Expert Models for Decision Makers ™
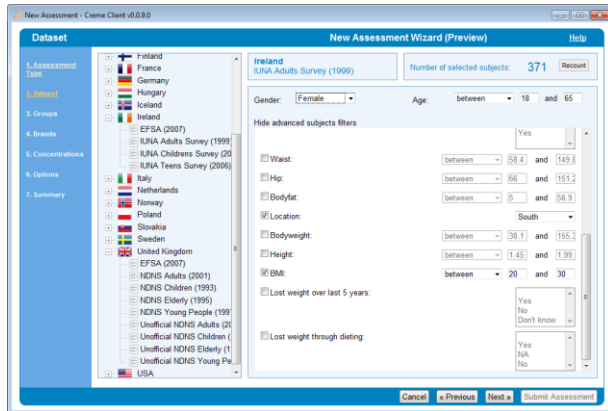
IDEA QRA Meeting

Cronan McNamara, CEO

Creme Global

March 2014

Creme Global - Services

High Performance
Cloud Software

Technical Services
& Projects

Data Collection
& Modelling

Expertise

Creme

Consumption Statistics	Expert Modelling	Food Safety	Flavourings & Fragrances
Nutrition Safety & Benefit	Additives	Packaging Migrants	Microbial Stability
Contaminants	Pesticides	Crop Science	Microbial Growth
Dose Response	Calories in vs. out	Cosmetics & Personal Care	High Performance Cloud Computing

Creme RIFM - Overview

- **RIFM – Creme Global**
  - Partnership: Project Commenced in 2010
  - 3 Work Packages over Two Phases

- **RIFM Creme Model**
  - Aggregate Exposure Assessment
  - Fragrances and Flavorings
  - Dermal, Inhalation, Oral and Ingestion
  - Safety Factor Calculation

Creme RIFM Approach

- Probabilistic NOT deterministic

Required Data
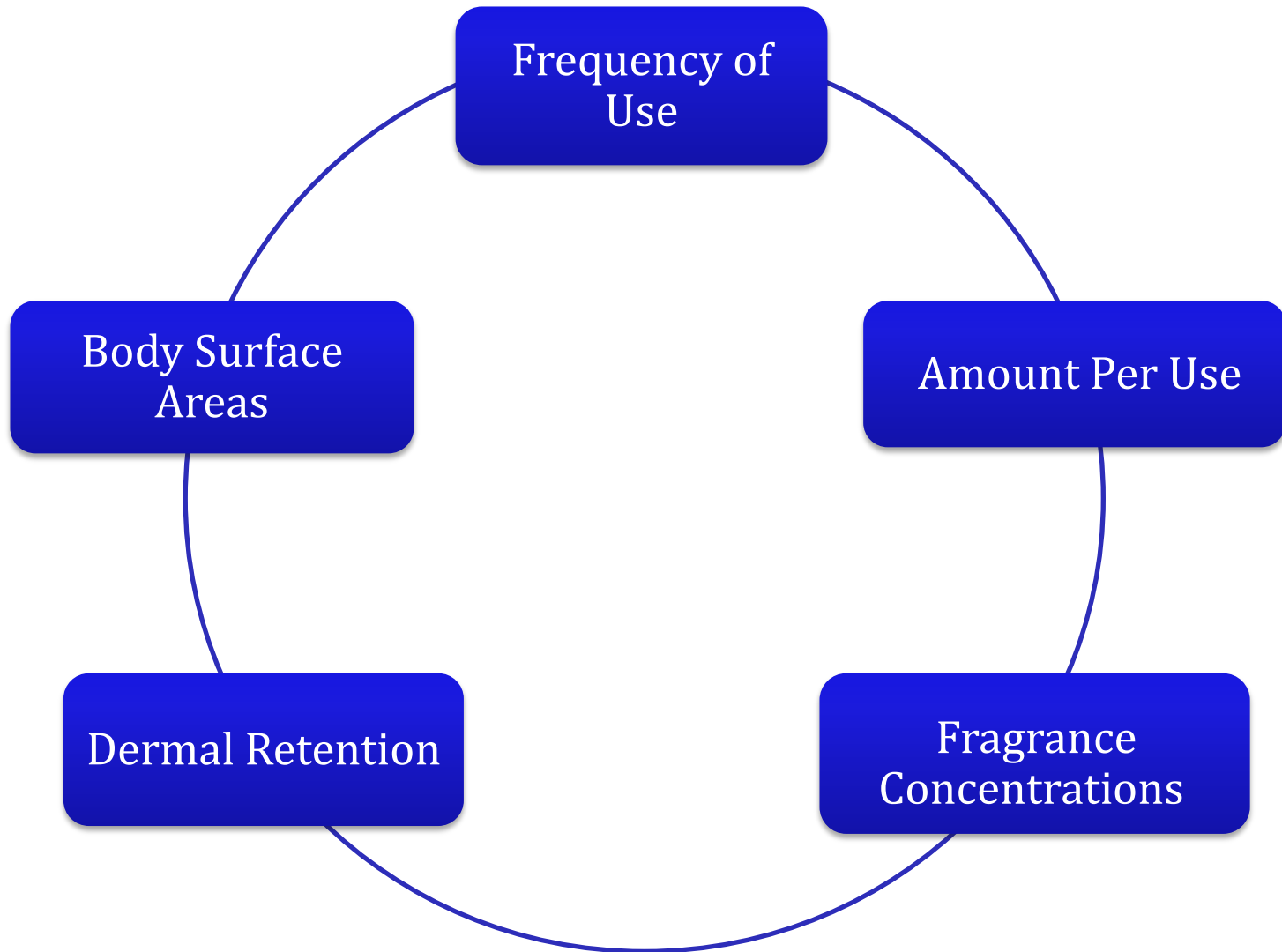
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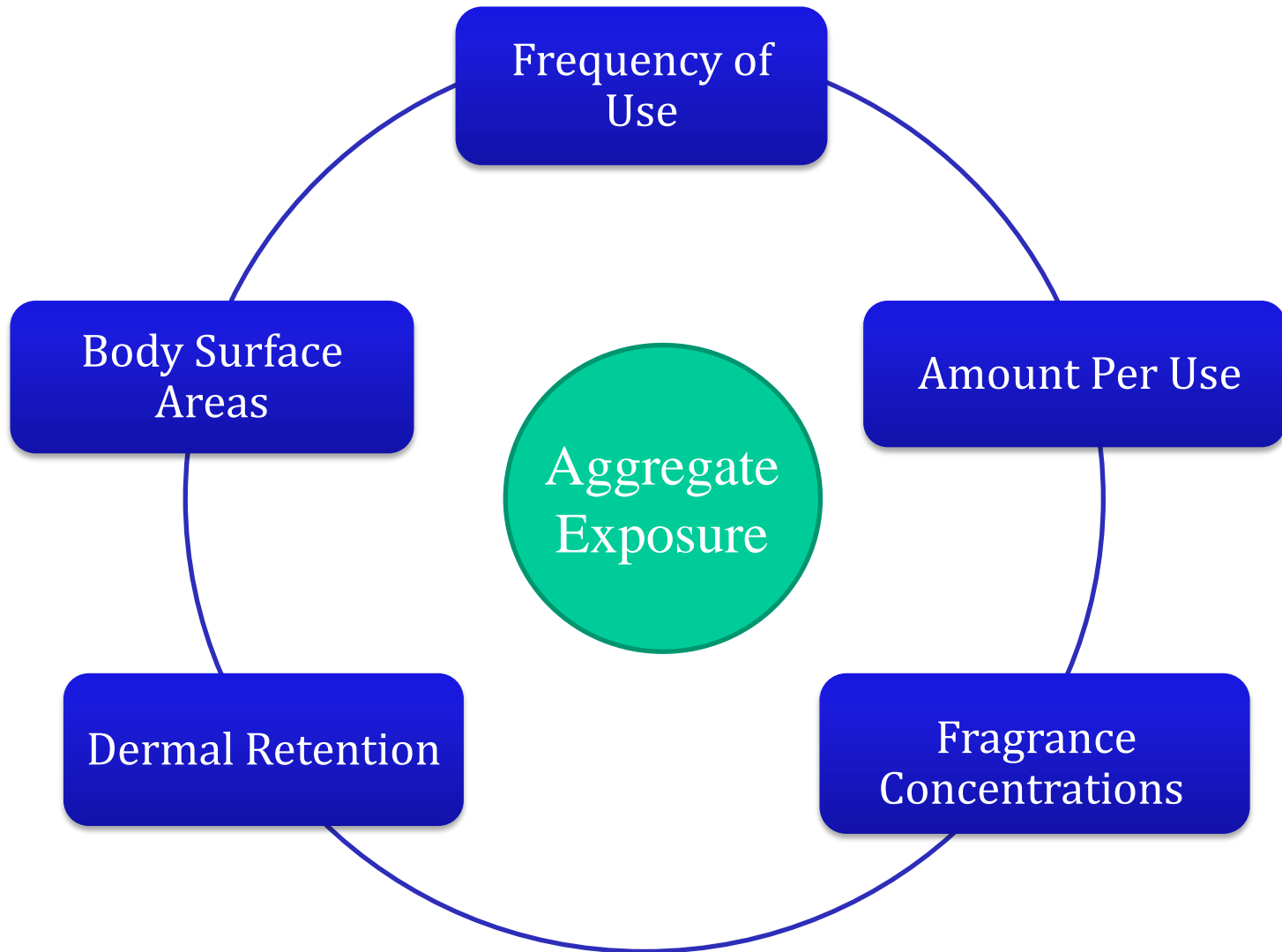
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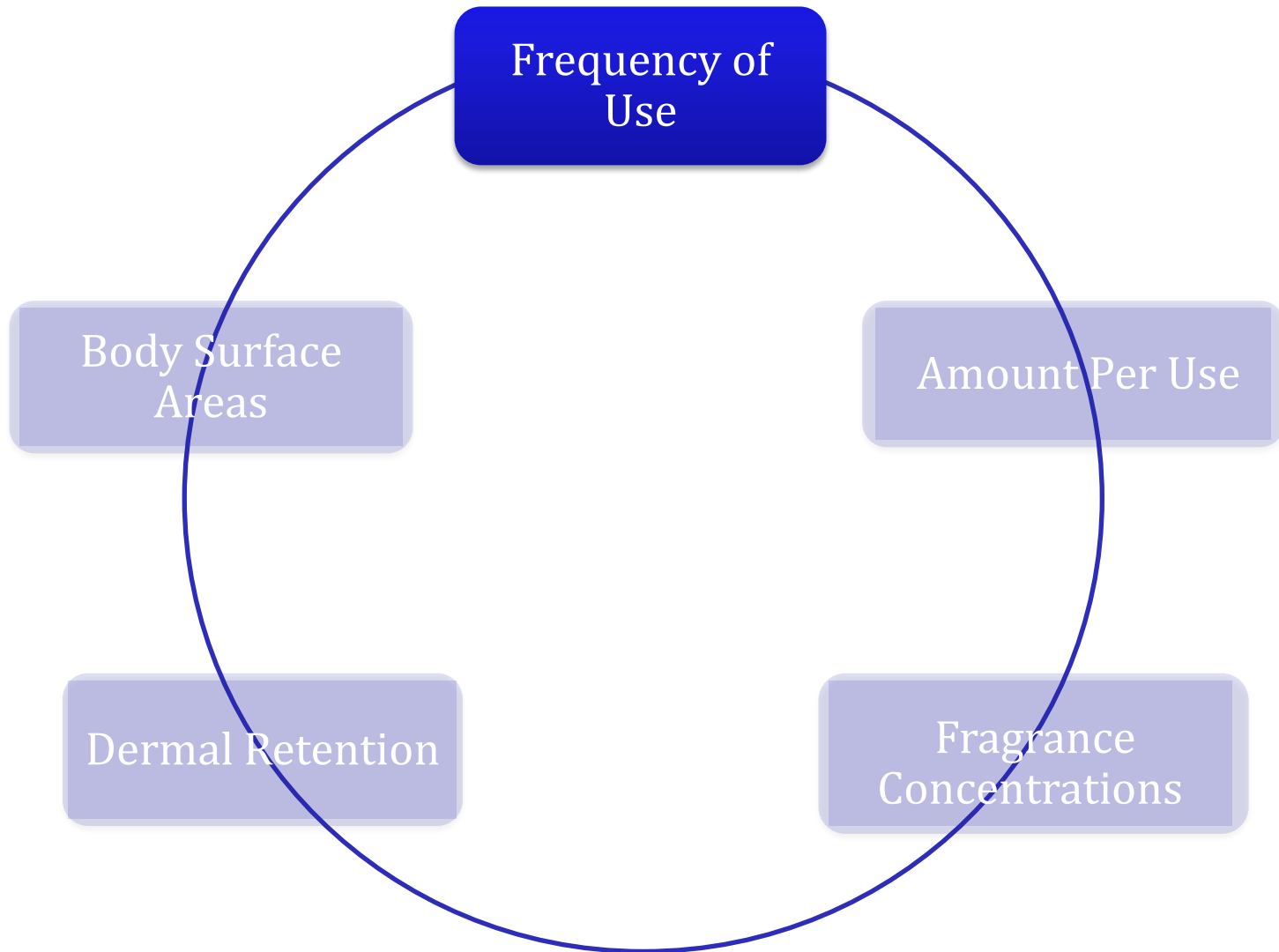
World's Largest Survey

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Online Consumption Diaries

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Online Consumption Diaries

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- Body Lotion
- Deodorant
- Oral Care

- Cosmetic Styling
- Hydro-alcoholics
- Shower Products

- Moisturizers
- Soaps
- Air Care

Personal Care Products

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Body Lotion	• Mass Market • Prestige
Deodorant	• Deodorant/Anti-Perspirant Spray • Deodorant/Anti-Perspirant NonSpray • Body Spray
Oral Care	• Toothpaste • Mouthwash
Cosmetic Styling	• Lipstick • Liquid/Makeup Foundation • Hair Styling Products (excl. Spray)
Hydroalcholics	• Eau de Toilette • Eau de Parfum • After Shave / Cologne (Splash-on)
Shower Products	• Showergel / Body Wash • Shampoo • Rinse-off Conditioner
Moisturizers	• Face Moisturizer • Hand Cream
Soaps	• Liquid Hand Soap • Bar Soap
Air Care	• Scented Candles • Plug-ins

