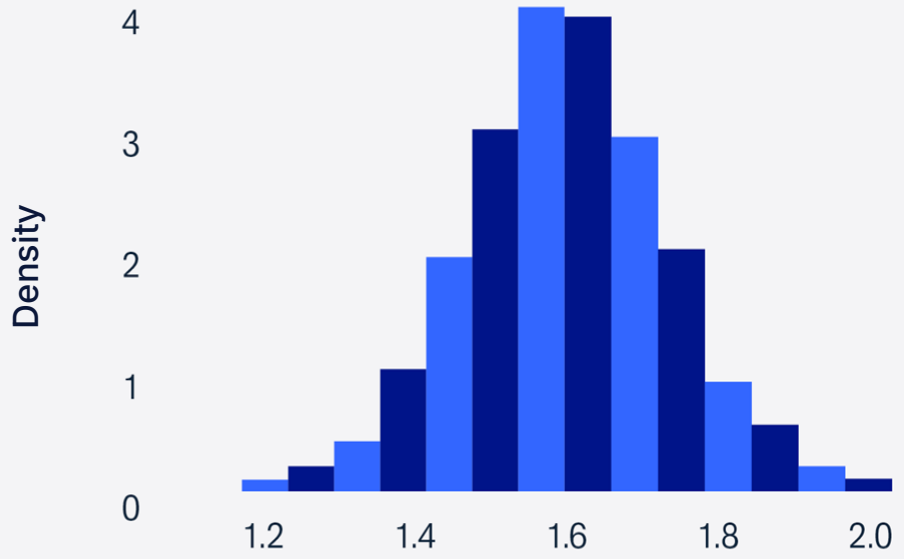
Brands purchased
Concentration of ingredient (fragrance)

The Solution

Aggregate exposure based on actual product consumption surveys and distributions of **real data** is more realistic.

E.g. Amount of Toothpaste consumed

2g VS



4) Data Sources

Kantar World Panel

$$Exp = \frac{F \times A \times C \times R \times P}{Bw \ or \ Sa}$$

Sources of data.

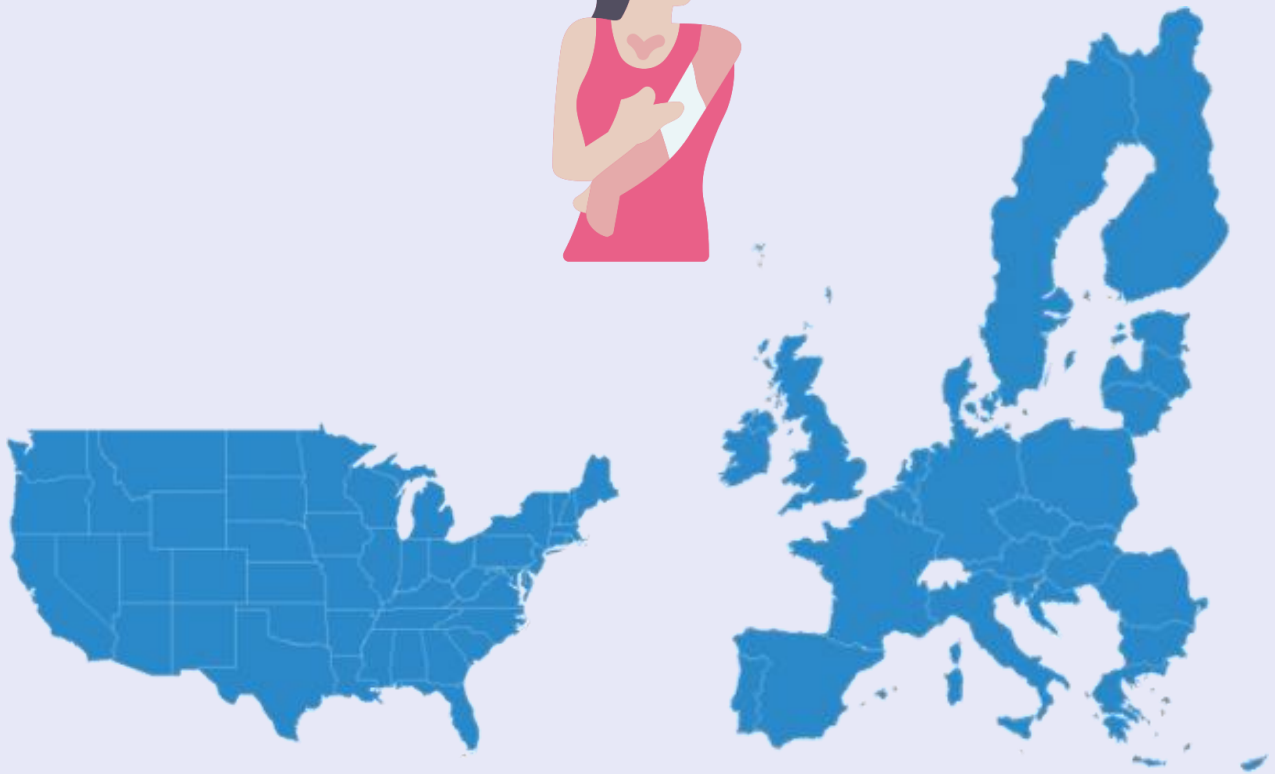
Kantar World Panel

Online survey – real usage

Users record the **product** used and **application site** in the body

7 day diary

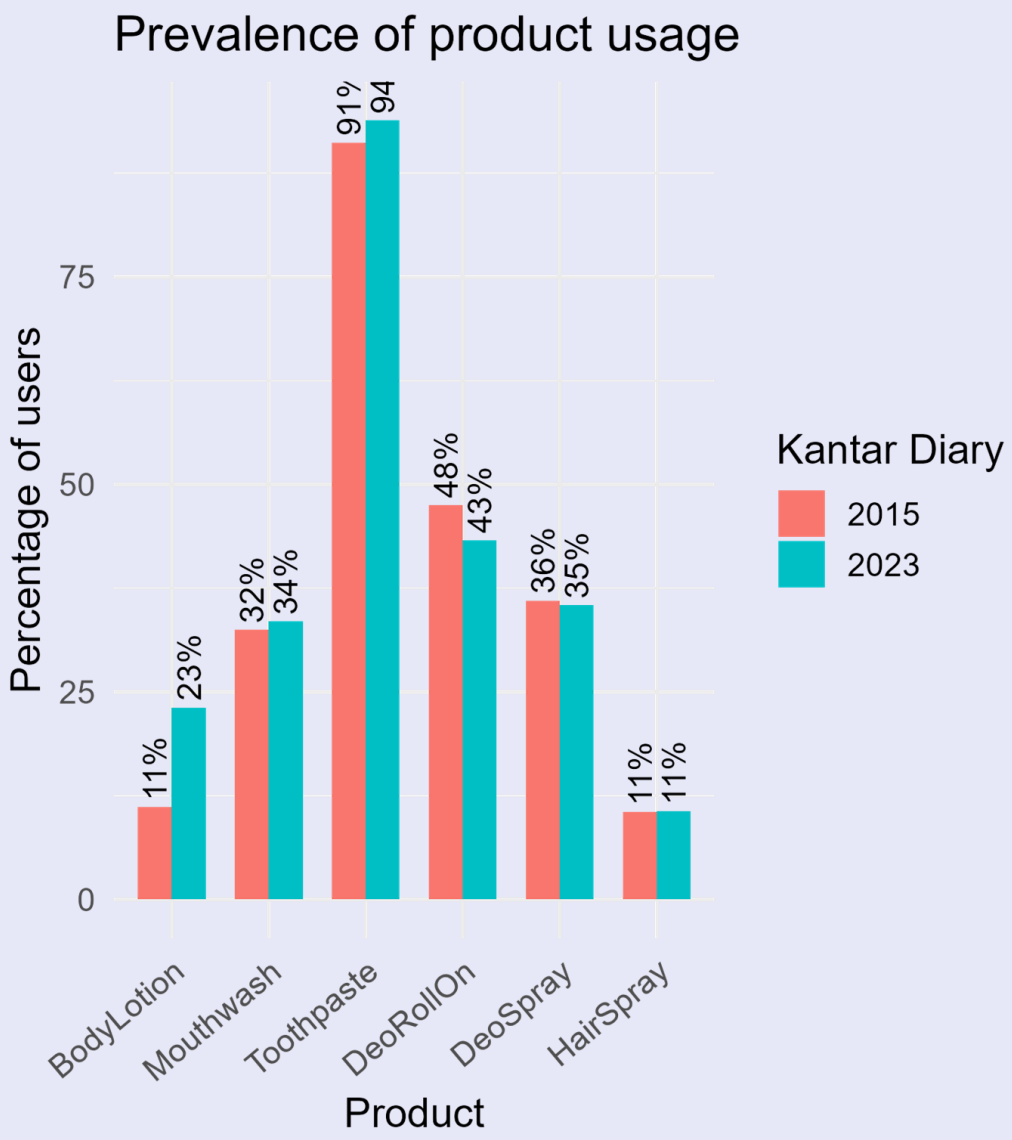
Europe + US populations

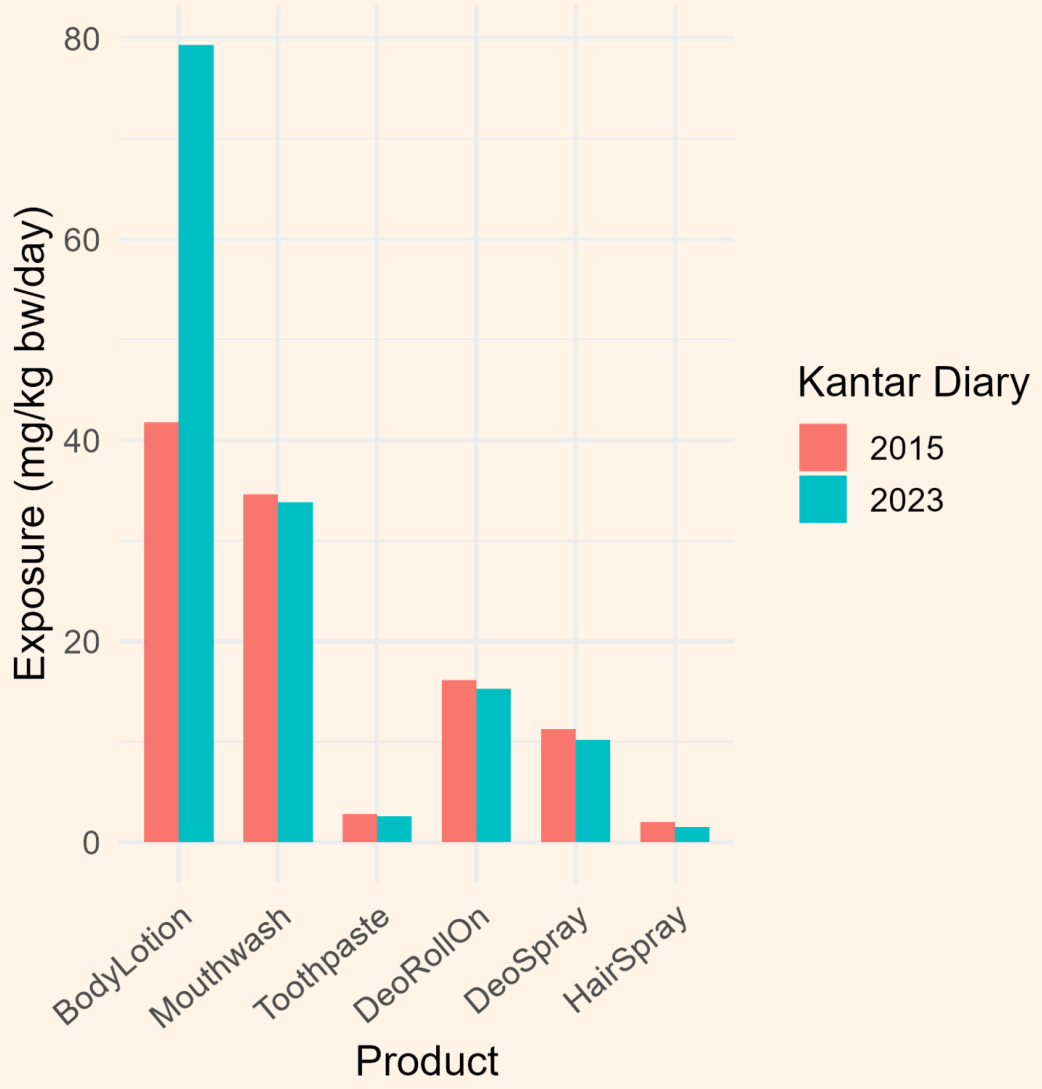


+37,000 Subjects

Kantar World Panel

- Kantar diaries have been updated with 2023/2024 data
- Include 4 new products.
- Addressed questions raised by SCCS with BodyLotion prevalence.

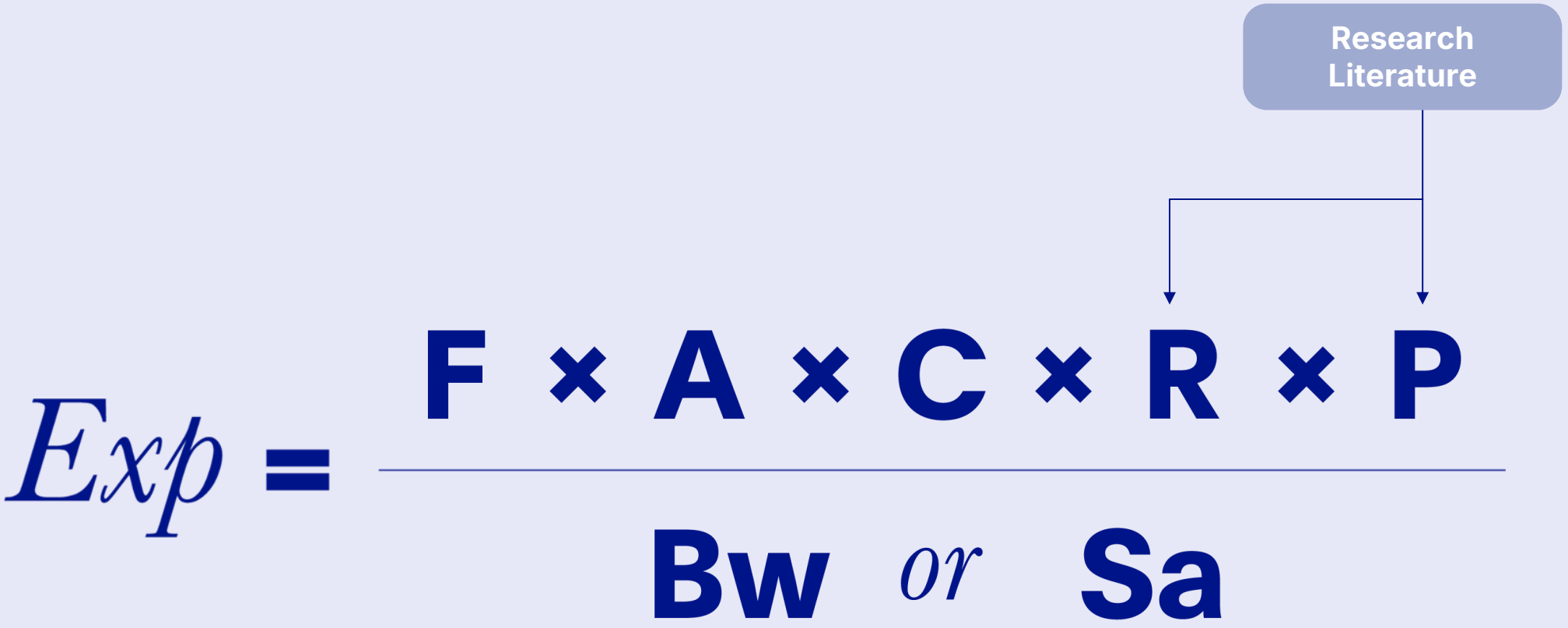

Prevalence of product usage
Percentage of users
0
25
50
75
11%
23%
32%
34%
91%
94
48%
43%
36%
35%
11%
11%
BodyLotion
Mouthwash
Toothpaste
DeoRollOn
DeoSpray
HairSpray
Product
Kantar Diary
2015
2023


P95 Chronic, Relative, All population Exposure
Exposure (mg/kg bw/day)
0
20
40
60
80
BodyLotion
Mouthwash
Toothpaste
DeoRollOn
DeoSpray
HairSpray
Product
Kantar Diary
2015
2023

Research Literature

$$Exp = \frac{F \times A \times C \times R \times P}{Bw \ or \ Sa}$$

Sources of data.