Application Sites

Required Data

Frequency of Use

Body Surface Areas

Amount Per Use

Dermal Retention

Fragrance Concentrations

Creme
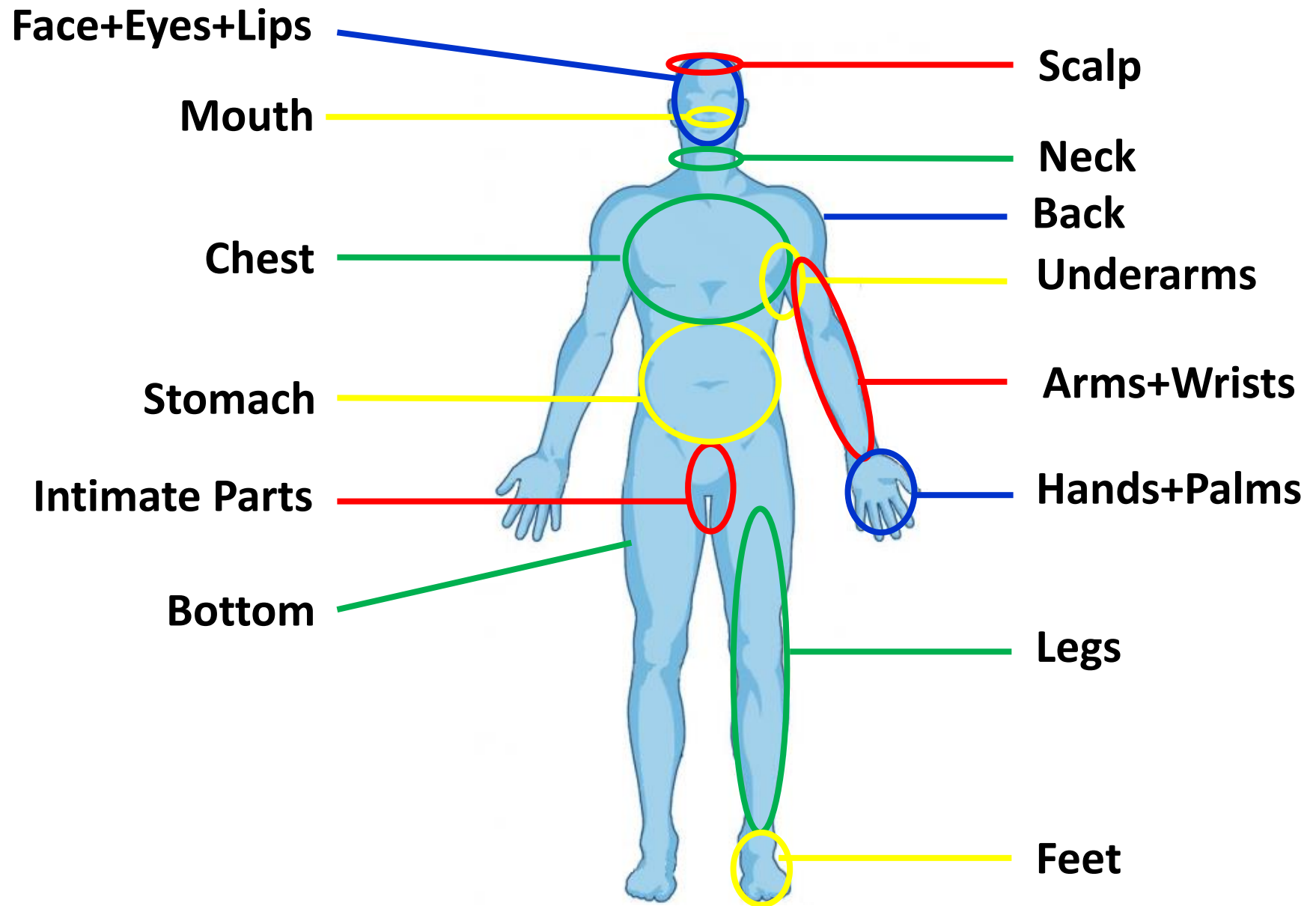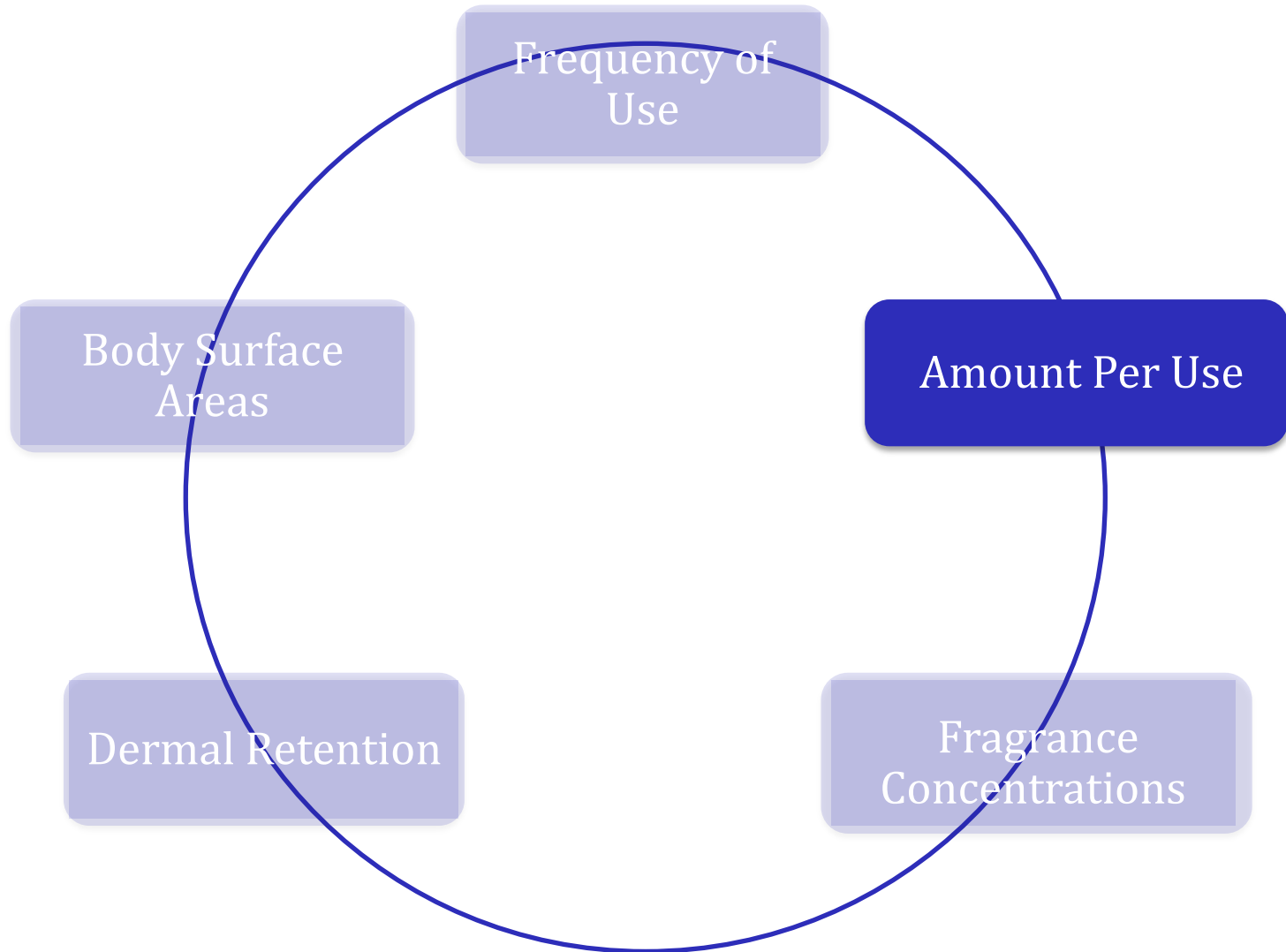
Amount per use

Amount per Use

- Fitted / Empirical Distributions for Average Amount per Use

- Distributions can be matched back to main Consumption Diary based on Demographic

Study	Relevant Products
COLIPA (2005)	Body Lotion
	Deodorant (Spray)
	Deodorant (Non-Spray)
	Lipstick
	Face Moisturiser
	Shampoo
	Toothpaste
COLIPA (2009)	Hair Styling
	Hand Cream
	Liquid Foundation
	Mouthwash
	Shower Gel
Loretz, Api et al. (2005)	Lipstick
	Body Lotion
	Face Cream
Loretz, Api et al. (2006)	Spray Perfume
	Liquid Foundation
	Shampoo
	Bodywash
	Deodorant (Non-Spray)
	HairSpray
Loretz, Api et al. (2008)	Hair Conditioner
Private	LiquidHandSoap
	BarSoap

Required Data
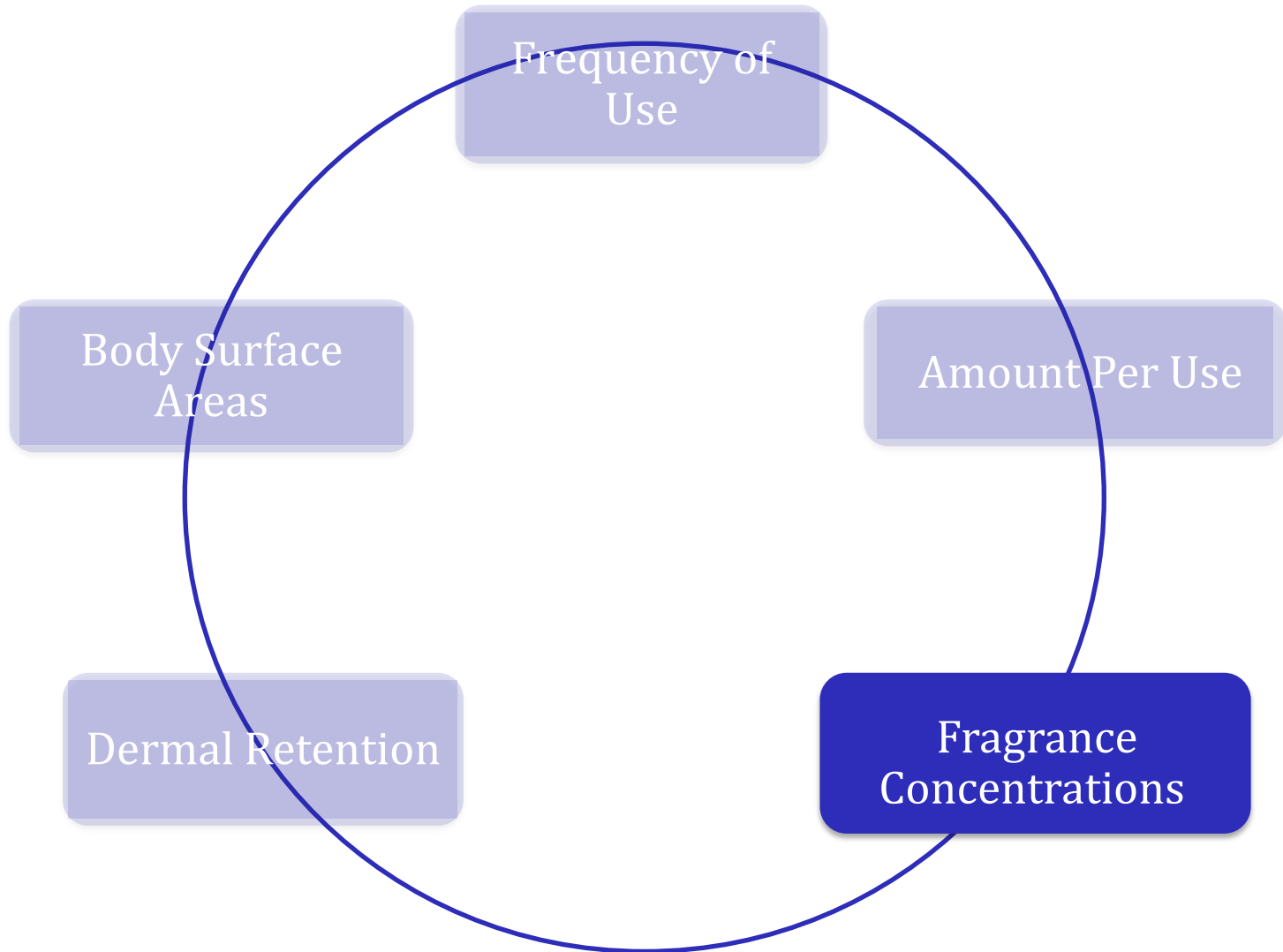
Fragrances and Mixtures Concentrations
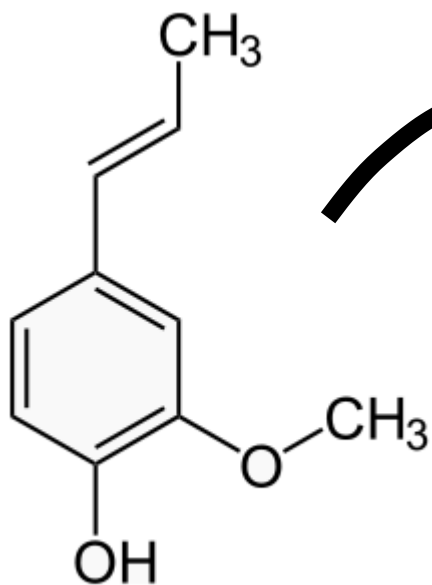
RIFM Fragrances and Mixtures Concentrations

- Raw Data from Industry Partners
- Provides more realistic information on the ranges of Fragrance Concentrations

Required Data
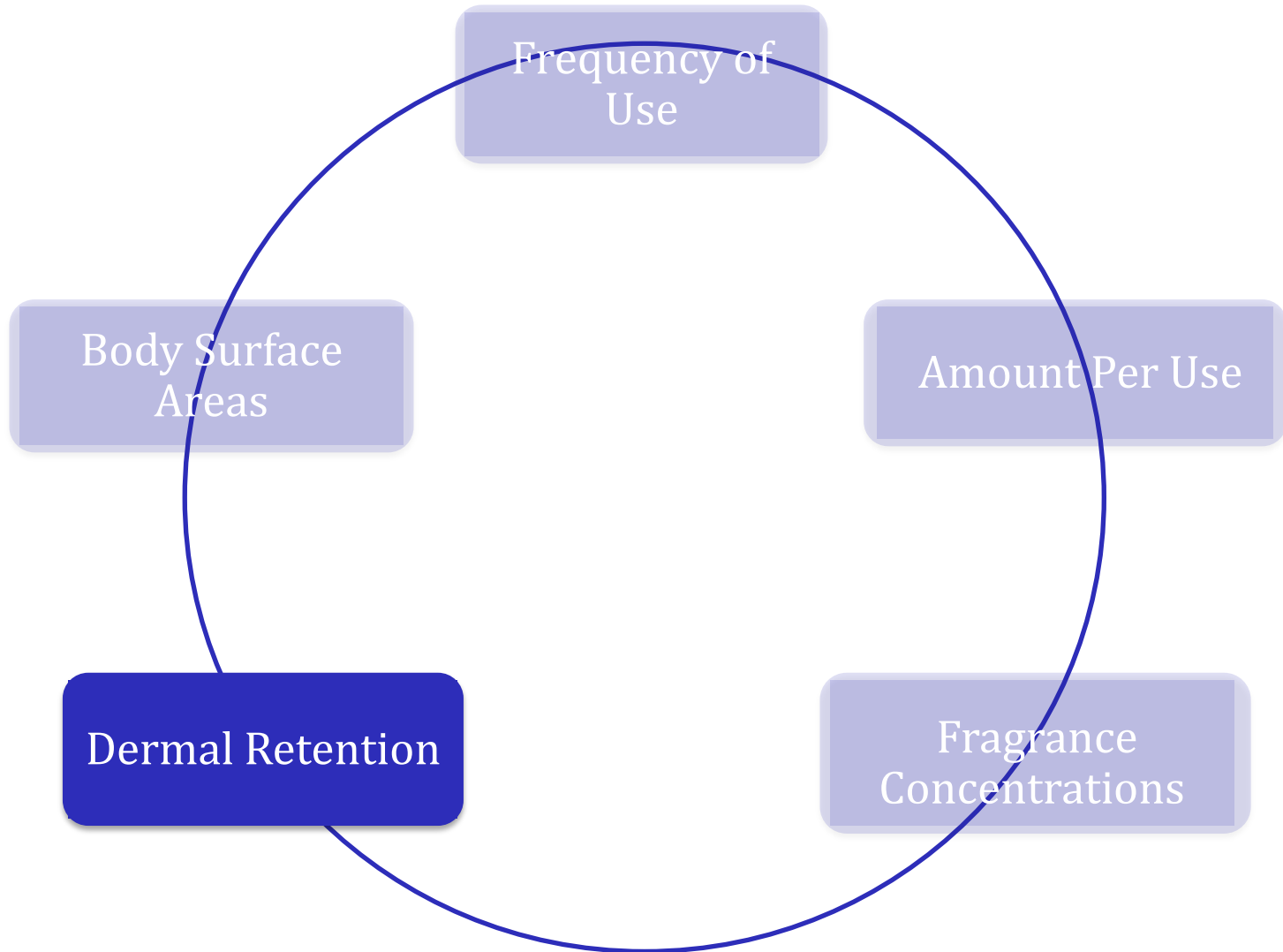
Dermal Retention Factors

- Retention Factors:
- Commonly used and are in SCCS Notes of Guidance
- Listed in Api et al. 2008 "Dermal Sensitization QRA for Fragrance Materials"

Product	Retention Factor
BodyLotion (Mass, Prestige, Other)	100%
DeoSpray	100%
DeoRollOn	100%
BodySpray	100%
Toothpaste	10%
Mouthwash	1%
Lipstick	100%
LiquMakeupFoundation	100%
HairStyling	10%
EaudeToilette	100%
EaudeParfum	100%
AfterShave	100%
Showergel	1%
Shampoo	1%
RinseoffConditioner	1%
FaceMoisturizer	100%
HandCream	100%
HairSpray	10%
BarSoap	1%
LiquidHandSoap	1%

Required Data
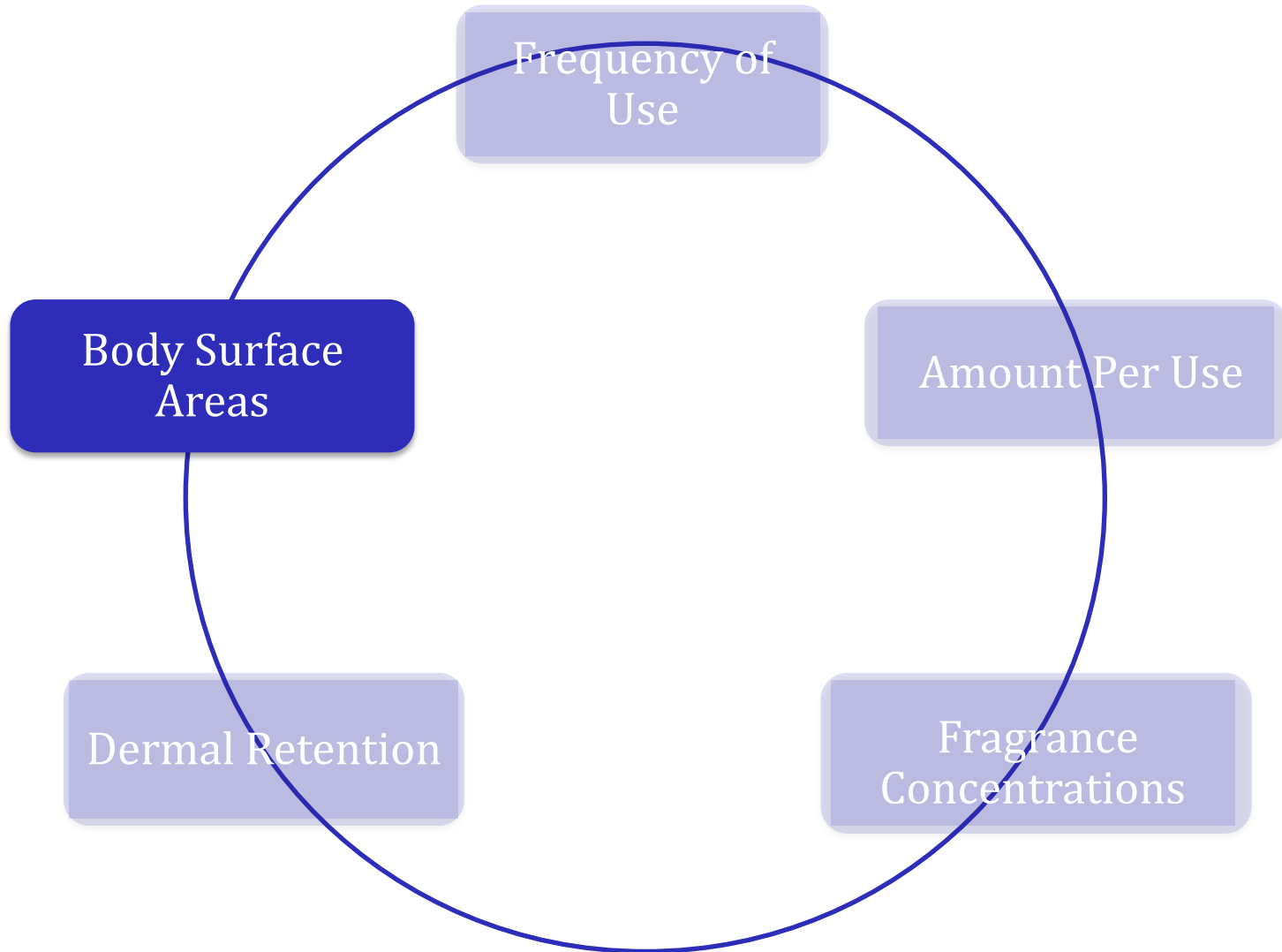
Anthropometric Data

Body Weight and Height

Creme

- Extract weight and height data from NHANES 07-08 survey:
- 8,861 US Subjects
- Build an empirical distribution for Body Weights and Heights for each Demographic Category separately.
- Use a scaling factor for European subjects.

Gender	Country	Age	Body Weight and Height
Male	France	18-24	Data(73.2, 181, …)
Male	GB	18-24	Data(83.2, 170.2, …)
Male	US	18-24	Data(81.3, 153.1, …)
…			

Surface Area of Body Parts

- EPA Exposure Factors Handbook Guidelines
- Dubois Formula:

$$SA = a \times w^b \times h^c$$

w = bodyweight
h = height
a, b, c = constants (determined experimentally)

- EPA provide constants (a, b, c) for the following body parts:

Trunk	Head
Legs	Arms
Thighs	Upper Arms
Lower Legs	Forearms
Feet	Hands

Relative Body Surface Area

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Make reasonable approximations based on known surface areas: e.g. Surface area of Scalp = ½ Surface area of Head

Body Part	Surface Area	Reference
Scalp	1/2 Head	Shampoo (Api et al., 2008, Table 3)
Face	1/2 Head – (28.8cm^2)	Face washes, Eye Products, Lip Products (Api et al., 2008, Table 3)
Neck	1/10 Trunk	–
Chest	1/4 Trunk	–
Stomach	1/5 Trunk	–
Back	3/10 Trunk	–
Arms	Arms – (1/4 Hands)	–
Wrists	1/4 Hands	–
Palms	1/2 Hands	Shampoo (Api et al., 2008, Table 3)
IntimateParts	1/100 Total Body	Rule of Nines (O'Sullivan & Schmitz 2007, p. 1098, Fig 27.9)

Absolute Surface Areas

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Body Part	Surface Area	Reference
Eyes	24cm^2	Eye Products (Bremmer et al., 2003)
Lips	4.8cm^2	Lip Products (Ferrario et al. 2000)
Mouth	212cm^2	Mouthwash, Lip Products (Collins and Dawes, 1987, Ferrario et al., 2000)
BehindEars	36cm^2	Discussion with project members
Underarms	200cm^2	(Bremmer 2006)

Aggregate Exposure

$$\text{Exposure} = \frac{Amount \times Retention \times Concentration}{Surface\ Area}$$

Aggregate Exposure

$$\text{Exposure} = \frac{Amount \times Retention \times Concentration}{Surface\ Area}$$

Aggregate Exposure

$$Exposure = \frac{Amount \times Retention \times Concentration}{Surface\ Area}$$

Aggregate Exposure

Creme
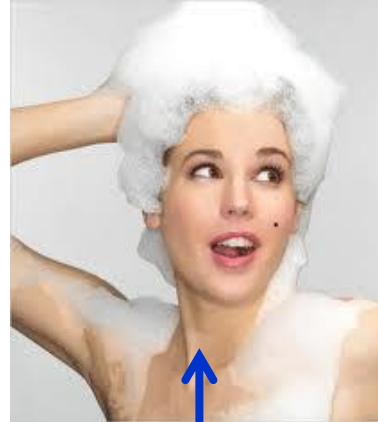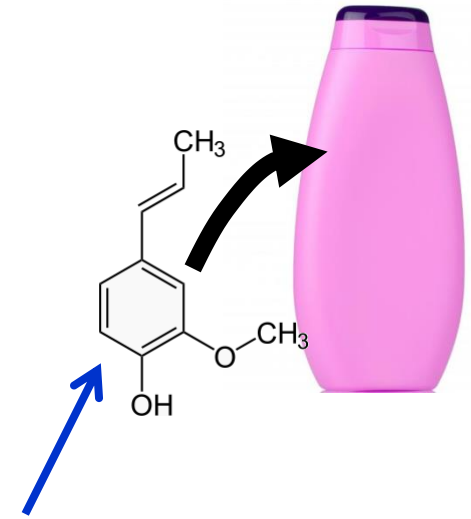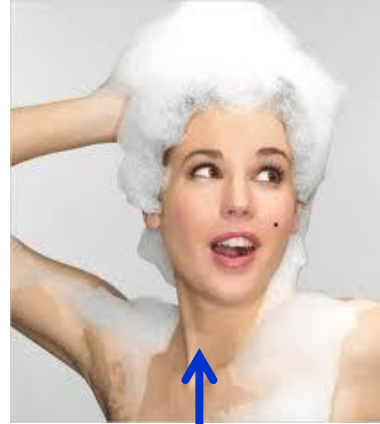
$$Exposure = \frac{Amount \times Retention \times Concentration}{Surface\ Area}$$

Aggregate Exposure
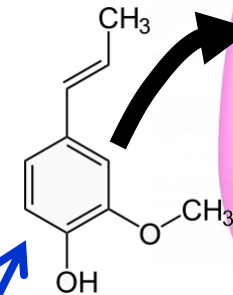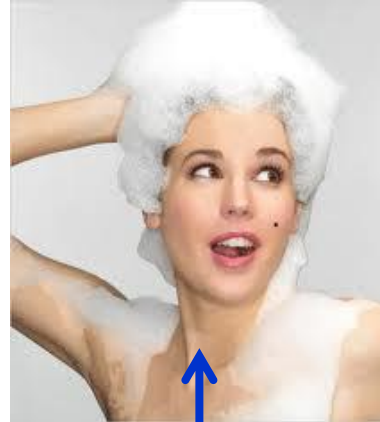
$$\text{Exposure} = \frac{Amount \times Retention \times Concentration}{Surface\ Area}$$

Daily Aggregate Exposure

Creme
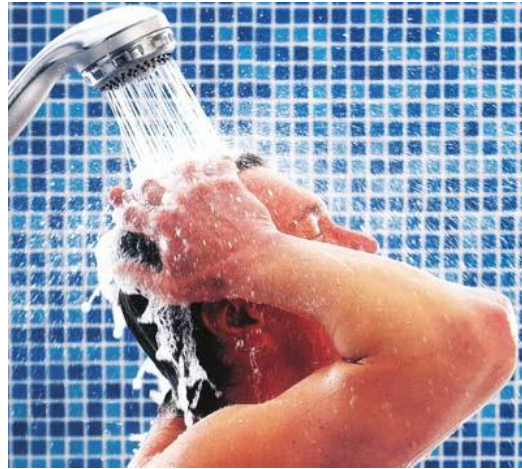
Simulating the Total Population
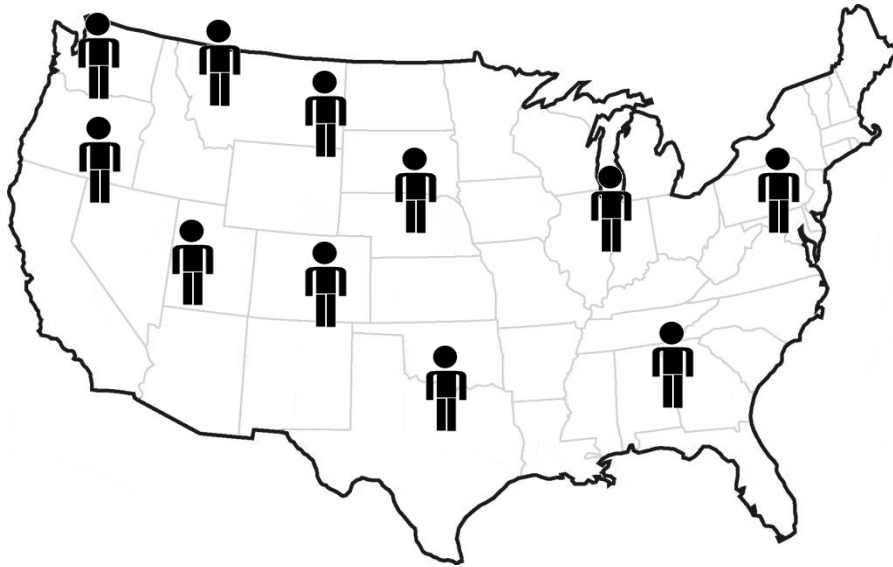
Simulating the Total Population
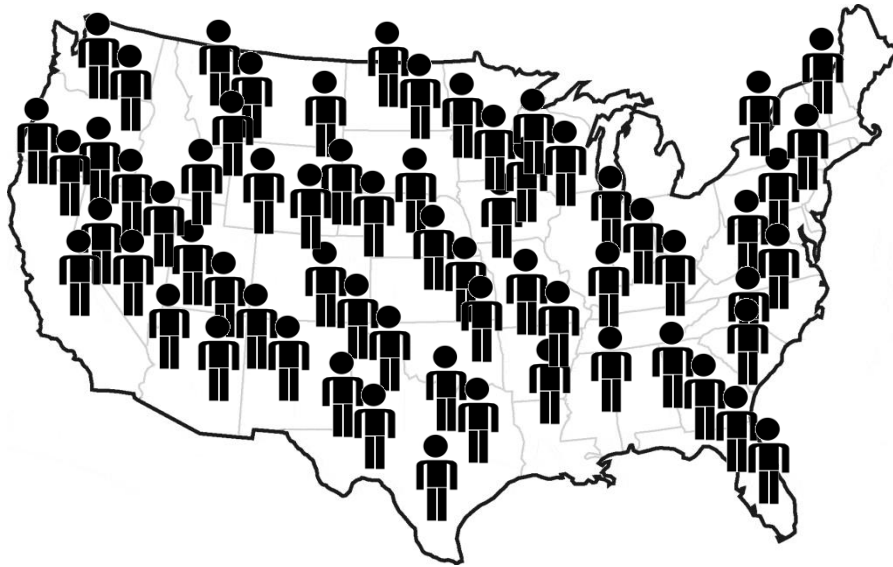
Statistical Analyses
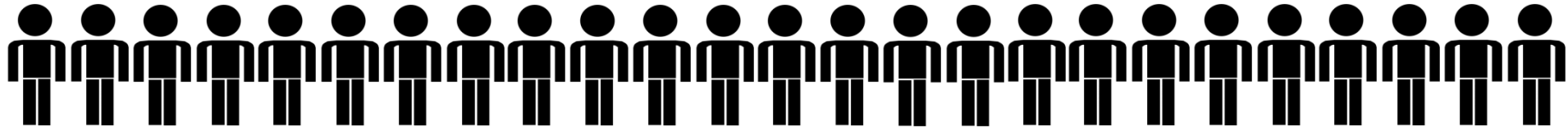
Lower-end consumer

Higher-end consumer

Statistical Analyses
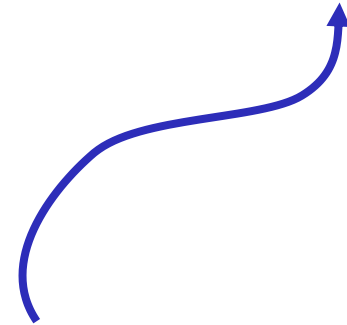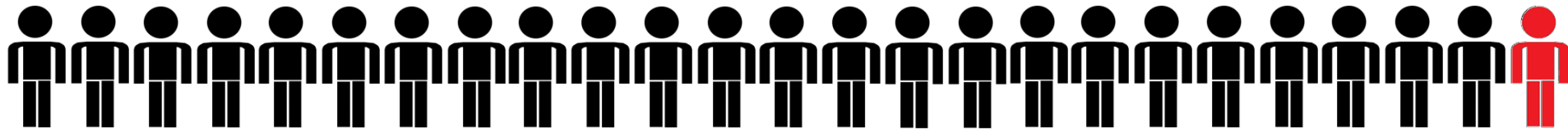
Statistical Analyses

Lower-end consumer

Higher-end consumer
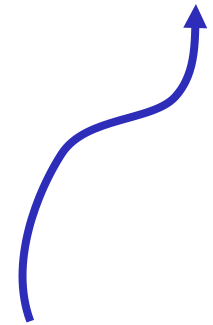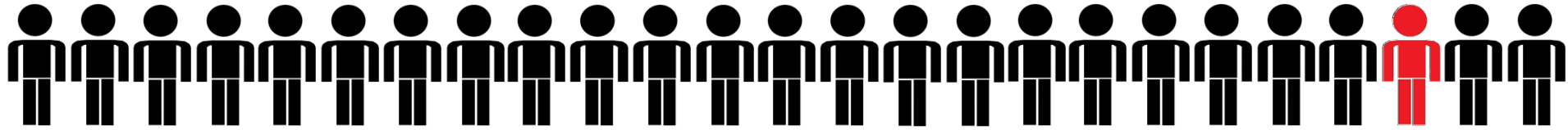
95th Percentile Consumer Exposure

Acceptable and Actual Exposure

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Based on the aggregate exposure for each body part, we can calculate the ratio a Acceptable Exposure Limit (AEL) and the aggregate Consumer Exposure Level (CEL) (Api et al., 2008). This ratio should be equal or greater than 1.

$$\frac{AEL_{BodyPart}}{CEL_{Aggregate}} \geq 1$$

Creme RIFM Fragrance Exposure Analysis

Username: cronan.mcnamara

Password: ●●●●●●●●●

☐ Remember me

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Proxy setup

Forgot password

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Account Settings (user3)

New Assessment   New Optimisation Assessment

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Name	Type	Progress	Row Count

File   Edit   Go   Actions   Help

Account Settings (user3)

New Assessment   New Optimisation Assessment

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  - ▼ 🏠 user3
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Name	Type	Progress	Row Count

Create Folder
Create Table   ›
Import Table   ›

Optimize view for   ›

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  ▼ 🏠 user3
      📁 My Assessments
      📁 My Data

Name	Type	Progress	Row Count

Create Folder
Create Table   ＞
Import Table   ＞   Table
Optimize view for   ＞   Fragrances Table
                                       Products Table
                                       Retention Table
                                       Dermal Penetration Table

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📁 RIFM Assessments	Folder		

Creme RIFM Fragrance Exposure Analysis

New Assessment   New Optimisation Assessment

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    - RIFM Data
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  - ▼ user3
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    - My Data

Name	Type	Progress	Row Count
Subjects	Subjects Table		36446
Product Hierarchies	Products Table		34
IFRA Product Hierarchies	Products Table		27
Fragrances Point Values	Fragrances Table		225
Retention	Retention Table		25
Dermal Penetration	Dermal Penetration Ta		225
Body Parts	Table		23
Diary	Diary Table		3389839

File   Go   Actions   View   Help

Account Settings (user3)