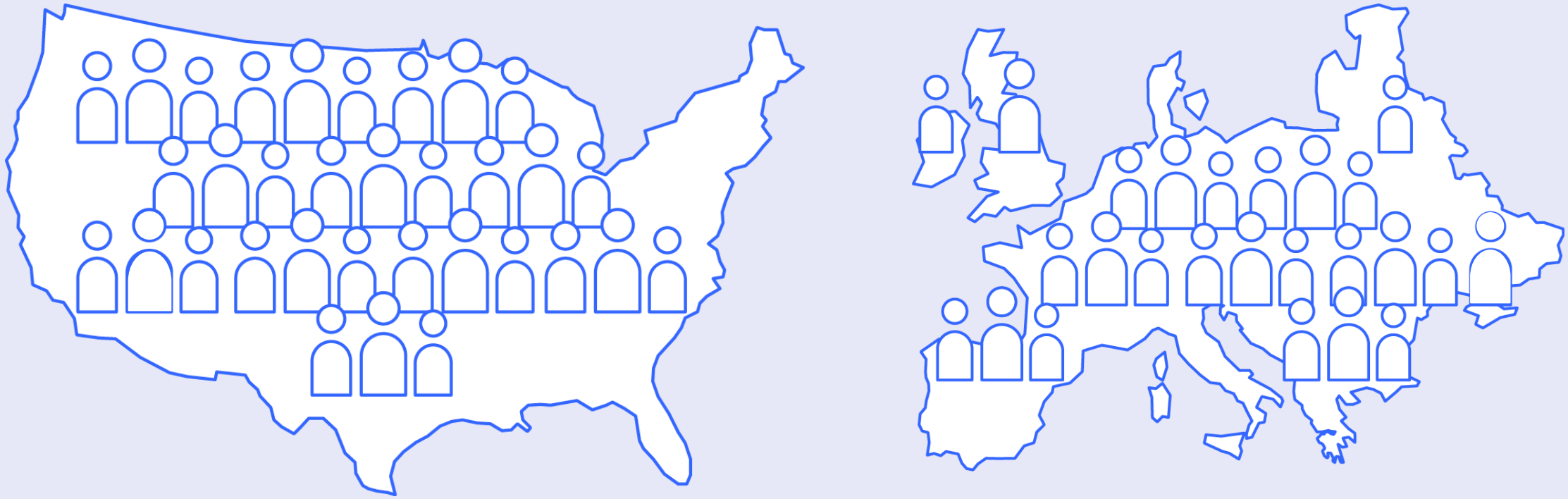


Sources of data.

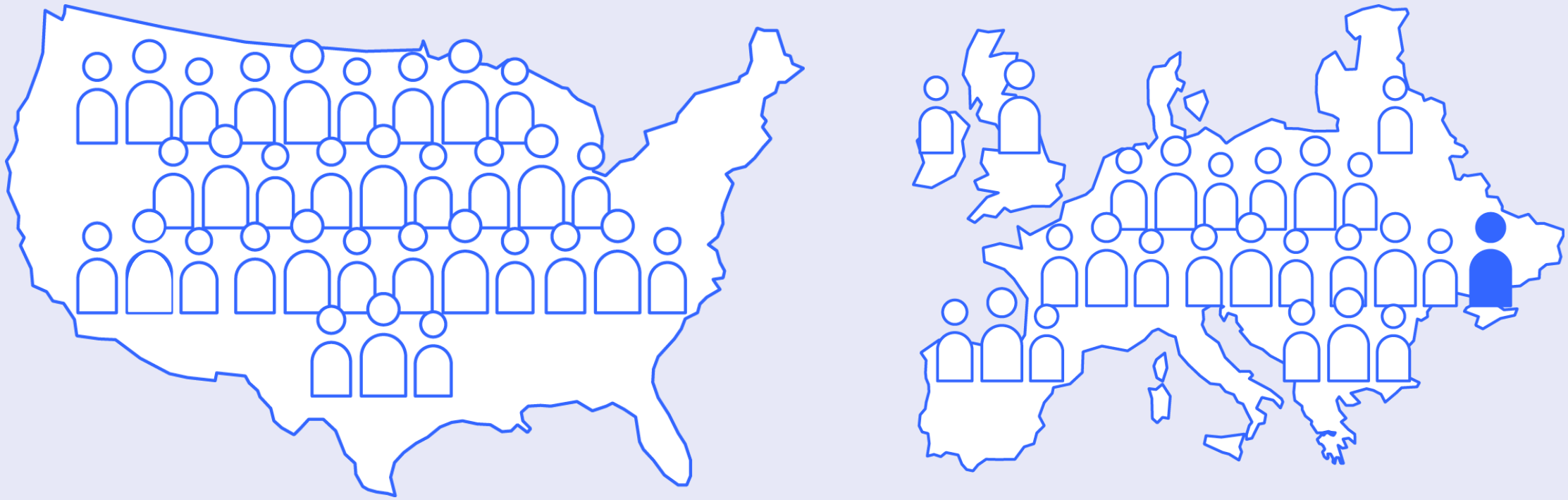
6) Model Calculations

Creme RIFM

Population Exposure Modelling



Population Exposure Modelling



Individual Exposure

Diary Day 1

1

Frequency	Amount	Substance Concentration
×2	10g	0.6%
×2	5g	0.02%
×1	15g	1.5%
×4	9g	0.007%

Individual Exposure

Diary Day 1

1

Frequency	Amount	Substance Concentration	
×2	10g	0.6%	=0.0276g
×2	5g	0.02%	=0.0001g
×1	15g	1.5%	=0.00225g
×4	9g	0.007%	=0.0299g

Individual Exposure

Diary Day 1

1

Frequency	Amount	Substance Concentration	
×2	10g	0.6%	=0.028g
×2	5g	0.02%	=0.0001g
×1	15g	1.5%	=0.0023g
×4	9g	0.007%	=0.029g

Total Exposure 510mg

Individual Exposure

1 + + + = 510µg

Individual Exposure

1	✓	+	✓	+	✓	+	✓	=	510µg
2			✓	+	✓	+	✓	=	480µg
3	✓	+			✓	+	✓	=	601µg
4	✓	+	✓			+	✓	=	590µg
5			✓	+	✓			=	380µg
6	✓	+	✓			+	✓	=	420µg
7	✓	+	✓	+	✓	+	✓	=	360µg

Individual Exposure

1	✓	+	✓	+	✓	+	✓	= 510µg
2			✓	+	✓	+	✓	= 480µg
3	✓	+			✓	+	✓	= 601µg
4	✓	+	✓			+	✓	= 590µg
5			✓	+	✓			= 380µg
6	✓	+	✓			+	✓	= 420µg
7	✓	+	✓	+	✓	+	✓	= 360µg