New Assessment   New Optimisation Assessment

RIFM Data   Diary

	BodyParts	Day	ID	Product	Time
1	bitset(15, 16)	1	1_2007_2_0000095753	BarSoap	2
2	bitset(15, 16)	1	1_2007_2_0000095753	BarSoap	2
3	bitset(15, 16)	1	1_2007_2_0000095753	BarSoap	2
4	bitset(15, 16)	1	1_2007_2_0000095753	BarSoap	2
5	bitset(2, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19)	1	1_2007_2_0000095753	Showergel	22
6	bitset(12)	1	1_2007_2_0000095753	DeoRollOn	4
7	bitset(7)	1	1_2007_2_0000095753	EaudeParfum	4
8	bitset(2, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19)	1	1_2007_2_0000095753	Showergel	4
9	bitset(7)	2	1_2007_2_0000095753	EaudeParfum	4
10	bitset(12)	2	1_2007_2_0000095753	DeoRollOn	4
11	bitset(15, 16)	2	1_2007_2_0000095753	BarSoap	2
12	bitset(15, 16)	2	1_2007_2_0000095753	BarSoap	2
13	bitset(15, 16)	2	1_2007_2_0000095753	BarSoap	2
14	bitset(15, 16)	2	1_2007_2_0000095753	BarSoap	2
15	bitset(15, 16)	3	1_2007_2_0000095753	BarSoap	2
16	bitset(15, 16)	3	1_2007_2_0000095753	BarSoap	2
17	bitset(15, 16)	3	1_2007_2_0000095753	BarSoap	2
18	bitset(15, 16)	3	1_2007_2_0000095753	BarSoap	2
19	bitset(15, 16)	4	1_2007_2_0000095753	BarSoap	2
20	bitset(15, 16)	4	1_2007_2_0000095753	BarSoap	2
21	bitset(15, 16)	4	1_2007_2_0000095753	BarSoap	2
22	bitset(15, 16)	4	1_2007_2_0000095753	BarSoap	2

File   Edit   Go   Actions   Help

Account Settings (user3)

New Assessment   New Optimisation Assessment

RIFM Data

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    - 📁 My Data

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Body Parts	Table		23
Diary	Diary Table		3389839

File   Go   Actions   View   Help

New Assessment   New Optimisation Assessment

RIFM Data   Diary   Retention

	Product	RetentionFactorDermal	RetentionFactorIngestion	RetentionFactorInhalation
1	BodyLotionMass	1	0	0
2	BodyLotionPrestige	1	0	0
3	BodyLotionOther	1	0	0
4	DeoSpray	0.235	0	0.2394
5	DeoRollOn	1	0	0
6	BodySpray	1	0	0
7	Toothpaste	0.1	0.05	0
8	Mouthwash	0.01	0.1	0
9	Lipstick	1	0	0
10	LiquMakeupFoundation	1	0	0
11	HairStyling	0.1	0	0
12	EaudeToilette	0.8	0	0.801258
13	EaudeParfum	0.8	0	0.801258
14	AfterShave	1	0	0
15	Showergel	0.01	0	0
16	Shampoo	0.01	0	0
17	RinseoffConditioner	0.01	0	0
18	FaceMoisturizer	1	0	0
19	HandCream	1	0	0
20	BarSoap	0.01	0	0
21	LiquidHandSoap	0.01	0	0
22	HairSpray	0.1	0	0.10441

File   Edit   Go   Actions   Help

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RIFM Data

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    - 📁 My Data

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File   Go   Actions   View   Help

New Assessment   New Optimisation Assessment

RIFM Data   ⊗   Subjects   ⊗

	AgeGroup	Country	Gender	ID	OriginalCountry	Weighting
1	35-49	EU	Male	1_2007_2_0000095753	France	9179.94
2	50-64	EU	Female	1_2007_2_0000095761	France	11590.1
3	35-49	EU	Male	1_2007_2_0000096072	France	8094.98
4	50-64	EU	Male	1_2007_2_0000096166	France	6174.76
5	35-49	EU	Male	1_2007_2_0000096338	France	7758.51
6	35-49	EU	Female	1_2007_2_0000096562	France	5413.56
7	65+	EU	Male	1_2007_2_0000096760	France	13954.5
8	50-64	EU	Male	1_2007_2_0000097248	France	6174.76
9	50-64	EU	Male	1_2007_2_0000097413	France	6285.32
10	35-49	EU	Male	1_2007_2_0000097435	France	8094.98
11	50-64	EU	Male	1_2007_2_0000097446	France	6174.76
12	25-34	EU	Male	1_2007_2_0000097603	France	6849.51
13	35-49	EU	Male	1_2007_2_0000098089	France	7758.51
14	18-24	EU	Female	1_2007_2_0000098397	France	2773.38
15	50-64	EU	Male	1_2007_2_0000098682	France	12649.7
16	35-49	EU	Male	1_2007_2_0000098686	France	7758.51
17	25-34	EU	Male	1_2007_2_0000098814	France	6849.51
18	25-34	EU	Female	1_2007_2_0000098998	France	6045.52
19	65+	EU	Male	1_2007_2_0000099139	France	13954.5
20	35-49	EU	Female	1_2007_2_0000099345	France	8893.99
21	50-64	EU	Female	1_2007_2_0000099494	France	6505.41
22	50-64	EU	Male	1_2007_2_0000099561	France	12649.7

File   Edit   Go   Actions   Help

New Assessment   New Optimisation Assessment

RIFM Data

- ▼ 📁 Home
  - ▼ 📁 RIFM
    - 📁 RIFM Assessments
    - 📁 RIFM Data
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Diary	Diary Table		3389839

Select Demographic

- ✔ **Select Demographic**
- Select Products
- Select Fragrances
- Select Body Parts
- Assessment Options
- Assessment Summary

Region

- ☑ EU
- ☑ US

Gender

- ☑ Male
- ☑ Female

Age Group

- ☑ 18 - 24
- ☑ 25 - 34
- ☑ 35 - 49
- ☑ 50 - 64
- ☑ 65+

Number of Selected Subjects: 36446

Cancel

Next>

New Assessment Wizard

Select Products

- ✅ Select Demographic
- ➕ Select Products
- Select Fragrances
- Select Body Parts
- Assessment Options
- Assessment Summary

- ⦿ Default (RIFM) Products
- ◯ Custom Products

Select Products Table

- ▼ 📁 Creme Data
  - 📄 IFRA Product Hierarchies
  - 📄 Product Hierarchies
- ▼ 📄 user3
  - 📁 My Assessments
  - 📁 My Data

Select Products:

☑ Select All

Product Name
▶ ☑ BodyLotion
▶ ☑ Deodorant
▶ ☑ OralCare
▶ ☑ CosmeticStyling
▶ ☑ Hydroalcoholics
▶ ☑ ShowerProducts
▶ ☑ Moisturizers
▶ ☑ Soaps
▶ ☑ AirCare

Number of Products Selected: 25

Cancel   <Previous   Next>

New Assessment Wizard

- ✔ Select Demographic
- ✚ **Select Products**
- Select Fragrances
- Select Body Parts
- Assessment Options
- Assessment Summary

Select Products

(●) Default (RIFM) Products

(○) Custom Products

Select Products Table

- ▼ 📁 Creme Data
  - 🗒 IFRA Product Hierarchies
  - 🗒 Product Hierarchies
- ▼ 📄 user3
  - 📁 My Assessments
  - 📁 My Data

Select Products:

☑ Select All

Product Name
▼ ☑ BodyLotion
☑ BodyLotionMass
☑ BodyLotionPrestige
☑ BodyLotionOther
▶ ☑ Deodorant
▶ ☑ OralCare
▶ ☑ CosmeticStyling
▶ ☑ Hydroalcoholics
▶ ☑ ShowerProducts
▶ ☑ Moisturizers
▶ ☑ Soaps
▶ ☑ AirCare

Number of Products Selected: 25

Cancel   <Previous   Next>

New Assessment Wizard

Select Products

- ✔ Select Demographic
- ✔ **Select Products**
- ✖ Select Fragrances
- Select Body Parts
- Assessment Options
- Assessment Summary

◉ Default (RIFM) Products

◯ Custom Products

Select Products Table

- ▼ 📁 Creme Data
  - 🗎 IFRA Product Hierarchies
  - 🗎 Product Hierarchies
- ▼ 💻 user3
  - 📁 My Assessments
  - 📁 My Data

Select Products:

☑ Select All

Product Name
▼ ☑ BodyLotion
☑ BodyLotionMass
☑ BodyLotionPrestige
☑ BodyLotionOther
▼ ☑ Deodorant
☑ DeoSpray
☑ DeoRollOn
☑ BodySpray
▶ ☑ OralCare
▶ ☑ CosmeticStyling
▶ ☑ Hydroalcoholics
▶ ☑ ShowerProducts
▶ ☑ Moisturizers
▶ ☑ Soaps
▶ ☑ AirCare

Number of Products Selected: 25

Cancel   <Previous   Next>

New Assessment Wizard

Select Fragrances

- ✔ Select Demographic
- ✔ Select Products
- ✚ **Select Fragrances**
- Select Body Parts
- Assessment Options
- Assessment Summary

○ Product Exposure Only (No Fragrances)

● Default (RIFM) Fragrances and Concentrations

○ Custom Fragrances and Concentrations

Select Fragrances Table

[New Table] [Edit Table]

▼ 📁 RIFM Data
     📑 Fragrances Point Values
▼ 📁 user3
     📁 My Assessments
     📁 My Data

Select Fragrances:

☐ Select All

Fragrance Name [CAS No.]	
☐ 100-52-7	[100-52-7]
☐ 101-86-0	[101-86-0]
☐ 104-20-1	[104-20-1]
☐ 104-54-1	[104-54-1]
☐ 104-55-2	[104-55-2]
☐ 115-95-7	[115-95-7]
☐ 117-98-6	[117-98-6]
☐ 118-58-1	[118-58-1]
☐ 119-61-9	[119-61-9]
☐ 121-32-4	[121-32-4]
☐ 121-33-5	[121-33-5]
☐ 127-51-5	[127-51-5]
☐ 138-86-3	[138-86-3]
☐ 17511-60-3	[17511-60-3]
☐ 18479-58-8	[18479-58-8]
☐ 18579-58-8	[18579-58-8]
☐ 20298-69-5	[20298-69-5]
☐ 23726-94-5	[23726-94-5]

☐ Calculate Product Exposure

Number of Fragrances Selected: 0

[Cancel] [<Previous] [Next>]

New Assessment Wizard

Select Fragrances

- ✔ Select Demographic
- ✔ Select Products
- ➕ Select Fragrances
- Select Body Parts
- Assessment Options
- Assessment Summary

○ Product Exposure Only (No Fragrances)

● Default (RIFM) Fragrances and Concentrations

○ Custom Fragrances and Concentrations

Select Fragrances Table

[New Table] [Edit Table]

▼ 📁 RIFM Data
    📑 Fragrances Point Values
▼ 📁 user3
    📁 My Assessments
    📁 My Data

Select Fragrances:

☐ Select All

Fragrance Name [CAS No.]	
✔ 100-52-7	[100-52-7]
☐ 101-86-0	[101-86-0]
☐ 104-20-1	[104-20-1]
☐ 104-54-1	[104-54-1]
✔ 104-55-2	[104-55-2]
☐ 115-95-7	[115-95-7]
☐ 117-98-6	[117-98-6]
☐ 118-58-1	[118-58-1]
☐ 119-61-9	[119-61-9]
☐ 121-32-4	[121-32-4]
☐ 121-33-5	[121-33-5]
☐ 127-51-5	[127-51-5]
✔ 138-86-3	[138-86-3]
☐ 17511-60-3	[17511-60-3]
☐ 18479-58-8	[18479-58-8]
☐ 18579-58-8	[18579-58-8]
☐ 20298-69-5	[20298-69-5]
☐ 23726-94-5	[23726-94-5]

☐ Calculate Product Exposure

Number of Fragrances Selected: 3

[Cancel]　　　　[<Previous] [Next>]

New Assessment Wizard

Select Body Parts

- ✔ Select Demographic
- ✔ Select Products
- ✔ Select Fragrances
- ➕ Select Body Parts
- Assessment Options
- Assessment Summary

☑ Select All

☑ Scalp	☑ Neck
☑ Face	☑ Behind Ears
☑ Eyes	
☑ Lips	
☑ Mouth	

☑ Chest	☑ Arms
☑ Stomach	☑ Wrists
☑ Back	☑ Hands
☑ Underarms	☑ Palms

- ☑ Intimate Parts
- ☑ Legs
- ☑ Feet
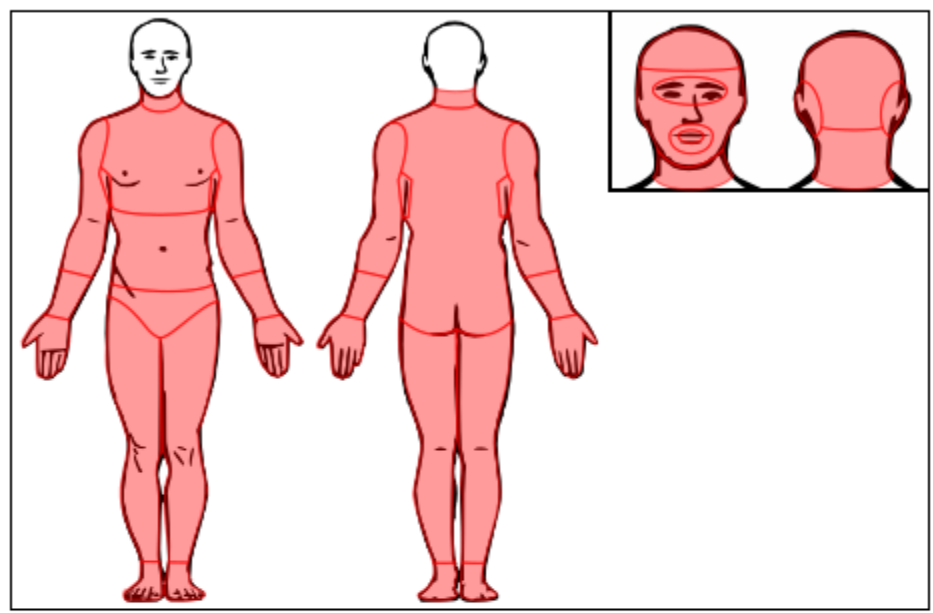
Number of Body Parts Selected: 18

Cancel   <Previous   Next>

Assessment Options

Select Demographic

Select Products

Select Fragrances

Select Body Parts

Assessment Options

Assessment Summary

Output file: /Home/user3/My Assessments/New Assessment

Change

Description:

▶ Choose custom Dermal Penetration and Retention tables

▶ Advanced Options

Cancel

<Previous

Next>

New Assessment Wizard

Assessment Options

- ✔ Select Demographic
- ✔ Select Products
- ✔ Select Fragrances
- ✔ Select Body Parts
- ✚ Assessment Options
- Assessment Summary

Output file: /Home/user3/My Assessments/New Assessment

Change

Description:

▶

▶

Save As

◀ ➡ ⬆

▼ 🏠 user3
   📁 My Assessments
   📁 My Data

Name	ID

Filename: New Assessment

Create Folder   Save   Cancel

Cancel   <Previous   Next>

Assessment Options

Output file: /Home/user3/My Assessments/New Assessment   Change

Description:

▶ Choose custom Dermal Penetration and Retention tables

▶ Advanced Options

Cancel   <Previous   Next>

New Assessment Wizard

Assessment Options

- ✔ Select Demographic
- ✔ Select Products
- ✔ Select Fragrances
- ✔ Select Body Parts
- ✚ Assessment Options
- Assessment Summary

Output file: /Home/user3/My Assessments/New Assessment   [Change]

Description:

▶ Choose custom Dermal Penetration and Retention tables

▼ Advanced Options

Simulated population size: 36446

Exposure types:
- ☑ Dermal Exposure (Absolute)
- ☑ Dermal Exposure (Per Unit Surface Area)
- ☑ Exposure (Absolute)
- ☑ Exposure (Per Unit Bodyweight)
- ☑ Ingestion Exposure (Absolute)
- ☑ Ingestion Exposure (Per Unit Bodyweight)
- ☑ Inhalation Exposure (Absolute)
- ☑ Inhalation Exposure (Per Unit Bodyweight)

Aggregation:
- ☑ Individual Products

[Cancel]   [<Previous] [Next>]
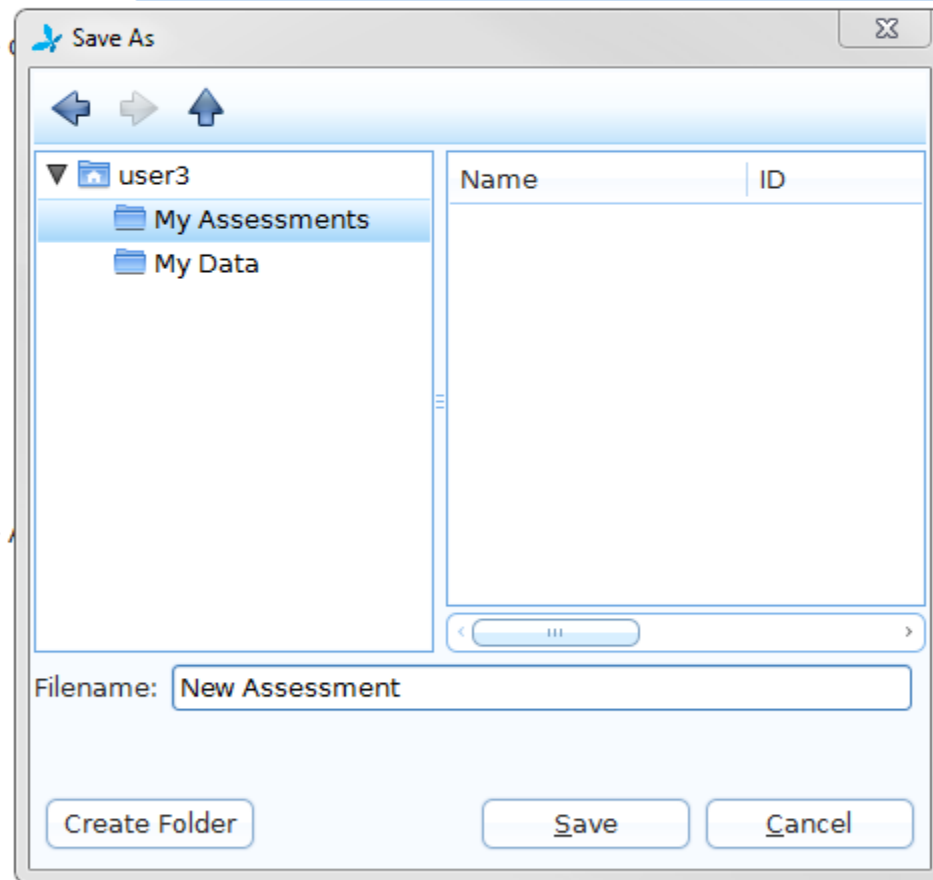
New Assessment Wizard

Assessment Summary

- ✔ Select Demographic
- ✔ Select Products
- ✔ Select Fragrances
- ✔ Select Body Parts
- ✔ Assessment Options
- ✚ Assessment Summary

Region: EU, US

Gender: Male, Female

Age Group:
18 - 24
25 - 34
35 - 49
50 - 64
65+

Product(s):

Product Name
BodyLotionMass
BodyLotionPrestige
BodyLotionOther
DeoSpray

Fragrances source: Default Fragrances

Fragrance(s):

Fragrance Name [CAS No.]
100-52-7 [100-52-7]
104-55-2 [104-55-2]
138-86-3 [138-86-3]

Body part(s):

Body Part Name
Scalp
Face
Eyes
Lips

Retention source: Default Retention Factors

Dermal Penetration source: Default Dermal Penetration Factors

Name: New Assessment

Cancel   <Previous   Submit

Your assessment has been submitted.

OK

File Edit Go Actions Help

Account Settings (user3)

New Assessment   New Optimisation Assessment

My Assessments

	Name	Type	Progress	Row Count	ID
	New Assessment	Assessment	1 %		359

- Home
  - RIFM
  - Shared
  - user3
    - My Assessments
    - My Data

File   Go   Actions   View   Help

Account Settings (user3)

New Assessment   New Optimisation Assessment

By Product   By Body Part

My Assessments   New Assessment

Benzaldehyde
100-52-7 [100-52-7] - All Population - P95
Total Body (Systemic, Per Unit Bodyweight)

BL: BodyLotion
D: Deodorant
OC: OralCare
CS: CosmeticStyling
H: Hydroalcoholics
SP: ShowerProducts
Moi: Moisturizers
S: Soaps
AC: AirCare
All: All Assessed Products

Body Part: Total Body ∨   **Fragrance / Product:** 100-52-7 [100-52-7] ∨   **Calculation Type:** Acute (Max Day) ∨   **Exposure Type:** Total Body (Systemic, Per Unit Bodyweight) ∨

	Product	Consumer Type	Statistic	Value	Units	Standard Error
4539	BodyLotion	All Population	P95	0.0508	µg/kg	0.0060
2475	Deodorant	All Population	P95	0.0697	µg/kg	0.0055
2460	OralCare	All Population	P95	0.0167	µg/kg	0.0009
5664	CosmeticStyling	All Population	P95	0.0111	µg/kg	0.0013
1977	Hydroalcoholics	All Population	P95	0.3685	µg/kg	0.0179

File   Go   Actions   View   Help

Account Settings (user3)

New Assessment   New Optimisation Assessment

By Product   By Body Part

My Assessments   New Assessment

Benzaldehyde
100-52-7 [100-52-7] - All Population - P95
Total Body (Systemic, Per Unit Bodyweight)

BLM: BodyLotionMass
BLP: BodyLotionPrestige
BLO: BodyLotionOther
DS: DeoSpray
DRO: DeoRollOn
BoSp: BodySpray
T: Toothpaste
Mou: Mouthwash
L: Lipstick
LMF: LiquMakeupFoundation
HaSt: HairStyling
ET: EaudeToilette
EP: EaudeParfum
AS: AfterShave
Sho: Showergel
Sha: Shampoo
RC: RinseoffConditioner
FM: FaceMoisturizer
HC: HandCream

BaSo: BarSoap
LHS: LiquidHandSoap
HaSp: HairSpray
AFA: AirFreshAerosol
AFP: AirFreshPlugin
SC: ScentedCandles
BL: BodyLotion
D: Deodorant
OC: OralCare
CS: CosmeticStyling
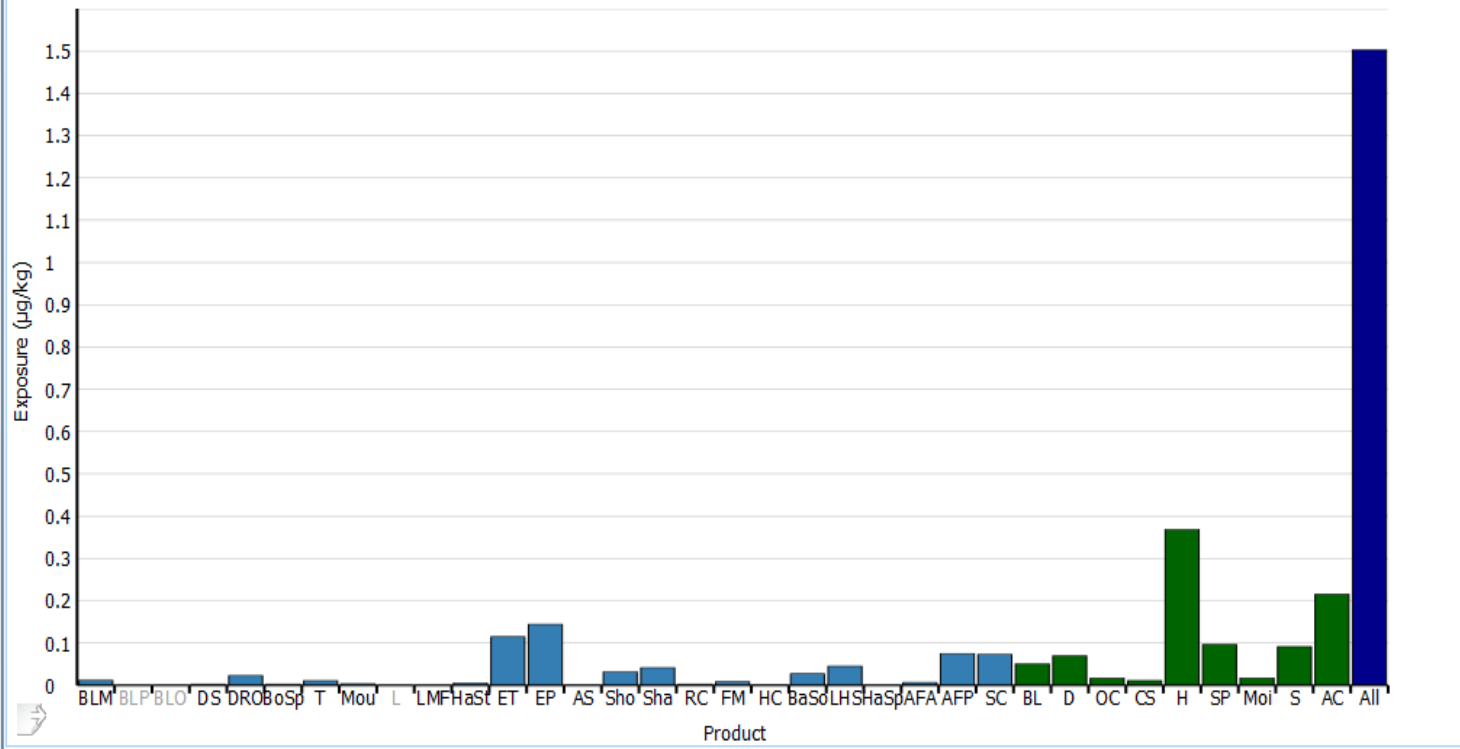H: Hydroalcoholics
SP: ShowerProducts
Moi: Moisturizers
S: Soaps
AC: AirCare
All: All Assessed Products

Body Part: Total Body ⌄   **Fragrance / Product:** 100-52-7 [100-52-7] ⌄   **Calculation Type:** Acute (Max Day) ⌄   **Exposure Type:** Total Body (Systemic, Per Unit Bodyweight) ⌄

	Product	Consumer Type	Statistic	Value	Units	Standard Error
2046	BodyLotionMass	All Population	P95	0.0116	µg/kg	0.0012
2037	BodyLotionPrestige	All Population	P95	0.0000	µg/kg	0.0000
6627	BodyLotionOther	All Population	P95	0.0000	µg/kg	0.0000
6612	DeoSpray	All Population	P95	0.0027	µg/kg	0.0002
6618	DeoRollOn	All Population	P95	0.0229	µg/kg	0.0014

New Assessment   New Optimisation Assessment

By Product   By Body Part

My Assessments   New Assessment

Benzaldehyde
100-52-7 [100-52-7] - All Population - P95
Total Body (Systemic, Per Unit Bodyweight)

BLM: BodyLotionMass   BaSo: BarSoap
BLP: BodyLotionPrestige   LHS: LiquidHandSoap
BLO: BodyLotionOther   HaSp: HairSpray
DS: DeoSpray   AFA: AirFreshAerosol
DRO: DeoRollOn   AFP: AirFreshPlugin
BoSp: BodySpray   SC: ScentedCandles
T: Toothpaste   BL: BodyLotion
Mou: Mouthwash   D: Deodorant
L: Lipstick   OC: OralCare
LMF: LiquMakeupFoundation   CS: CosmeticStyling
HaSt: HairStyling   H: Hydroalcoholics
ET: EaudeToilette   SP: ShowerProducts
EP: EaudeParfum   Moi: Moisturizers
AS: AfterShave   S: Soaps
Sho: Showergel   AC: AirCare
Sha: Shampoo   All: All Assessed Products
RC: RinseoffConditioner
FM: FaceMoisturizer
HC: HandCream

Exposure (μg/kg) — y-axis: 0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1, 1.1, 1.2, 1.3, 1.4, 1.5

Product (x-axis): BLM BLP BLO DS DRO BoSp T Mou L LMF HaSt ET EP AS Sho Sha RC FM HC BaSo LHS HaSp AFA AFP SC BL D OC CS H SP Moi S AC All

Body Part: Total Body ⌄   **Fragrance / Product:** 100-52-7 [100-52-7] ⌄   **Calculation Type:** Acute (Max Day) ⌄   **Exposure Type:** Total Body (Systemic, Per Unit Bodyweight) ⌄

	Product	Consumer Type	Statistic	Value	Units	Standard Error
2046	BodyLotionMass	All Population	P95	0.0116	μg/kg	0.0012
2037	BodyLotionPrestige	All Population	P95	0.0000	μg/kg	0.0000
6627	BodyLotionOther	All Population	P95	0.0000	μg/kg	0.0000
6612	DeoSpray	All Population	P95	0.0027	μg/kg	0.0002
6618	DeoRollOn	All Population	P95	0.0229	μg/kg	0.0014

☐ Select All
○ By Body Part (Dermal, Per Unit Surface Area)
○ Total Body (Ingestion)
○ Total Body (Ingestion, Per Unit Bodyweight)
○ Total Body (Inhalation)
○ Total Body (Inhalation, Per Unit Bodyweight)
○ Total Body (Systemic)
◉ Total Body (Systemic, Per Unit Bodyweight)

File   Go   Actions   View   Help

Account Settings (user3)

New Assessment   New Optimisation Assessment

By Product   By Body Part

My Assessments ⊗   New Assessment ⊗

Benzaldehyde 100-52-7 [100-52-7] - All Population - P95
Total Body (Inhalation, Per Unit Bodyweight)

Exposure (μg/kg)

Product

BLM: BodyLotionMass | BaSo: BarSoap
BLP: BodyLotionPrestige | LHS: LiquidHandSoap
BLO: BodyLotionOther | HaSp: HairSpray
DS: DeoSpray | AFA: AirFreshAerosol
DRO: DeoRollOn | AFP: AirFreshPlugin
BoSp: BodySpray | SC: ScentedCandles
T: Toothpaste | BL: BodyLotion
Mou: Mouthwash | D: Deodorant
L: Lipstick | OC: OralCare
LMF: LiquMakeupFoundation | CS: CosmeticStyling
HaSt: HairStyling | H: Hydroalcoholics
ET: EaudeToilette | SP: ShowerProducts
EP: EaudeParfum | Moi: Moisturizers
AS: AfterShave | S: Soaps
Sho: Showergel | AC: AirCare
Sha: Shampoo | All: All Assessed Products
RC: RinseoffConditioner
FM: FaceMoisturizer
HC: HandCream