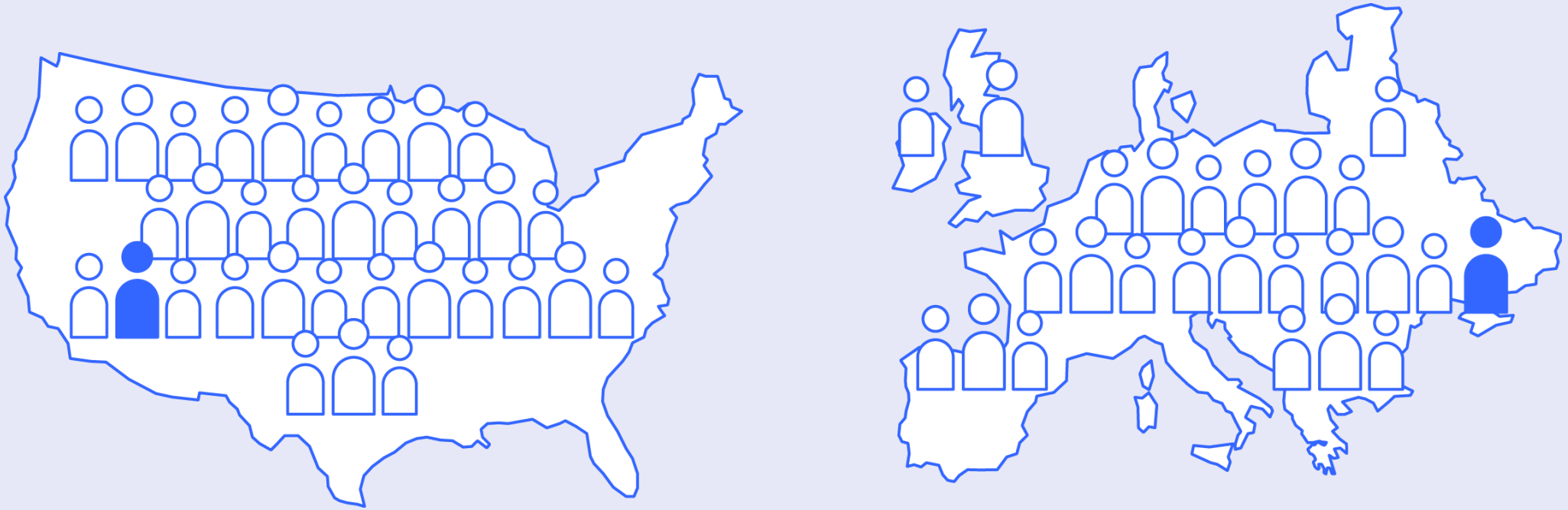
} Acute

Individual Exposure

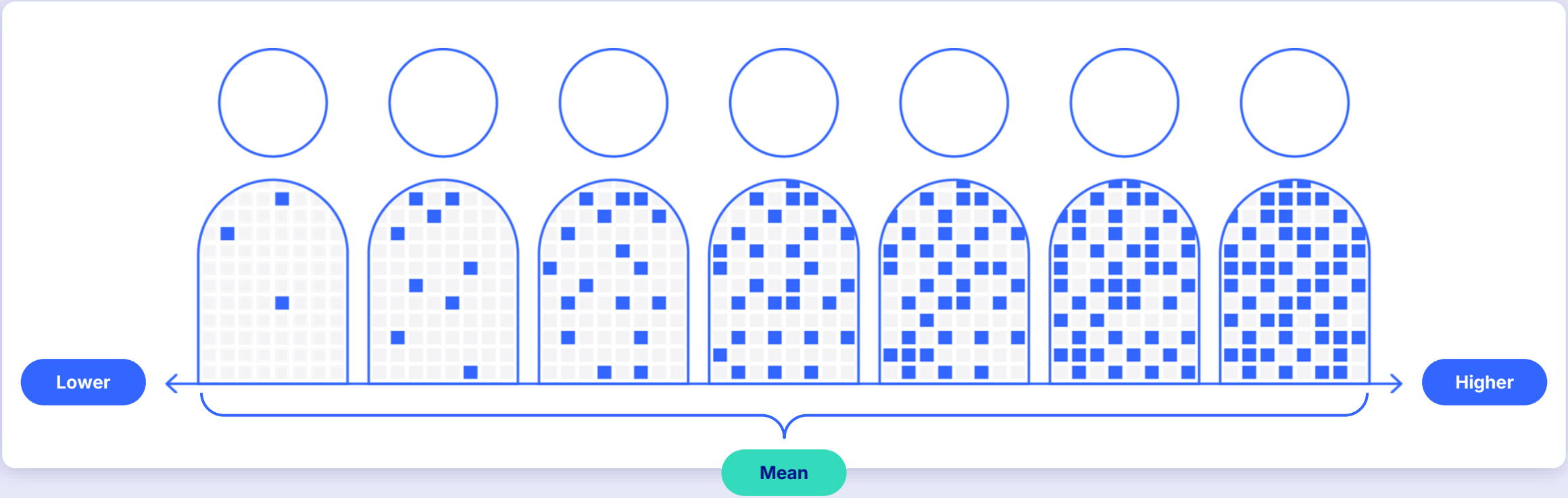
1	✓	+	✓	+	✓	+	✓	= 510µg
2			✓	+	✓	+	✓	= 480µg
3	✓	+			✓	+	✓	= 601µg
4	✓	+	✓			+	✓	= 590µg
5			✓	+	✓			= 380µg
6	✓	+	✓			+	✓	= 420µg
7	✓	+	✓	+	✓	+	✓	= 360µg

Daily Average

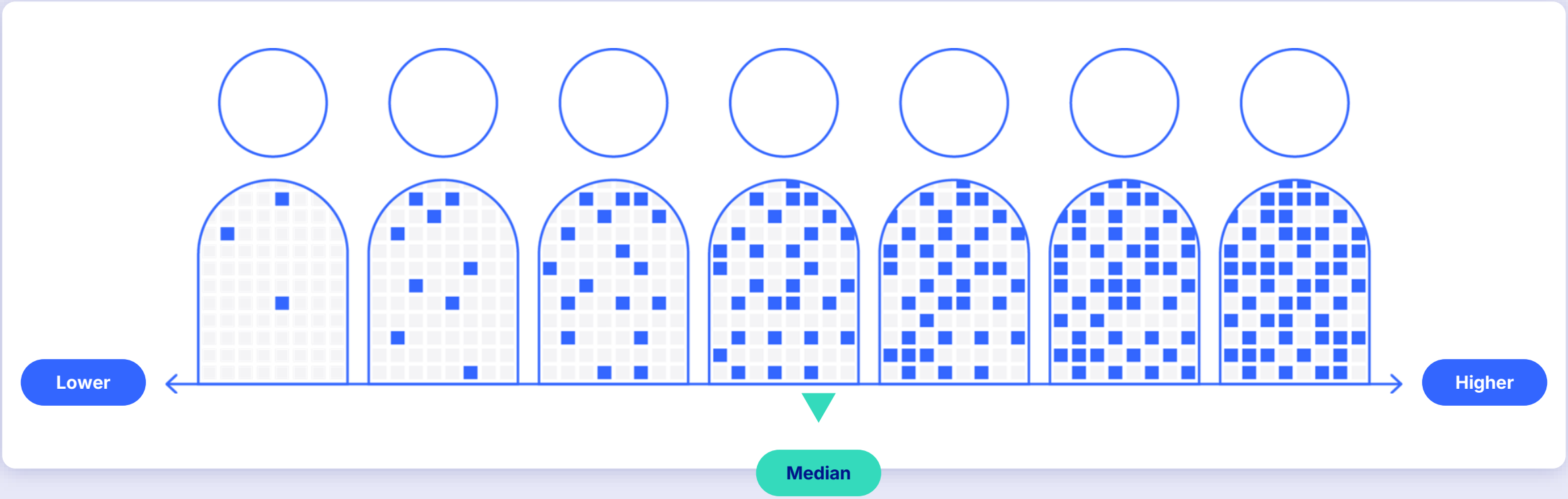
Population Exposure



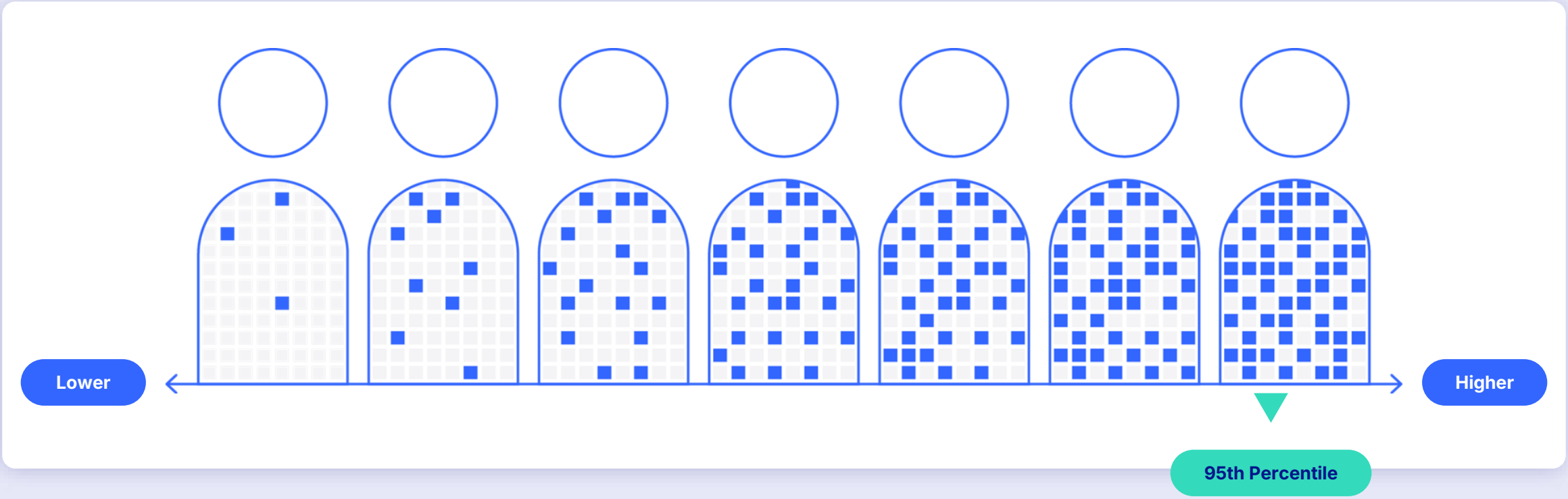
Population Exposure



Population Exposure



Population Exposure



Customisation and Flexibility

Creme Care
Workshop

Upcoming Enhancements

Creme Care
Workshop

Upcoming enhancement

- Kantar Diaries updated to latest Habits and practices.
- Includes 4 New products.
- Updated Bodyweights and heights

Updated Habits and Practices

Recent and Upcoming enhancements

- Kantar Diaries updated to latest Habits and practices.
- Includes 6 New products.
- Updated Bodyweights and heights

Updated Habits and Practices

- Inclusion of infants in our diaries
- US and EU
- Baby specific products and handling

Infants (0-3 years of age)

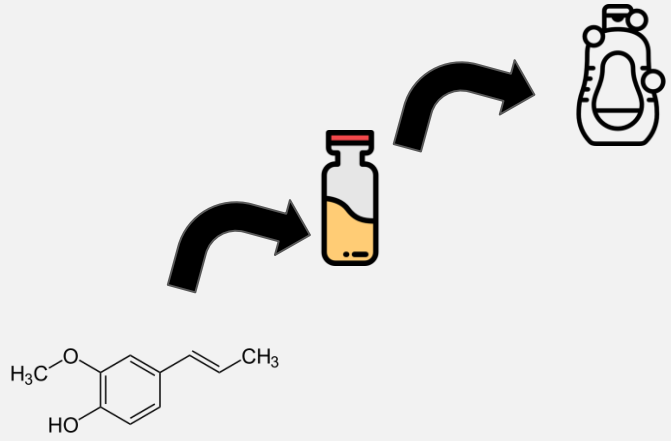
Upcoming enhancement

- Kantar Diaries updated to latest Habits and practices.
- Includes 6 New products.
- Updated Bodyweights and heights

Updated Habits and Practices

- Inclusion of infants in our diaries
- US and EU
- Baby specific products and handling

Infants (0-3 years of age)



- Updated Level 2 concentrations
- Occurrence for both Level 1 and Level 2 concentrations

Occurrence Data

RIFM
RESEARCH INSTITUTE FOR FRAGRANCE MATERIALS

The Creme RIFM Aggregate Exposure Model: A powerful tool in the assessment of fragrance safety

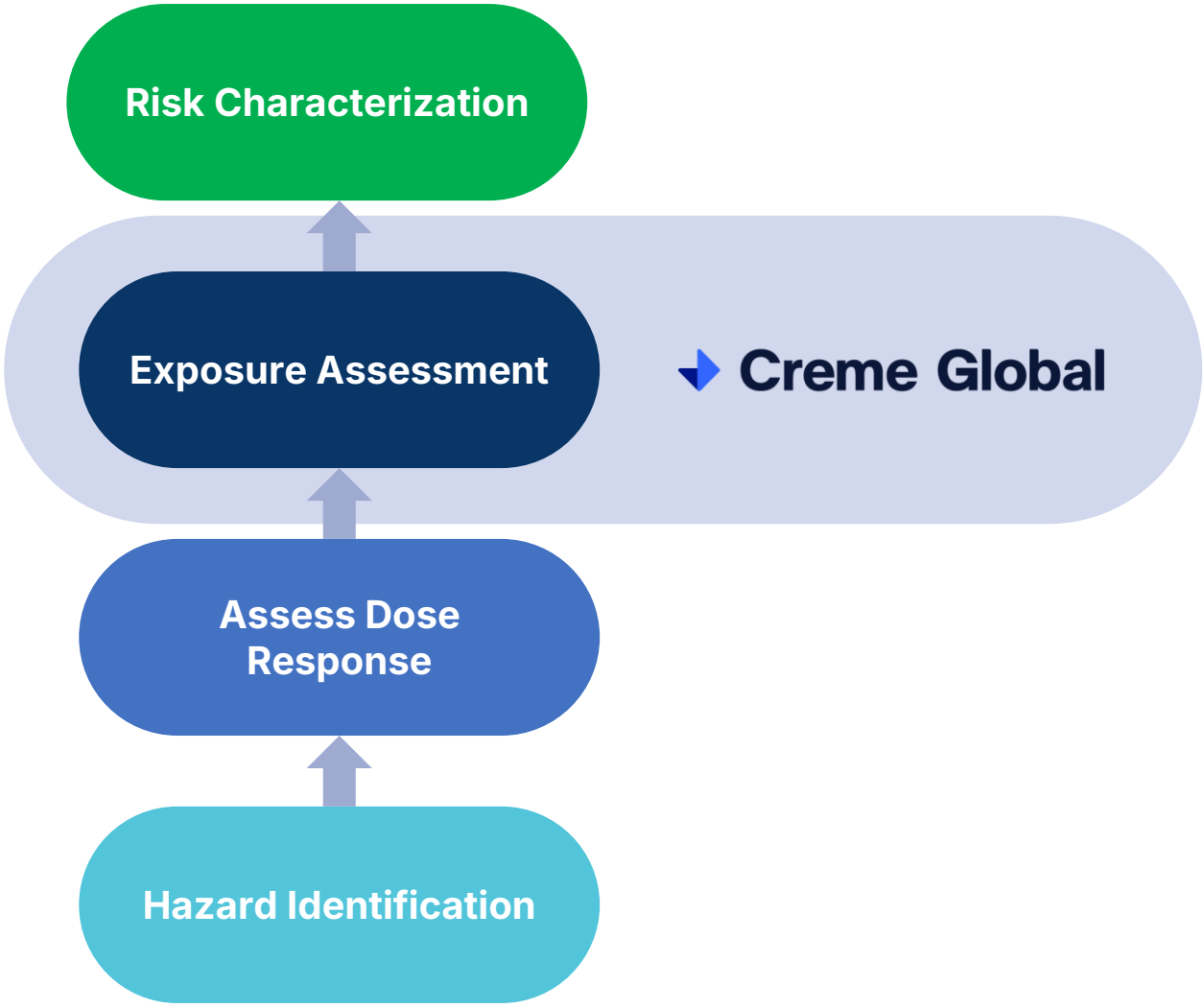
IDEA Annual Review
29th January 2026, Brussels, Belgium

Gretchen Ritacco, MS, Principal Scientist
gritacco@rifm.org

RIFM
RESEARCH INSTITUTE FOR FRAGRANCE MATERIALS

Exposure data are essential to assessing risk

The Creme RIFM Aggregate Exposure Model has a strategic role in RIFM Safety Assessments



The Creme RIFM Aggregate Exposure Model is a probabilistic model based on real-world data

United States, Europe, Singapore populations

Oral, dermal, inhalation

Cosmetics, personal care, air care, household cleaning products

Flexible, customizable, continually refined

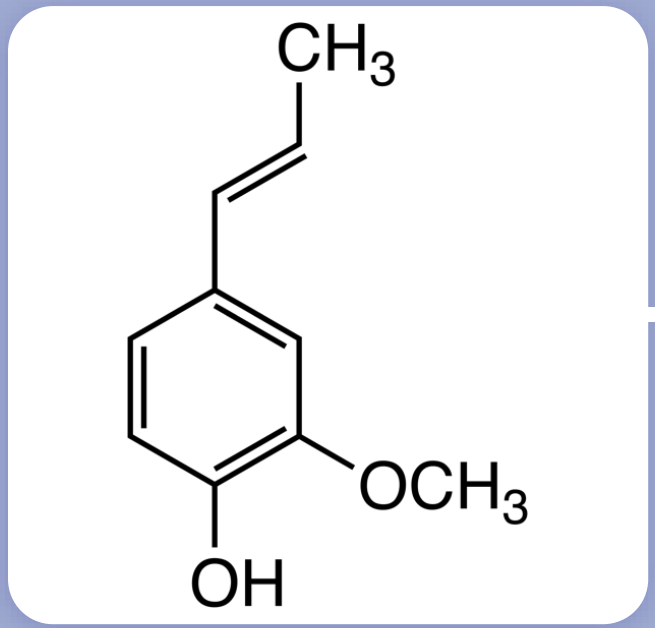
RIFM
RESEARCH INSTITUTE FOR FRAGRANCE MATERIALS

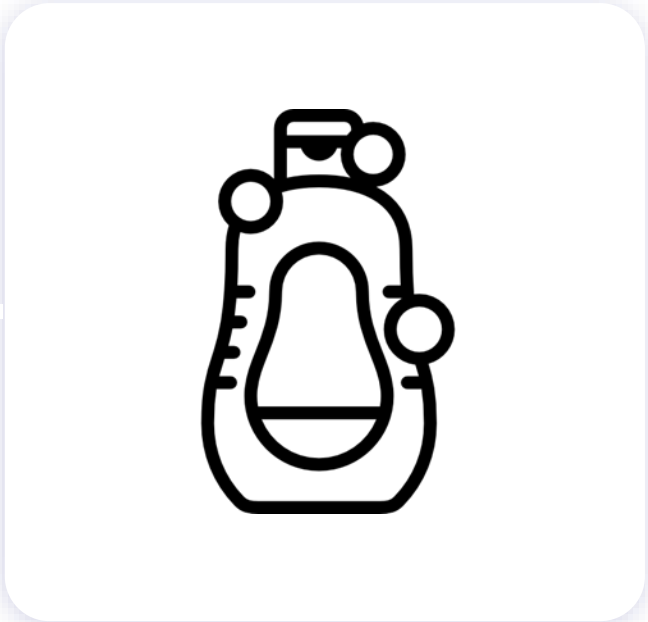
The Model contains 71 different consumer product types (personal care, cosmetics, air care, household cleaning)