Body Part: Total Body Inhalation ⌄   Fragrance / Product: 100-52-7 [100-52-7] ⌄   Calculation Type: Acute (Max Day) ⌄   Exposure Type: Total Body (Inhalation, Per Unit Bodyweight) ⌄
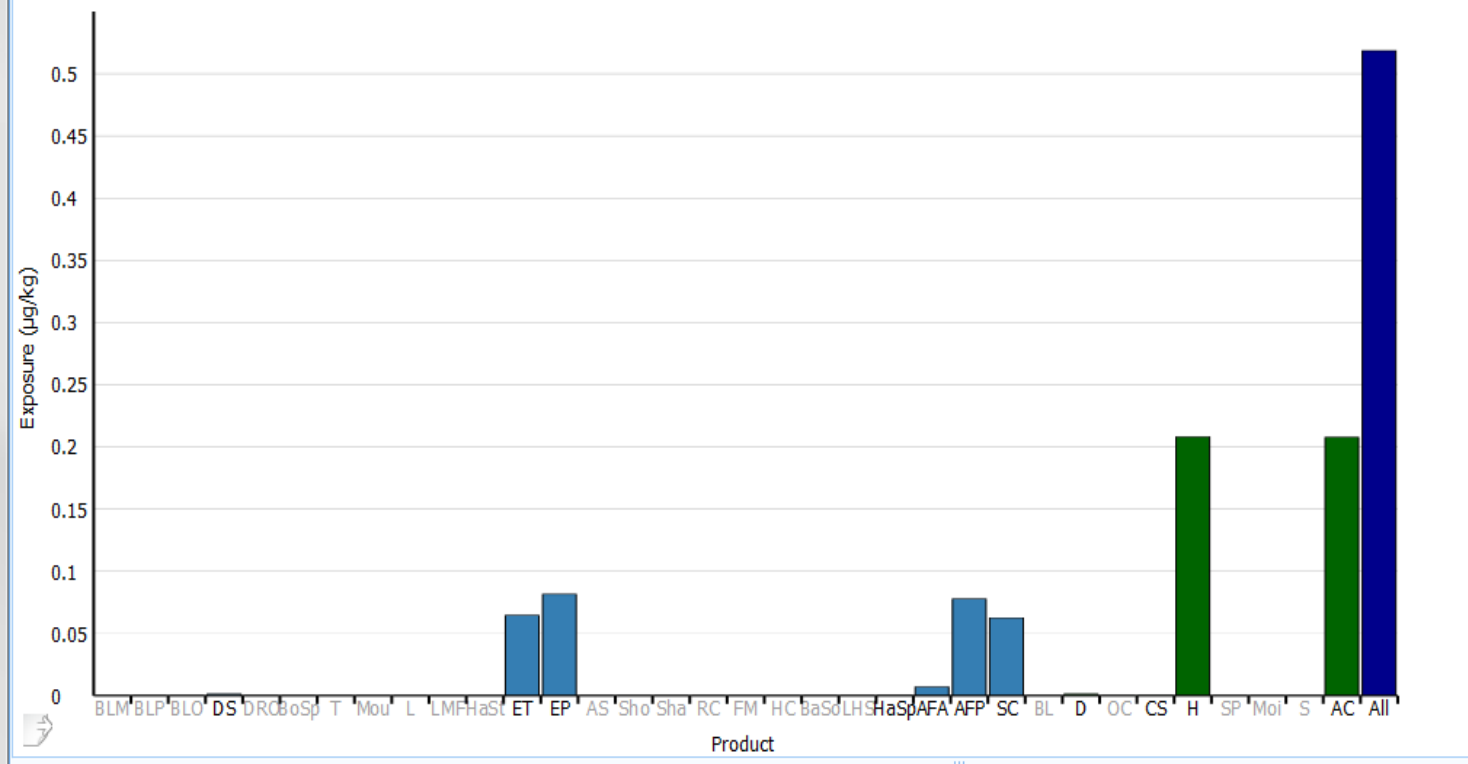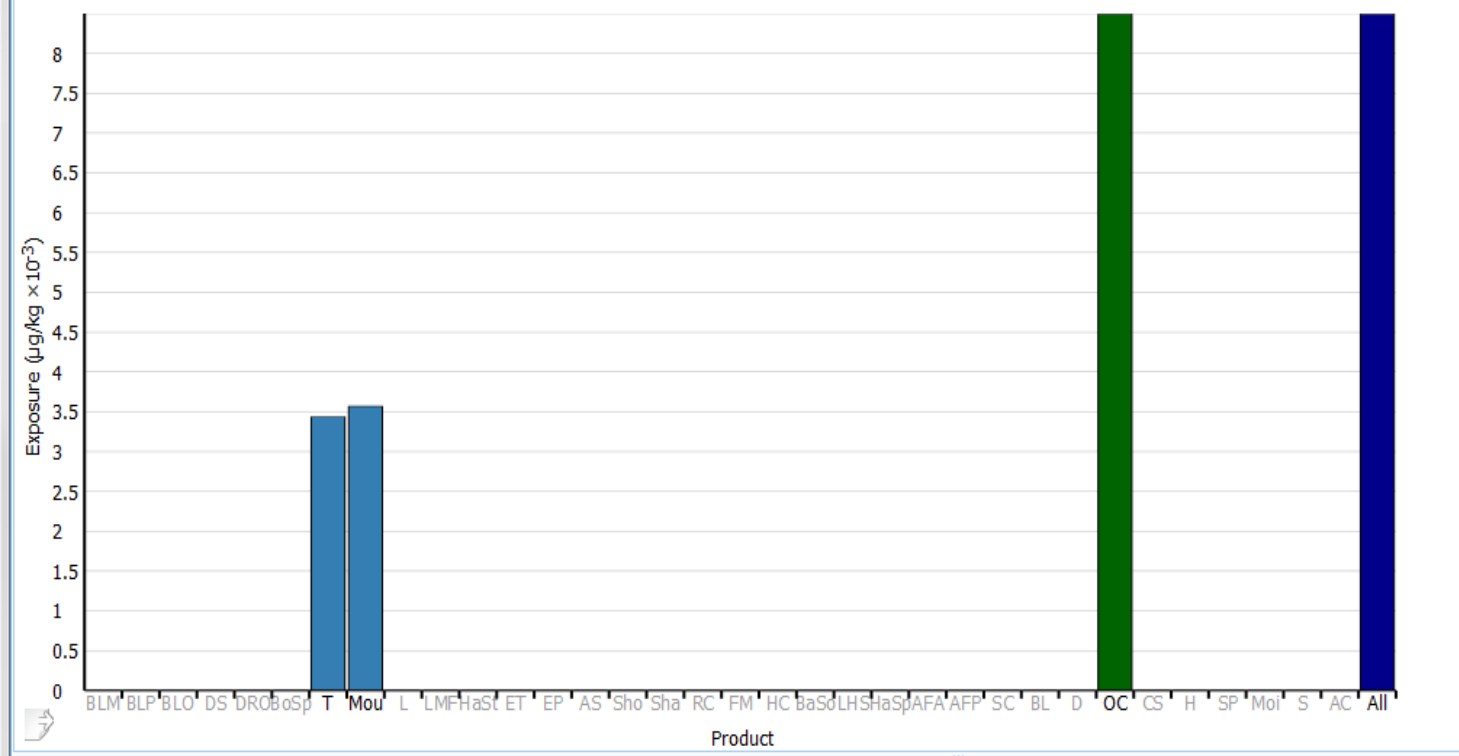
	Product	Consumer Type	Statistic	Value	Units	Standard Error
1140	BodyLotionMass	All Population	P95	0.0000	μg/kg	0.0000
1122	BodyLotionPrestige	All Population	P95	0.0000	μg/kg	0.0000
1128	BodyLotionOther	All Population	P95	0.0000	μg/kg	0.0000
5322	DeoSpray	All Population	P95	0.0013	μg/kg	0.0001
1116	DeoRollOn	All Population	P95	0.0000	μg/kg	0.0000

☐ Select All

○ By Body Part (Dermal, Per Unit Surface Area)
○ Total Body (Ingestion)
○ Total Body (Ingestion, Per Unit Bodyweight)
○ Total Body (Inhalation)
◉ Total Body (Inhalation, Per Unit Bodyweight)
○ Total Body (Systemic)
○ Total Body (Systemic, Per Unit Bodyweight)

File   Go   Actions   View   Help

Account Settings (user3)

New Assessment   New Optimisation Assessment

By Product   By Body Part

My Assessments   New Assessment

Benzaldehyde 100-52-7 [100-52-7] - All Population - P95
Total Body (Ingestion, Per Unit Bodyweight)

Exposure (µg/kg ×10⁻³)

8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0

BLM BLP BLO DS DROBoSp T Mou L LMFHaSt ET EP AS Sho Sha RC FM HC BaSoLHSHaSpAFA AFP SC BL D OC CS H SP Moi S AC All

Product

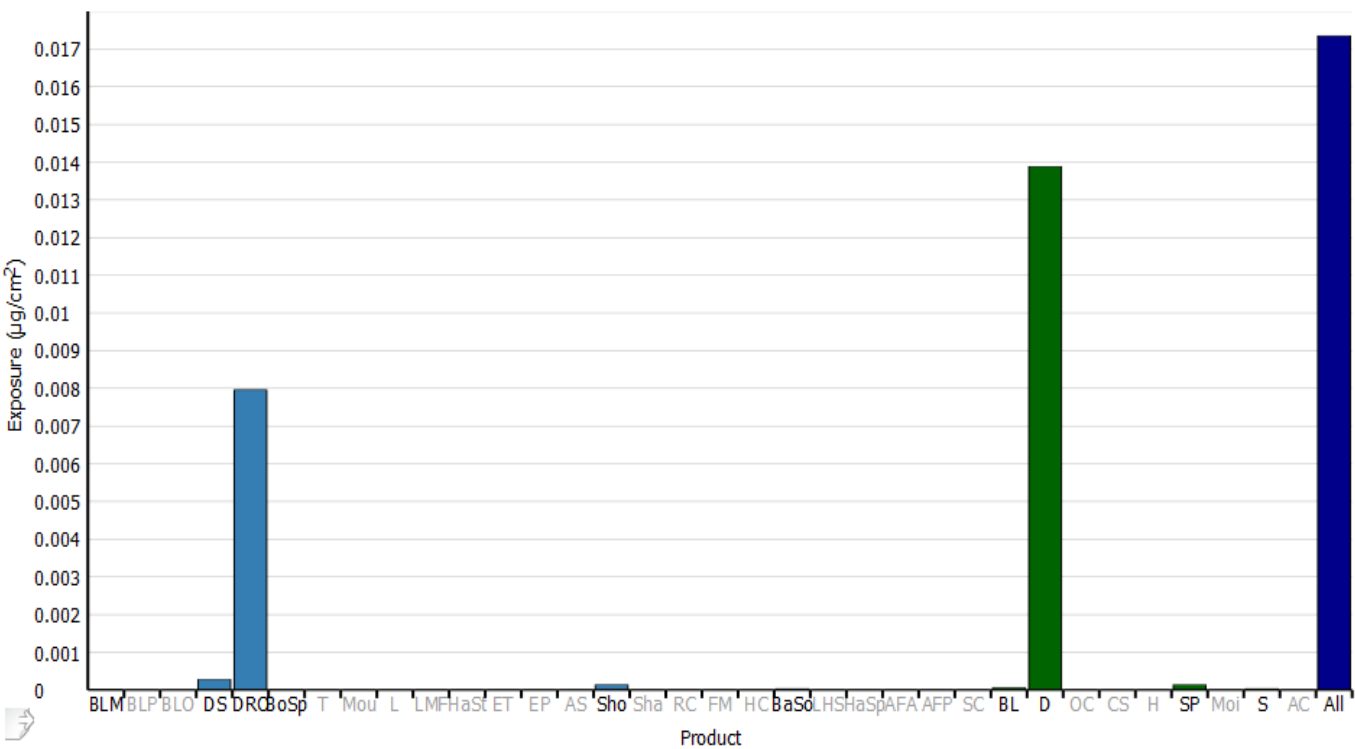|	
BLM: BodyLotionMass	BaSo: BarSoap
BLP: BodyLotionPrestige	LHS: LiquidHandSoap
BLO: BodyLotionOther	HaSp: HairSpray
DS: DeoSpray	AFA: AirFreshAerosol
DRO: DeoRollOn	AFP: AirFreshPlugin
BoSp: BodySpray	SC: ScentedCandles
T: Toothpaste	BL: BodyLotion
Mou: Mouthwash	D: Deodorant
L: Lipstick	OC: OralCare
LMF: LiquMakeupFoundation	CS: CosmeticStyling
HaSt: HairStyling	H: Hydroalcoholics
ET: EaudeToilette	SP: ShowerProducts
EP: EaudeParfum	Moi: Moisturizers
AS: AfterShave	S: Soaps
Sho: Showergel	AC: AirCare
Sha: Shampoo	All: All Assessed Products
RC: RinseoffConditioner	
FM: FaceMoisturizer	
HC: HandCream	

Body Part: Total Body Ingestion ⌄   **Fragrance / Product:** 100-52-7 [100-52-7] ⌄   **Calculation Type:** Acute (Max Day) ⌄   **Exposure Type:** Total Body (Ingestion, Per Unit Bodyweight) ⌄

	Product	Consumer Type	Statistic	Value	Units	Standard Error
1710	BodyLotionMass	All Population	P95	0.0000	µg/kg	0.0000
5832	BodyLotionPrestige	All Population	P95	0.0000	µg/kg	0.0000
5838	BodyLotionOther	All Population	P95	0.0000	µg/kg	0.0000
5820	DeoSpray	All Population	P95	0.0000	µg/kg	0.0000
5826	DeoRollOn	All Population	P95	0.0000	µg/kg	0.0000

☐ Select All

○ By Body Part (Dermal, Per Unit Surface Area)
○ Total Body (Ingestion)
● Total Body (Ingestion, Per Unit Bodyweight)
○ Total Body (Inhalation)
○ Total Body (Inhalation, Per Unit Bodyweight)
○ Total Body (Systemic)
○ Total Body (Systemic, Per Unit Bodyweight)

Creme RIFM Fragrance Exposure Analysis

File   Go   Actions   View   Help

Account Settings (user3)

New Assessment   New Optimisation Assessment

By Product   By Body Part

My Assessments   New Assessment

Benzaldehyde 100-52-7 [100-52-7] - All Population - P95
By Body Part (Dermal, Per Unit Surface Area)

Exposure (μg/cm²)

Product

BLM: BodyLotionMass
BLP: BodyLotionPrestige
BLO: BodyLotionOther
DS: DeoSpray
DRO: DeoRollOn
BoSp: BodySpray
T: Toothpaste
Mou: Mouthwash
L: Lipstick
LMF: LiquMakeupFoundation
HaSt: HairStyling
ET: EaudeToilette
EP: EaudeParfum
AS: AfterShave
Sho: Showergel
Sha: Shampoo
RC: RinseoffConditioner
FM: FaceMoisturizer
HC: HandCream

BaSo: BarSoap
LHS: LiquidHandSoap
HaSp: HairSpray
AFA: AirFreshAerosol
AFP: AirFreshPlugin
SC: ScentedCandles
BL: BodyLotion
D: Deodorant
OC: OralCare
CS: CosmeticStyling
H: Hydroalcoholics
SP: ShowerProducts
Moi: Moisturizers
S: Soaps
AC: AirCare
All: All Assessed Products

Body Part: Underarms ∨   Fragrance / Product: 100-52-7 [100-52-7] ∨   Calculation Type: Acute (Max Day) ∨   Exposure Type: By Body Part (Dermal, Per Unit Surface Area) ∨
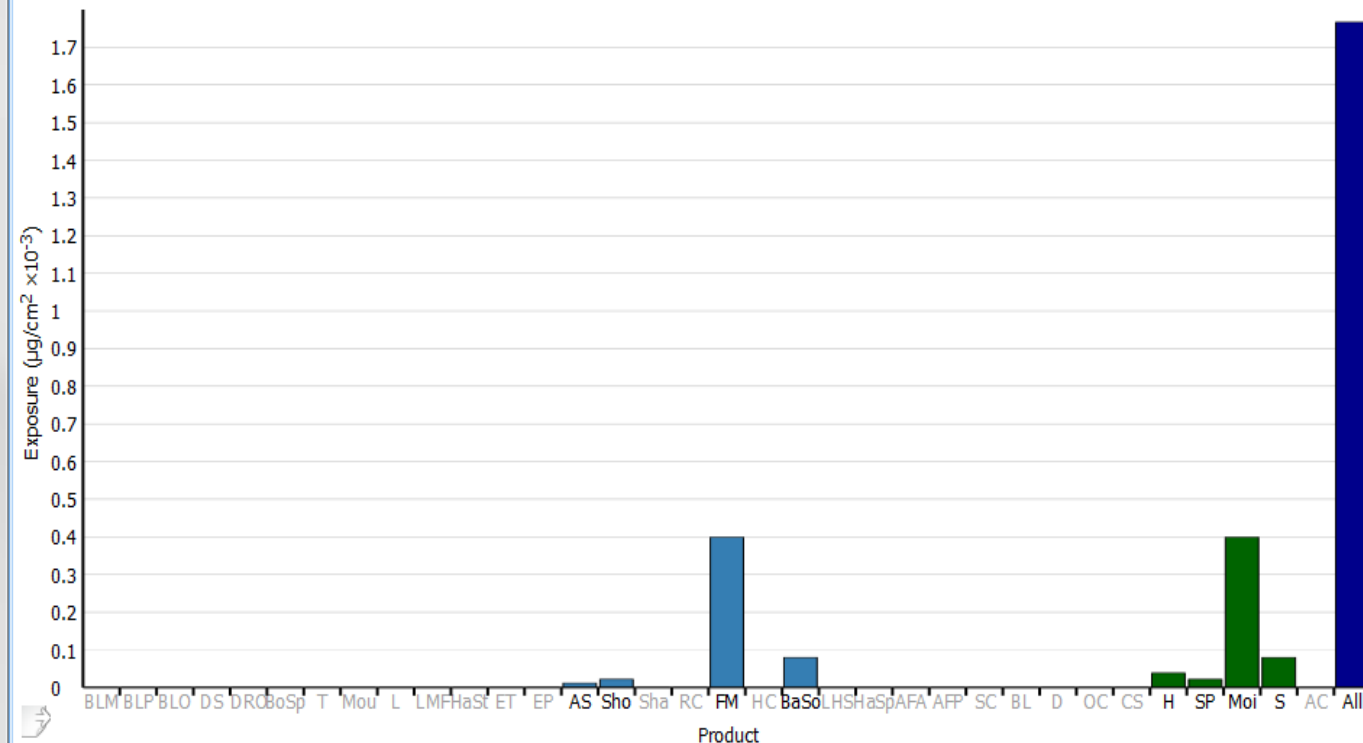
Select All

	...ner Type	Statistic	Value	Units	Standard Error
BehindEars	n	P95	0.0000	μg/cm²	0.0000
Chest	n	P95	0.0000	μg/cm²	0.0000
Stomach	n	P95	0.0000	μg/cm²	0.0000
Back	n	P95	0.0000	μg/cm²	0.0000
Underarms	n	P95	0.0003	μg/cm²	0.0000
Arms	n	P95	0.0080	μg/cm²	0.0007
Wrists					

Select All
○ By Body Part (Dermal)
◉ By Body Part (Dermal, Per Unit Surface Area)
○ Total Body (Ingestion)
○ Total Body (Ingestion, Per Unit Bodyweight)
○ Total Body (Inhalation)
○ Total Body (Inhalation, Per Unit Bodyweight)
○ Total Body (Systemic)