Hair Removal	Hair Removal Cream, Foam, Gel
Shaving Products	Shaving Cream, Foam, Gel
Cleansing Wipes	Facial Cleansing Wipes, Make-up & Eye Remover/ Creams, Medicated & Non-Medicated Facial Scrubs & Washes, Toner/Astringent
Cleaning Products	Bath, Floor, Kitchen, Multi-purpose & Window Cleaners, Bleaches, Disinfectants
Dishwash	Washing-up Liquids, Hand Dishwash Detergent
Laundry Products	Hand Wash Detergent, Laundry Pre-treatment

Fragrance concentration data comes from two sources

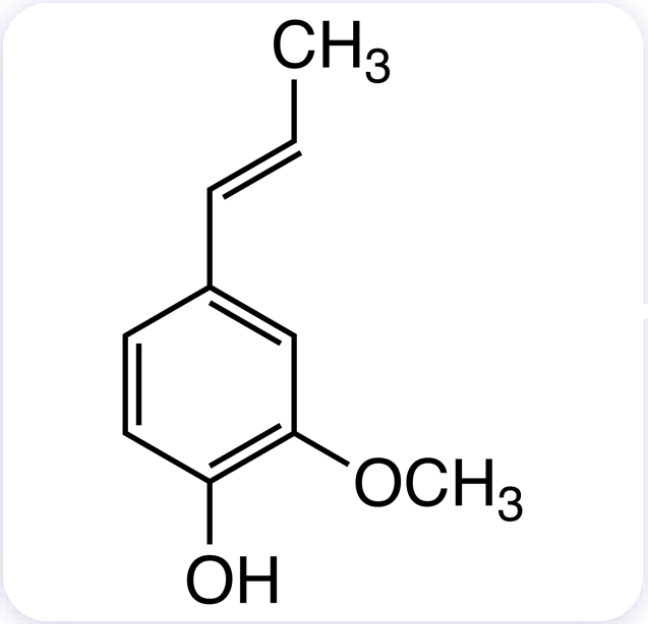
Fragrance Compounders



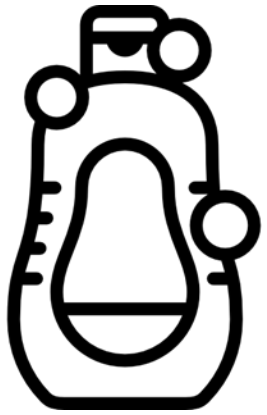


Data Updated every 5 years

Fragrance concentration data comes from two sources



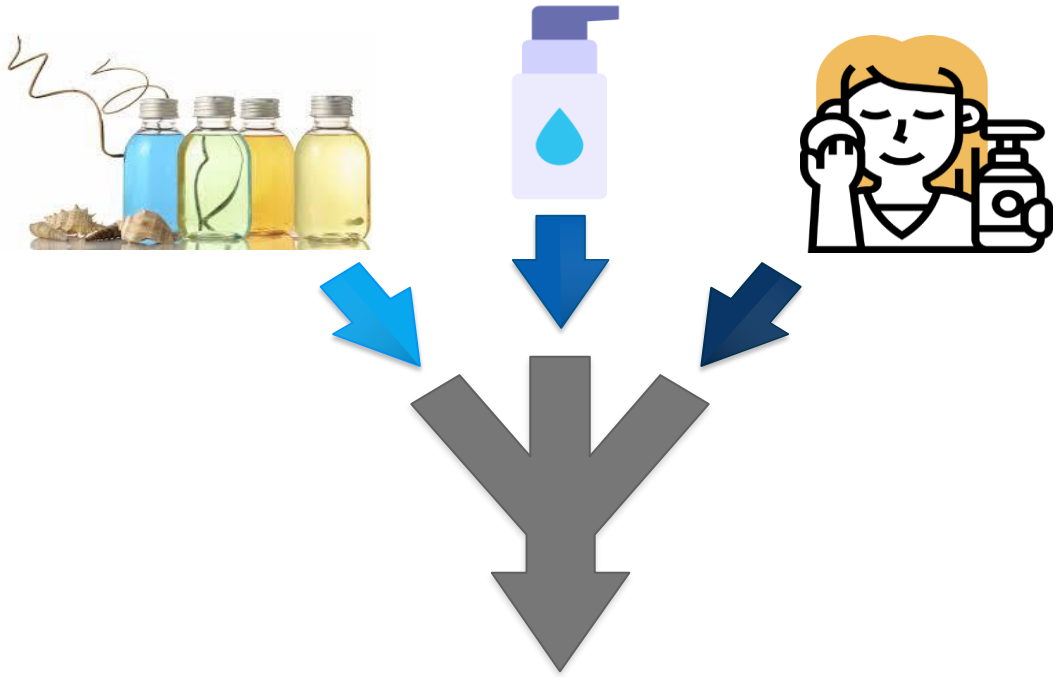
Consumer Product Companies



Data Updated every 5-6 years

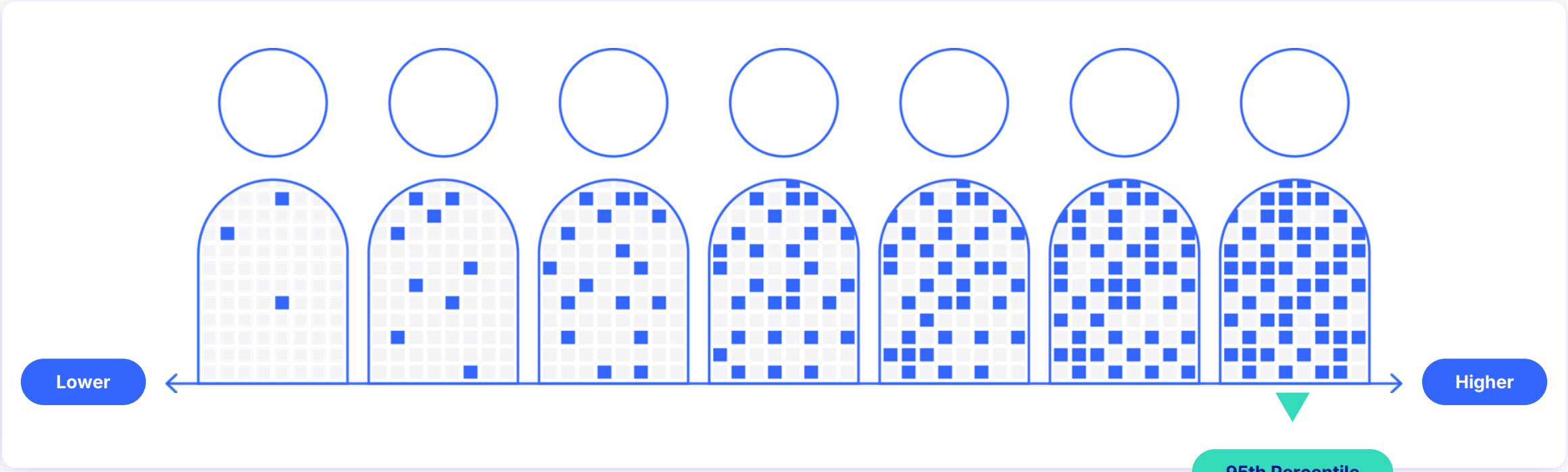
RIFM
RESEARCH INSTITUTE FOR FRAGRANCE MATERIALS

The model combines fragrance concentration with habits and practices data to calculate population exposure



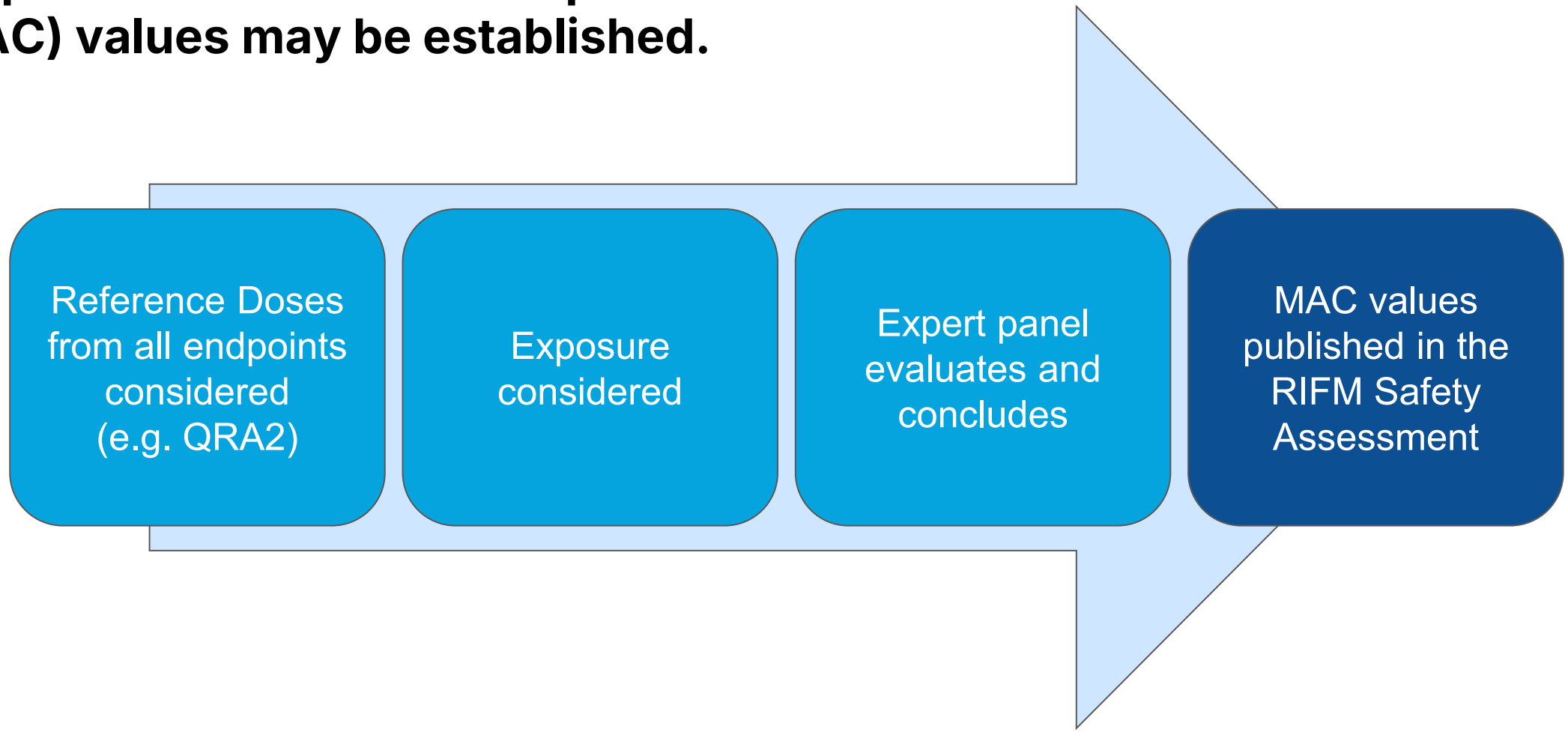
Aggregate Exposure

Population exposure is available at different percentile values

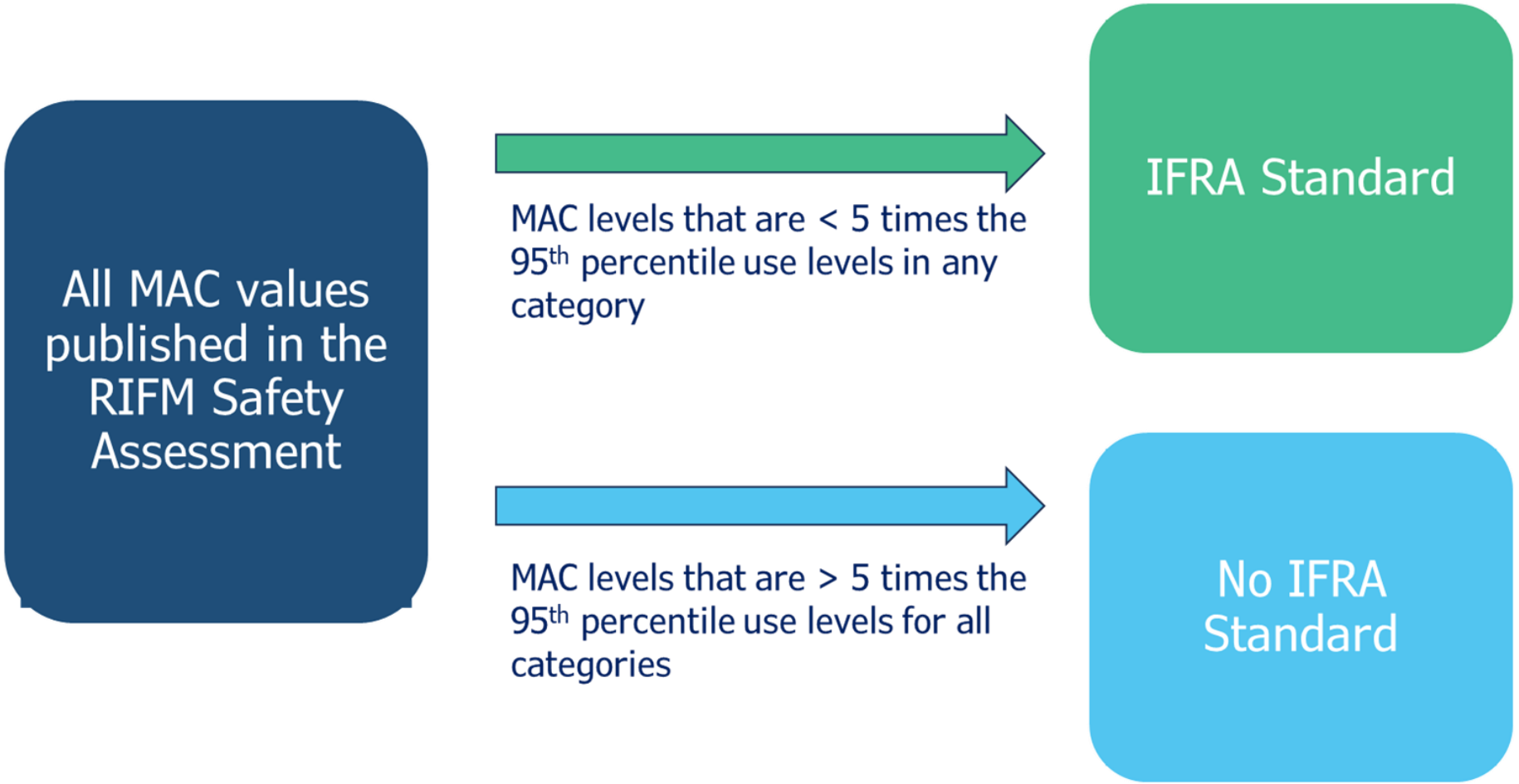


RIFM
RESEARCH INSTITUTE FOR FRAGRANCE MATERIALS

The RIFM Safety Assessment (SA) includes all endpoints & Maximum Acceptable Concentration (MAC) values may be established.



RIFM provides the data that supports potential IFRA Standards.

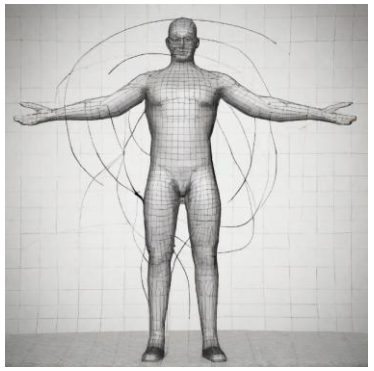


RIFM's inventory comprises >3000 fragrance ingredients with exposure data calculated through the Creme RIFM aggregate exposure model

RIFM's database of fragrance ingredients

Toxicological data

- 2/3 Discrete chemicals
- 1/3 Natural complex substances (NCS)



Creme RIFM Aggregate Exposure Model

Realistic exposure calculation

- Fragrance concentration data
- Habits and practices data

RIFM
RESEARCH INSTITUTE FOR FRAGRANCE MATERIALS

Two assessments were conducted

Comparison of exposure to benchmarks for low exposure

Exposure analysis by product category and route

RIFM
RESEARCH INSTITUTE FOR FRAGRANCE MATERIALS

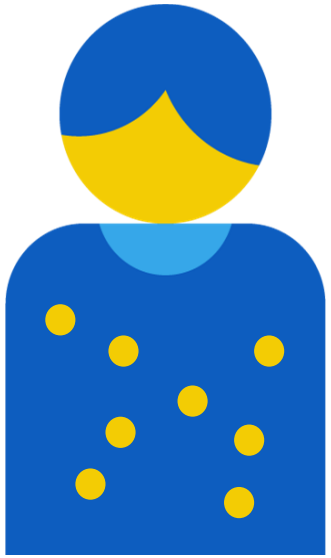
Product category analysis was conducted based on routes of exposure