File   Go   Actions   View   Help

Account Settings (user3)

New Assessment   New Optimisation Assessment

By Product   By Body Part

My Assessments   New Assessment

Benzaldehyde   100-52-7 [100-52-7] - All Population - P95
By Body Part (Dermal, Per Unit Surface Area)

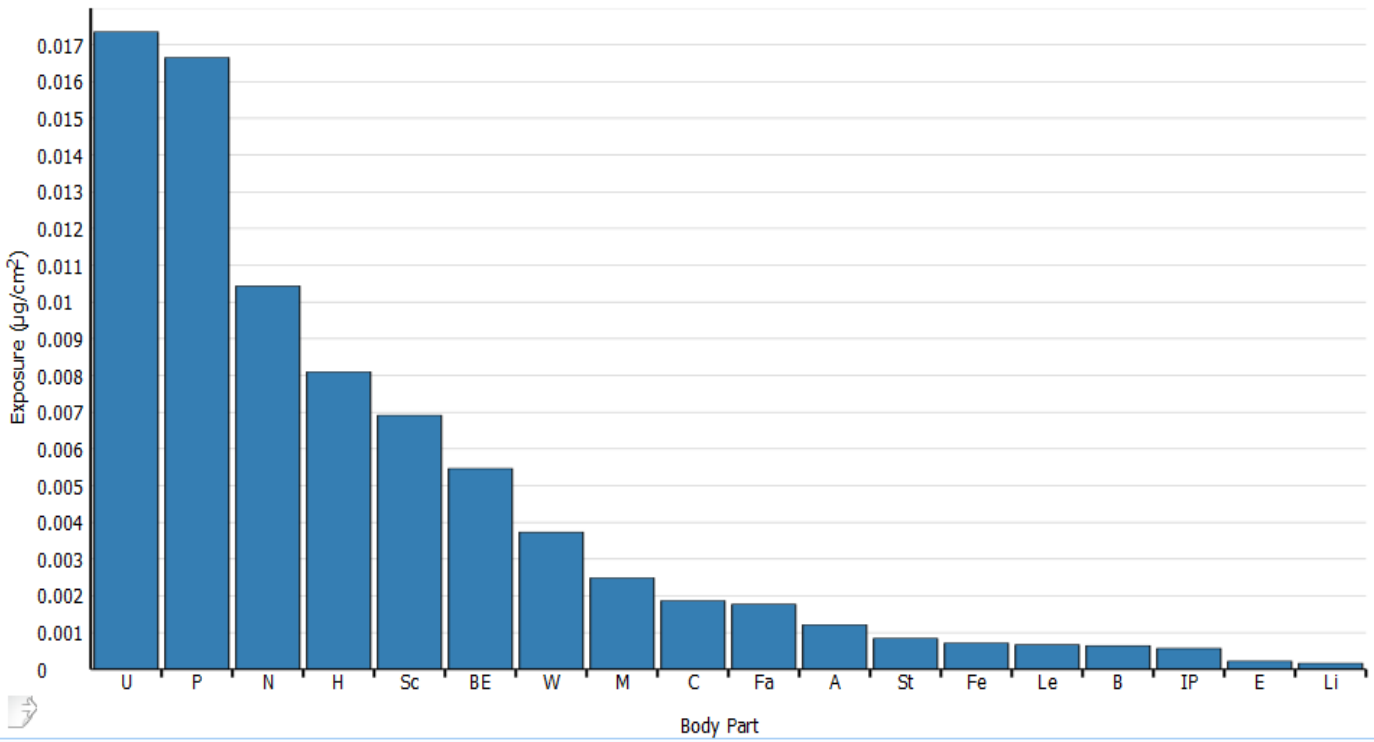| BLM: BodyLotionMass	BaSo: BarSoap
BLP: BodyLotionPrestige	LHS: LiquidHandSoap
BLO: BodyLotionOther	HaSp: HairSpray
DS: DeoSpray	AFA: AirFreshAerosol
DRO: DeoRollOn	AFP: AirFreshPlugin
BoSp: BodySpray	SC: ScentedCandles
T: Toothpaste	BL: BodyLotion
Mou: Mouthwash	D: Deodorant
L: Lipstick	OC: OralCare
LMF: LiquMakeupFoundation	CS: CosmeticStyling
HaSt: HairStyling	H: Hydroalcoholics
ET: EaudeToilette	SP: ShowerProducts
EP: EaudeParfum	Moi: Moisturizers
AS: AfterShave	S: Soaps
Sho: Showergel	AC: AirCare
Sha: Shampoo	All: All Assessed Products
RC: RinseoffConditioner	
FM: FaceMoisturizer	
HC: HandCream	

Body Part: Face ⌄   **Fragrance / Product:** 100-52-7 [100-52-7] ⌄   **Calculation Type:** Acute (Max Day) ⌄   **Exposure Type:** By Body Part (Dermal, Per Unit Surface Area) ⌄

Select All		...er Type	Statistic	Value	Units	Standard Error
○ Scalp		n	P95	0.0000	μg/cm²	0.0000
⦿ Face		n	P95	0.0000	μg/cm²	0.0000
○ Eyes		n	P95	0.0000	μg/cm²	0.0000
○ Lips		n	P95	0.0000	μg/cm²	0.0000
○ Mouth		n	P95	0.0000	μg/cm²	0.0000
○ Neck						
○ BehindEars						

Select All	
○ By Body Part (Dermal)	
⦿ By Body Part (Dermal, Per Unit Surface Area)	
○ Total Body (Ingestion)	
○ Total Body (Ingestion, Per Unit Bodyweight)	
○ Total Body (Inhalation)	
○ Total Body (Inhalation, Per Unit Bodyweight)	
○ Total Body (Systemic)	

File   Go   Actions   View   Help

Account Settings (user3)

New Assessment   New Optimisation Assessment   By Product   By Body Part

My Assessments   New Assessment

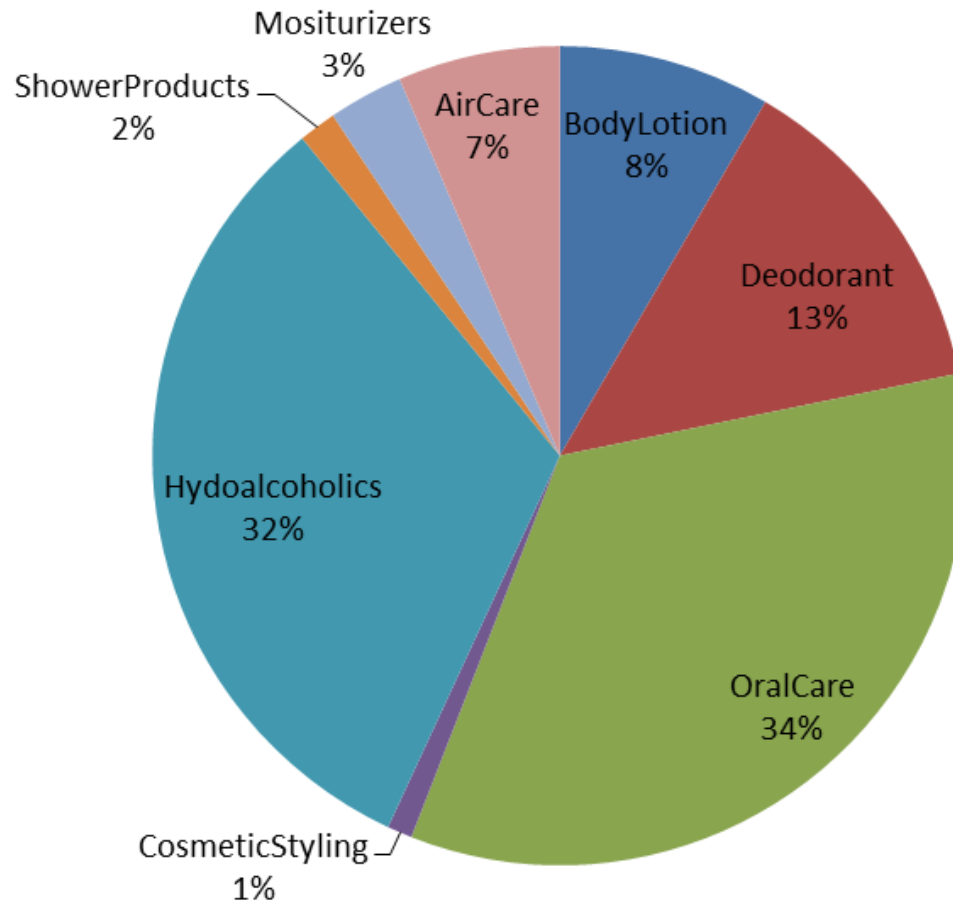**Benzaldehyde** 100-52-7 [100-52-7] - All Population - P95
By Body Part (Dermal, Per Unit Surface Area)

Sc: Scalp
Fa: Face
E: Eyes
Li: Lips
M: Mouth
N: Neck
BE: BehindEars
C: Chest
St: Stomach
B: Back
U: Underarms
A: Arms
W: Wrists
H: Hands
P: Palms
IP: IntimateParts
Le: Legs
Fe: Feet

Exposure (μg/cm²)

0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0

U P N H Sc BE W M C Fa A St Fe Le B IP E Li

Body Part

Product: All Assessed Products   **Fragrance / Product:** 100-52-7 [100-52-7]   **Calculation Type:** Acute (Max Day)   **Exposure Type:** By Body Part (Dermal, Per Unit Surface Area)

	Body Part	Consumer Type	Statistic 2^	Value 1^	Units	Standard Error
2847	Underarms	All Population	P95	0.0173	μg/cm²	0.0014
5325	Palms	All Population	P95	0.0167	μg/cm²	0.0006
2343	Neck	All Population	P95	0.0104	μg/cm²	0.0004
5094	Hands	All Population	P95	0.0081	μg/cm²	0.0005
6702	Scalp	All Population	P95	0.0069	μg/cm²	0.0002
1524	BehindEars	All Population	P95	0.0055	μg/cm²	0.0005

Example - Vanillin

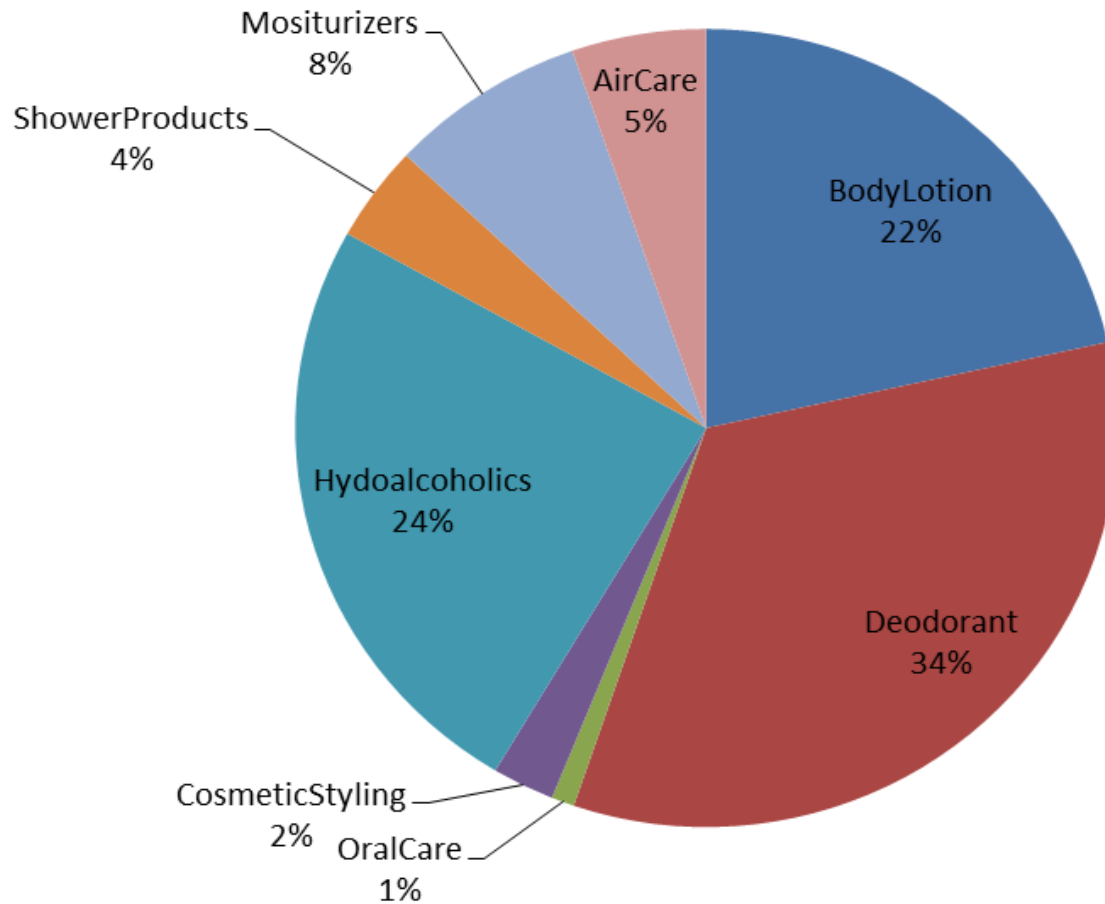**Vanillin – Approximate relative contribution to P95 aggregate exposure**

Example - PEA

PEA - All Population - P95
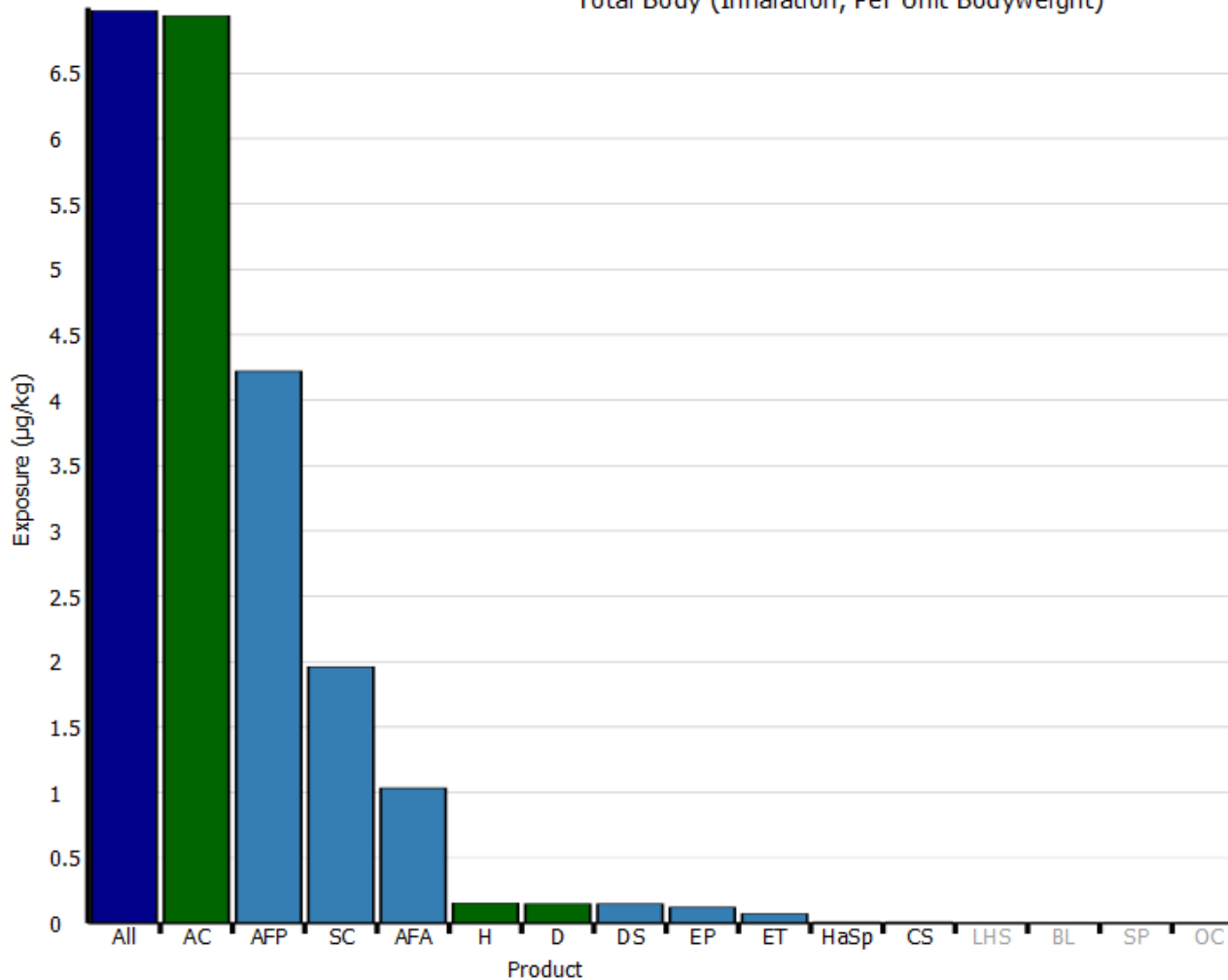Total Body (Systemic, Per Unit Bodyweight)