- Dermal
- Oral
- Inhalation

RIFM
RESEARCH INSTITUTE FOR FRAGRANCE MATERIALS

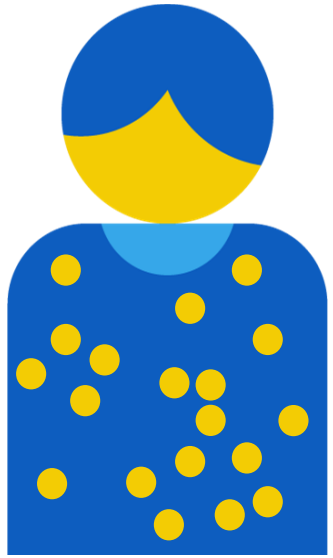
Exposure to fragrance ingredients is highest in cosmetic and personal care products

Average Consumer



≤ 10 µg/kg/day ≤ 10 ppb

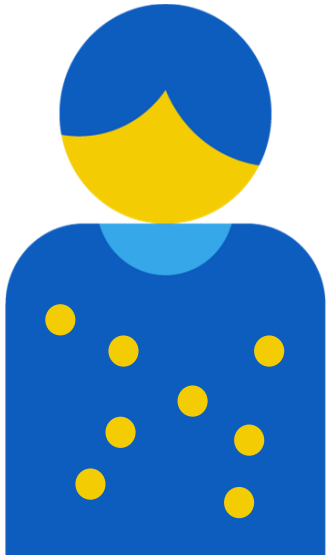
Loyal Consumer



≤ 50 µg/kg/day ≤ 50 ppb

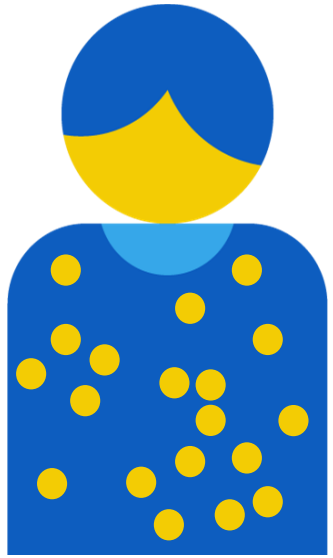
Followed by Oral care exposure

Average Consumer



≤ 2.5 µg/kg/day ≤ 2.5 ppb

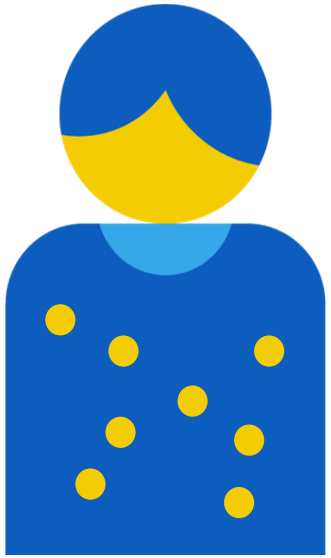
Loyal Consumer



≤ 15 µg/kg/day ≤ 15 ppb

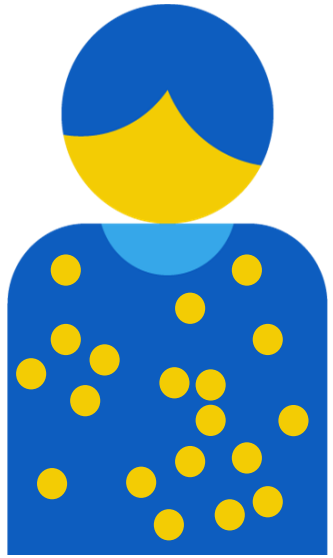
And Air care exposure

Average Consumer



≤ 1 µg/kg/day ≤ 1 ppb

Loyal Consumer

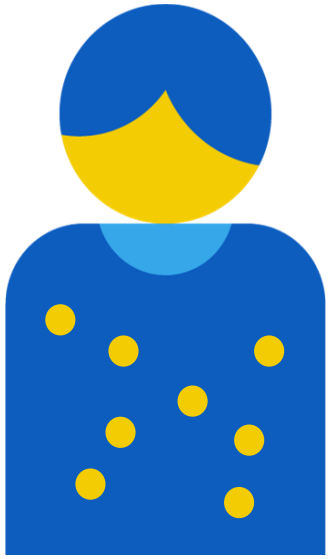


≤ 5 µg/kg/day ≤ 5 ppb

RIFM
RESEARCH INSTITUTE FOR FRAGRANCE MATERIALS

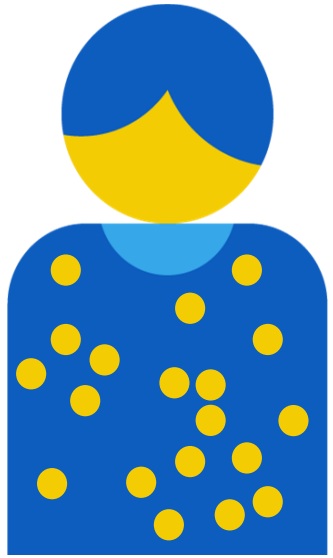
Exposure to fragrance ingredients is lowest in household care products

Average Consumer



≤ 0.05 µg/kg/day ≤ 0.05 ppb

Loyal Consumer



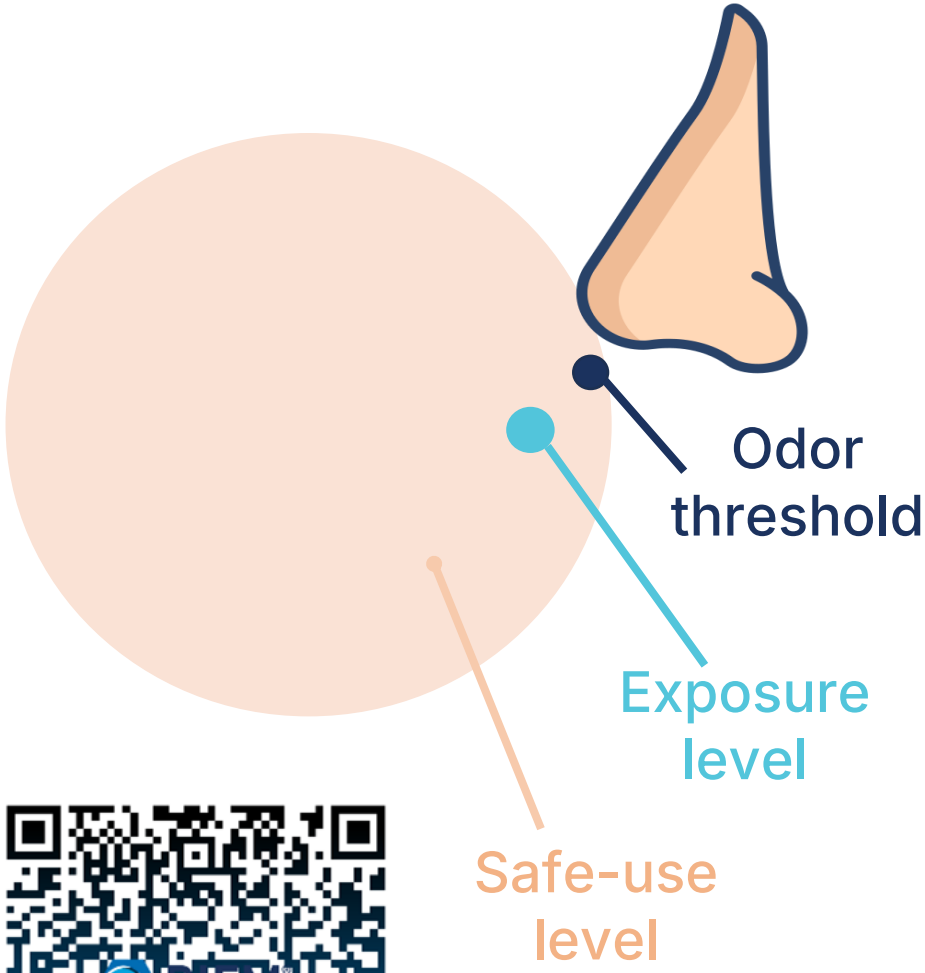
≤ 0.2 µg/kg/day ≤ 0.2 ppb

Personal care products are mostly accounted for by the dermal route, oral care – ingestion, and air care – inhalation

RIFM
RESEARCH INSTITUTE FOR FRAGRANCE MATERIALS

Detailed Aggregate Exposure Analysis Shows that Exposure to Fragrance Ingredients in Consumer Products Is Extremely Low

Many orders of magnitude below thresholds of concern



Published in **Regulatory Toxicology and Pharmacology**, Volume 148, March 2024

Scan the QR code to download the open-access peer-reviewed publication

Thank you

cesar.scrochi@cremeglobal.com

Creme Global

gritacco@rifm.org

RIFM®
RESEARCH INSTITUTE FOR
FRAGRANCE MATERIALS