AFA: AirFreshAerosol
AFP: AirFreshPlugin
SC: ScentedCandles
BL: BodyLotion
D: Deodorant
OC: OralCare
CS: CosmeticStyling
H: Hydroalcoholics
SP: ShowerProducts
Moi: Moisturizers
AC: AirCare
All: All Assessed Products
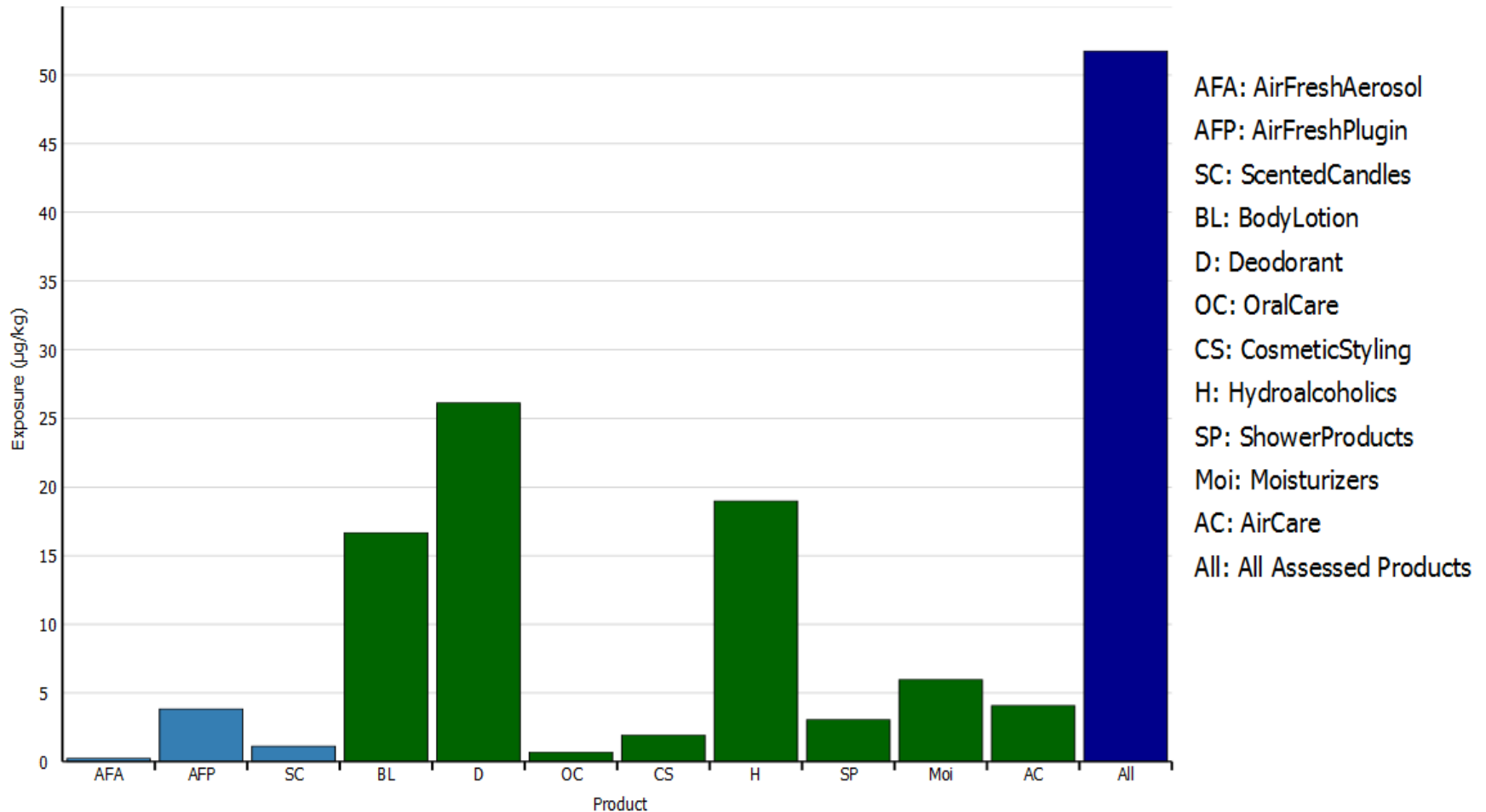
Example - PEA

PEA – Approximate relative contribution to P95 aggregate exposure

Inhalation Exposure – Limonene

Ingestion Exposure - Limonene

138-86-3 [138-86-3] - All Population - P95
Total Body (Ingestion, Per Unit Bodyweight)
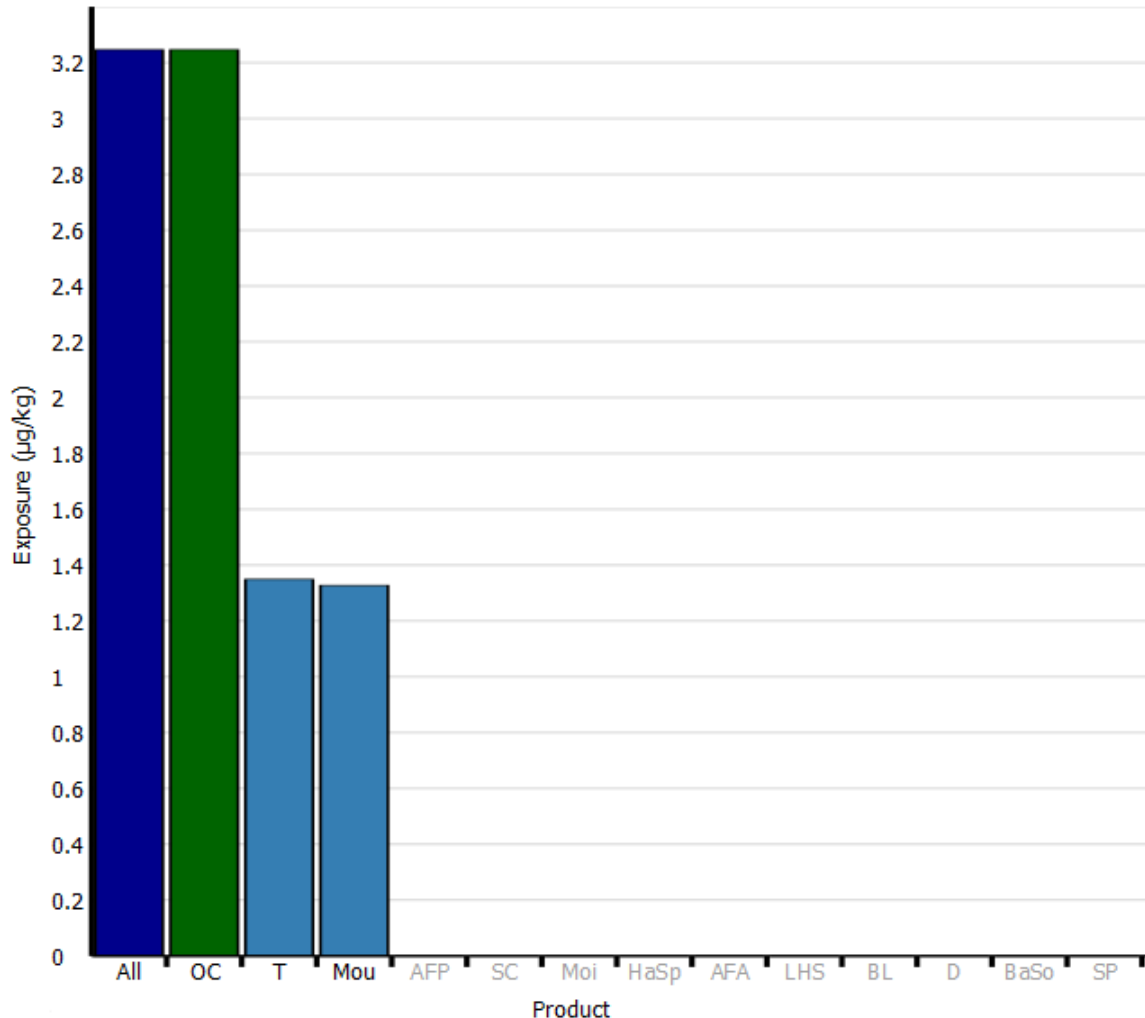
BLM: BodyLotionMass
BLP: BodyLotionPrestige
BLO: BodyLotionOther
DS: DeoSpray
DRO: DeoRollOn
BoSp: BodySpray
T: Toothpaste
Mou: Mouthwash
L: Lipstick
LMF: LiquMakeupFoundation
HaSt: HairStyling
ET: EaudeToilette
EP: EaudeParfum
AS: AfterShave
Sho: Showergel
Sha: Shampoo
RC: RinseoffConditioner
FM: FaceMoisturizer
HC: HandCream

BaSo: BarSoap
LHS: LiquidHandSoap
HaSp: HairSpray
AFA: AirFreshAerosol
AFP: AirFreshPlugin
SC: ScentedCandles
BL: BodyLotion
D: Deodorant
OC: OralCare
CS: CosmeticStyling
H: Hydroalcoholics
SP: ShowerProducts
Moi: Moisturizers
S: Soaps
AC: AirCare
All: All Assessed Products
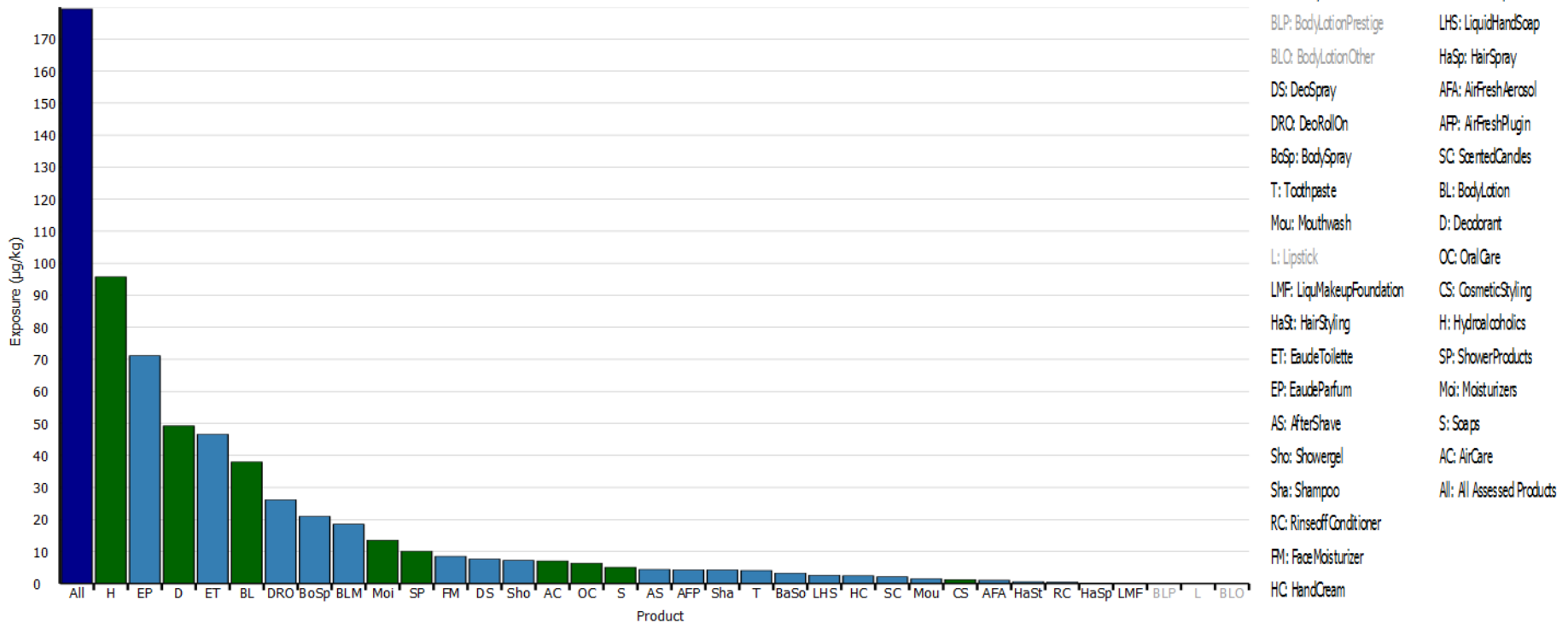
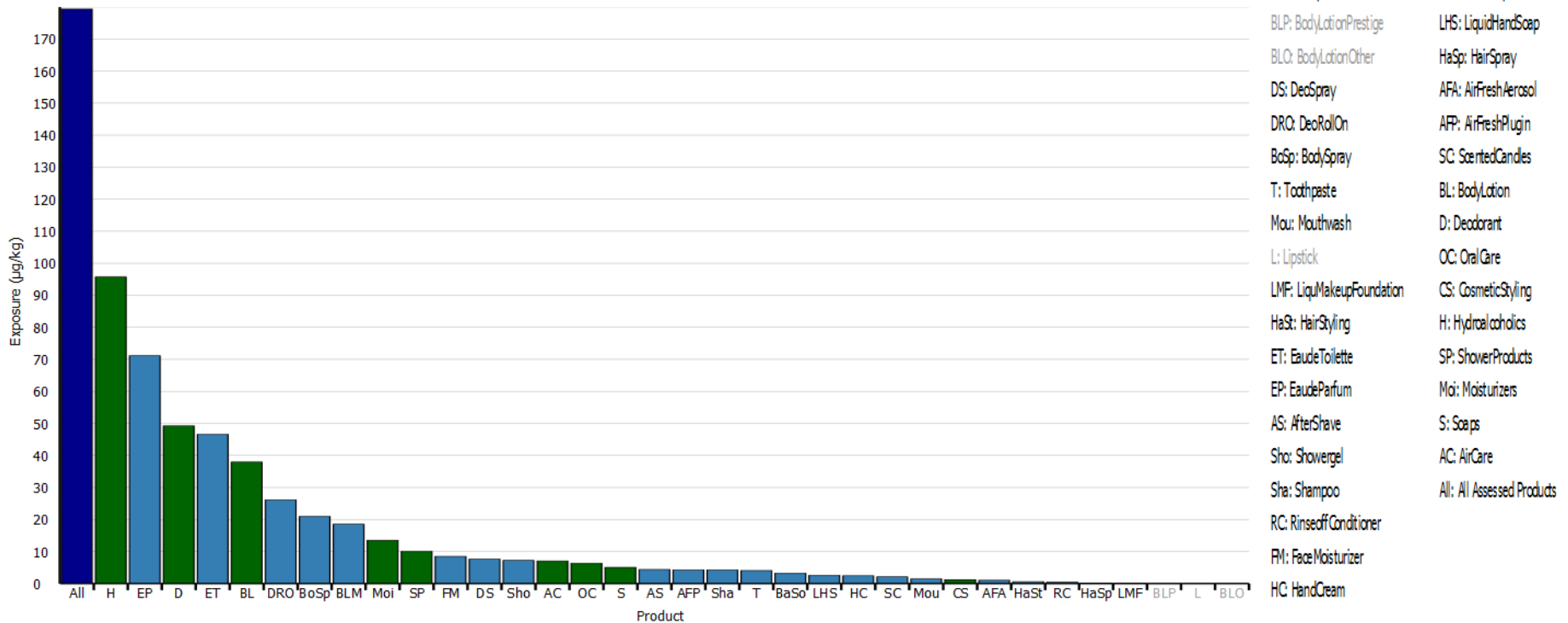# Dermal Exposure per Surface Area (BarSoap) - Limonene

Total Exposure (per unit BW) - Limonene

Total Exposure (per unit BW) - Limonene

138-86-3 [138-86-3] - All Population - P95
Total Body (Systemic, Per Unit Bodyweight)

BLM: BodyLotionMass
BLP: BodyLotionPrestige
BLO: BodyLotionOther
DS: DeoSpray
DRO: DeoRollOn
BoSp: BodySpray
T: Toothpaste
Mou: Mouthwash
L: Lipstick
LMF: LiquMakeupFoundation
HaSt: HairStyling
ET: EaudeToilette
EP: EaudeParfum
AS: AfterShave
Sho: Showergel
Sha: Shampoo
RC: RinseoffConditioner
FM: FaceMoisturizer
HC: HandCream

BaSo: BarSoap
LHS: LiquidHandSoap
HaSp: HairSpray
AFA: AirFreshAerosol
AFP: AirFreshPlugin
SC: ScentedCandles
BL: BodyLotion
D: Deodorant
OC: OralCare
CS: CosmeticStyling
H: Hydroalcoholics
SP: ShowerProducts
Moi: Moisturizers
S: Soaps
AC: AirCare
All: All Assessed Products

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Thank you

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CEO, Creme Global

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